City and County of San Francisco
Department of City Planning

SAN FRANCISCO INTERNATIONAL AIRPORT MASTER PLAN
Final
Environmental Impact Report

86.638E
SCH #90030535

Volume I: Text

Draft EIR Publication Date: July 11, 1991
Draft EIR Public Hearing Dates:
August 27, 1991, 7:30 p.m., Clarion Hotel, Millbrae
August 29, 1991, 1:30 p.m. or later, City Hall, Room 282, San Francisco
October 17, 1991, 1:30 p.m. or later, City Hall, Room 282, San Francisco
Draft EIR Public Comment Period: July 11, 1991 to October 21, 1991
Final EIR Certification Date: May 28, 1992

● CERTIFICATION MOTION

File No.: 86.638E
San Francisco Airport EIR

SAN FRANCISCO

CITY PLANNING COMMISSION

MOTION NO. 13356

ADOPTING FINDINGS RELATED TO THE CERTIFICATION OF A FINAL ENVIRONMENTAL IMPACT REPORT FOR THE PROPOSED SAN FRANCISCO INTERNATIONAL AIRPORT MASTER PLAN.

MOVED, That the San Francisco City Planning Commission (hereinafter "Commission") hereby CERTIFIES the Final Environmental Impact Report identified as case file No. 86.638E, San Francisco International Airport Master Plan (hereinafter "Project") based upon the following findings:

1) The City and County of San Francisco, acting through the Department of City Planning (hereinafter "Department") fulfilled all procedural requirements of the California Environmental Quality Act (Cal. Pub. Res. Code Section 21000 et seq., hereinafter "CEQA"), the State CEQA Guidelines (Cal. Admin. Code Title 14, Section 15000 et. seq., (hereinafter "CEQA Guidelines") and Chapter 31 of the San Francisco Administrative Code (hereinafter "Chapter 31").

a. The Department determined that an EIR was required and provided public notice of that determination by publication in newspapers of general circulation on August 11, 1989.

b. On June 25, 1990, the Department issued a Notice of Preparation, circulated to interested individuals, to communities surrounding the San Francisco International Airport (hereinafter "SFIA") and through the State Clearinghouse.

b. On July 11, 1991, the Department published the Draft Environmental Impact Report (hereinafter "DEIR") and provided public notice in newspapers of general circulation in San Francisco and San Mateo Counties of the availability of the DEIR for public review and comment and of the date and time of the City Planning Commission public hearing on the DEIR; this notice was mailed to the Department's list of persons requesting such notice.

c. Notices of availability of the DEIR and of the date and time of the public hearing were posted near the project site by S.F. Airport staff on or about July 11, 1991.

d. On July 11-13, 1991 copies of the DEIR were mailed or otherwise delivered to a list of persons requesting it, to those noted on the distribution list in the DEIR, to adjacent property owners, and to government agencies, the latter both directly and through the State Clearinghouse. In addition, notices of availability of the DEIR were mailed to other persons and organizations noted on the distribution list in the DEIR.

e. Notice of Completion was filed with the State Secretary of Resources via the State Clearinghouse on July 15, 1991.

2) The Commission delegated to the Environmental Review Officer a noticed public hearing held in Millbrae on August 27, 1991, and held a duly advertised public hearing on said Draft Environmental Impact Report on August 29, 1991, continued to October 17, 1991, at which opportunity for public comment was given, and public comment was received on the DEIR. The period for acceptance of written comments ended October 21, 1991.

3) The Department prepared responses to comments on environmental issues received at the public hearings and in writing during the 102-day public review period for the DEIR, prepared revisions to the text of the DEIR in response to comments received or based on additional information that became available during the public review period, and corrected errors in the DEIR. This material was presented in a "Draft Summary of Comments and Responses," published on May 7, 1992, was distributed to the Commission and to all parties who commented on the DEIR, and was available to others upon request at Department offices.

4) A Final Environmental Impact Report has been prepared by the Department, consisting of the Draft Environmental Impact Report, any consultations and comments received during the review process, any additional information that became available, and the Summary of Comments and Responses all as required by law.

5) Project Environmental Impact Report files have been made available for review by the Commission and the public, and these files are part of the record before the Commission.

6) On May 28, 1992, the Commission reviewed and considered the Final Environmental Impact Report and found that the contents of said report and the procedures through which the Final Environmental Impact Report was prepared, publicized and reviewed comply with the provisions of CEQA, the CEQA Guidelines and Chapter 31.

7) The City Planning Commission hereby does find that the Final Environmental Impact Report concerning File No. 86.638E: San Francisco International Airport Master Plan is adequate, accurate and objective, and that the Summary of Comments and Responses contains no significant revisions to the Draft Environmental Impact Report, and hereby does CERTIFY THE COMPLETION of said Final Environmental Impact Report in compliance with CEQA and the CEQA Guidelines.

8) The Commission, in certifying the completion of said Final Environmental Impact Report, hereby does find that the project described in the Environmental Impact Report, without consideration or inclusion of mitigation measures described in the Final Environmental Impact Report as "Identified In this Report," will have the following significant environmental impacts:

a. Will have a project-specific significant effect on the environment by (1) causing levels of service to degrade to "E" or below at the following intersections: California Drive at Millbrae Avenue (a.m. and p.m. peak hours), Rollins Road at Millbrae Ave. (p.m. peak hour), Long-Term Parking Road and Road R-3 on SFIA property and at Holly Street at Ralston Ave (a.m. and p.m. peak hours); (2) causing levels of service to degrade to "E" or below on certain freeway ramps in the vicinity of SFIA; (3) causing levels of service to degrade to "E" or below on various sections of the freeways in the vicinity of SFIA; (4) causing increased noise levels at sensitive receptors such as schools during construction activities; (5) causing violations of particulate air quality standards due to dust production during construction; (6) contributing to increased frequency of violation of CO standards at certain nearby intersections (violations would occur at these locations without the project but would occur more frequently with the project and without extensive transportation mitigation); (7) causing air pollutant emissions that exceed

BAAQMD thresholds; (8) possibly causing impacts on subsurface cultural resources during construction; (9) causing sediment from dewatering (if any) and from other construction activities to enter storm drains and/or the Bay; and (10) causing soil to be temporarily exposed to erosion during construction; and (11) exposing construction workers, other Airport workers or the public to hazardous wastes if hazards are found in soils or groundwater in and around construction areas.

b. Will contribute to cumulative traffic increases on US 101 in the vicinity that would further reduce levels of service on some segments of the freeway, and will contribute to cumulative air quality impacts in San Mateo County and the Bay Area region.

Note that many of these environmental impacts could be mitigated to levels of insignificance by measures described in the Final EIR. The San Francisco Airports Commission, the decision maker for the Project, will consider whether or not to include these measures in its deliberations on the proposed project.

I hereby certify that the foregoing Motion was ADOPTED by the City Planning Commission at its regular meeting of May 28, 1992.

Linda Avery
Commission Secretary

AYES: Commissioners, Unobskey, Fung, Karasick, Levine, Lowenberg, and Smith

NOES: None

ABSENT: Commissioner Boldridge

ADOPTED: May 28, 1992

BWS:557/rlj

SAN FRANCISCO INTERNATIONAL AIRPORT
● FINAL EIR

TABLE OF CONTENTS BY CHAPTER

SAN FRANCISCO INTERNATIONAL AIRPORT
●FINAL EIR

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

LIST OF TABLES (Continued)

TABLE OF CONTENTS (Continued)

LIST OF TABLES (Continued)

SAN FRANCISCO INTERNATIONAL AIRPORT
●FINAL EIR

TABLE OF CONTENTS (Continued)

LIST OF TABLES

SAN FRANCISCO INTERNATIONAL AIRPORT
●FINAL EIR

TABLE OF CONTENTS (Continued)

LIST OF TABLES (Continued)

TABLE OF CONTENTS (Continued)

LIST OF TABLES (Continued)

TABLE OF CONTENTS (Continued)

LIST OF FIGURES

TABLE OF CONTENTS (Continued)

LIST OF FIGURES (Continued)

I. SUMMARY

A. PROJECT DESCRIPTION

The project evaluated in this Environmental Impact Report (EIR) is the proposed San Francisco International Airport (SFIA) *Final Draft Master Plan* (hereinafter referred to as the SFIA Master Plan), published in November, 1989. The proposed SFIA Master Plan is a two-phase physical/management design plan for airport landside facilities and circulation systems. Near-term SFIA Master Plan projects would be implemented from start-up through 1996. Long-term SFIA Master Plan projects would be implemented from 1997 through 2006.

SFIA is on the west shore of San Francisco Bay, about 13 miles south of San Francisco in unincorporated San Mateo County. SFIA is an agency of the City and County of San Francisco, and the Airport property is part of San Francisco's jurisdiction. The SFIA Master Plan Area (Project Area) comprises the 2,500-acre Airport complex, including runways, passenger terminals, support services, airline maintenance, air-freight facilities and over 550 acres of undeveloped land. Freeway access to SFIA is available via U.S. Highway 101 (US 101), U.S. Interstate Highway I-280 (I-280) and U.S. Interstate Highway I-380 (I-380).

Existing and proposed SFIA facilities, as categorized in the SFIA Master Plan, include terminals, airline support, airline maintenance, General Aviation, air freight, airport support, commercial, administration/office, transportation, miscellaneous, parking, roads, and airside (runways and taxiways).

Existing SFIA building space, excluding parking garages and utilities in buildings, totals about 8.2 million square feet. The 2.6-million-square-foot terminal complex includes six boarding piers and 80 jet aircraft gates, 48 of which can accommodate wide-body jets. Airline support functions (primarily catering, storage and warehousing) occupy about 81,800 square feet of building space; airline-maintenance facilities total approximately 3.9 million square feet; and air-freight functions occupy about 867,700 square feet of building space. General aviation functions total about 88,100 square feet; airport support functions, about 172,800 square feet; commercial facilities, about 234,000 square feet; and administration/office functions, about

126,100 square feet. The U.S. Coast Guard Air Station occupies approximately 88,400 square feet of building space.

Airport utility systems include aircraft fueling; airfield lighting; power distribution; natural gas and water supply; industrial waste collection and disposal; and storm drainage. Existing auto parking facilities at SFIA, including employee, rental car and short- and long-term public parking, total about 30,050 stalls. Roadways on SFIA property total about 18 miles.

According to SFIA Master Plan forecast and facility requirements analyses, demand for SFIA services (passenger, cargo and aircraft operations) would be constrained by inadequate landside facilities if SFIA Master Plan projects were not implemented. If not constrained, the number of annual passengers would, according to SFIA Master Plan forecasts, grow about 41 percent by 1996 and about 71 percent by 2006. International passenger traffic would grow more rapidly than domestic traffic, nearly doubling between 1990 and 2006. The SFIA Master Plan forecasts that, if not constrained, total cargo and mail tonnage would increase about 32 percent by 1996 and about 55 percent by 2006. To accommodate passenger and cargo demand, air carrier operations would also be expected to increase, by 24 percent under the near-term SFIA Master Plan and 36 percent under the total SFIA Master Plan. Larger capacity aircraft and higher load factors (proportion of available seats occupied) are among the factors expected to produce higher rates of growth in passenger counts than aircraft operations.

Proposed SFIA Master Plan projects were developed by the consulting firm of Daniel, Mann, Johnson, & Mendenhall (DMJM), using the forecast and requirements analyses prepared by Thompson Consultants International (TCI), under contract to the Airports Commission. Principal projects include: construction of a new international terminal and additional boarding areas and aircraft gates; construction of a Rental Car Garage / Ground Transportation Center and Automated People Mover (APM); consolidation and expansion of air cargo facilities; consolidation of airport administrative facilities; consolidation and expansion of airline support, maintenance and administrative facilities; modification and expansion of ground-vehicle parking and circulation systems; and development of additional hotel, commercial and airport support facilities. Airside facility (runway) changes are not included in the SFIA Master Plan except where necessary to accommodate other SFIA Master Plan projects. No runway extensions, relocations or additions are proposed as part of this project.

Total SFIA building area, excluding parking garages and utility structures, would increase by 31 percent under the near-term SFIA Master Plan (1990-1996) and by 35 percent under the total SFIA Master Plan (1990-2006). Approximately 1.4 million square feet of building space would be demolished and about 4.2 million square feet would be constructed by 2006, bringing total SFIA building area to approximately 11.1 million square feet. The greatest net growth would occur in the terminal complex (about 1.5 million net new square feet) and air freight facilities (about 785,000 net new square feet). Between 22 and 26 aircraft gates would be added to the terminal complex (Boarding Areas A and G) by 1996, and several more gates would be added to the reconfigured Boarding Area B between 1997 and 2006. Over 780,000 square feet of existing SFIA facility area would be remodeled by 2006. About 3.6 million square feet of parking garages and transportation facilities would be constructed and about 7,340 net new parking stalls would be added by 2006 under the SFIA Master Plan.

B. MAIN ENVIRONMENTAL EFFECTS

LAND USE AND PLANS

The SFIA Master Plan would not alter land use types at the airport, but would intensify, reconfigure and/or consolidate existing uses. Runway expansions and reconfigurations are not included in the SFIA Master Plan; therefore, no runway land use impacts would result directly from near-term or long-term SFIA Master Plan projects. Several vacant parcels would be developed in airport uses, but the 180-acre West-of-Bayshore site, an identified habitat of the San Francisco garter snake, an endangered species, and the red-legged frog, a candidate for the endangered species list, would not be affected by the SFIA Master Plan. Total land area under the airport's jurisdiction would not increase, nor would additional land area be created by filling of tidelands owned by SFIA.

The cities closest to the airport and partially within the 65 dBA, CNEL contour (see definition in Section III.B, Noise) (i.e., Brisbane, South San Francisco, San Bruno, Millbrae and Burlingame) are affected by airport-related safety and noise regulations. However, since aircraft approach zones and flight paths would not be altered by the SFIA Master Plan, Airport Land Use Commission and Federal Aviation Administration (FAA) building-height and clear-zone regulations currently affecting parts of these cities would not change as a result of SFIA Master Plan implementation.

The SFIA Master Plan calls for the extension of North Access Road and alteration or construction of a multiuse dock facility. Both projects would require San Francisco Bay Conservation and Development Commission (BCDC) approval.

There are a number of plans by various local, regional, and state agencies that address the provision of facilities to accommodate regional air transportation demand. Most of those plans were developed on the basis of forecasts of regional transportation demand, assessments of the capabilities of facilities in the Bay Area (airports and the facilities for other modes of transportation) to accommodate the forecast demand, and various recommended means of meeting demand (such as facility expansion). Those plans do not include the same recommended means for meeting forecast demand. The *California Aviation System Plan* (*CASP*), forecasts expansion at SFIA to about 52,770,000 passengers in 2006 (three percent over the SFIA Master Plan). The Federal Aviation Administration (FAA) forecasts indicate that SFIA expansion would be less than predicted in the SFIA Master Plan.

TRANSPORTATION

This section takes into consideration all future ground travel related to the projected airside and landside operations at SFIA, with special emphasis on the off-site transportation impacts of those operations. The EIR analysis, which makes use of surveyed traffic, pedestrian, parking and transit data collected in the SFIA vicinity, considers the projected increases in air passengers, freight tonnage and SFIA employment.

The EIR analysis indicates the following impacts of the proposed SFIA expansion:

Vehicular traffic would increase from approximately 110,700 daily, 5,100 a.m. peak hour and 5,530 p.m.-peak-hour trips in 1990 to 151,000 daily, 6,950 a.m.-peak-hour and 7,550 p.m.-peak-hour trips in 1996; and 179,700 daily, 8,270 a.m.-peak-hour and 8,990 p.m.-peak-hour trips in 2006. If the Bay Area Rapid Transit (BART) system (or other transit service) is extended to SFIA by 2006, future vehicular traffic would not increase as much. With a mass transit extension to SFIA, it is projected that SFIA would generate 168,500 daily, 7,750 a.m.-peak-hour and 8,430 p.m.-peak-hour vehicle trips in 2006.

Peak-day parking demand would increase from about 23,800 spaces in 1990 to about 35,200 spaces in 1996 and about 42,200 spaces in 2006. There would be a surplus of spaces in 1996. A peak-day deficit of about 4,400 spaces would exist in 2006.

Given the improvements programmed by Caltrans, area local governments and the Airports Commission, the project proposed for 1996 would cause El Camino Real (SR 82) at Millbrae Avenue and Rollins Road at Millbrae Avenue to worsen below level of service (LOS) E during the a.m. peak hour. The project alone would not cause p.m.-peak-hour conditions to worsen below LOS D. Four intersections (either in the a.m. or p.m.) would operate below LOS D in 1996 even without the project. LOS at these intersections would not worsen as a result of the project.

The project proposed for 2006 would cause no study intersections to worsen further during the a.m. peak hour, except for South Airport Boulevard at North Access Road South, which would degrade from LOS A to LOS B; and California Drive at Millbrae Avenue, for which minor street turns into the major street would degrade from LOS D to LOS E. In the p.m. peak hour, the Rollins Road at Millbrae Avenue intersection would worsen below LOS D; the intersections of South Airport Boulevard with North Access Road South and North would degrade from LOS A to LOS C and B, respectively; San Mateo Avenue at San Bruno Avenue would degrade from LOS B to C; at California Drive and Millbrae Avenue, minor street turns into the major street would degrade from LOS D to LOS E; and at Long-Term Parking and Road R-3, minor street turns into the major street would degrade from LOS C to LOS E. Three intersections (either in the a.m. or p.m.) will operate below LOS D in 2006 even without the project. LOS at these intersections would not worsen as a result of the project.

The proposed project would cause further deterioration of levels of service on the surrounding freeway network, and decreases in levels of service on the arterial street network in surrounding communities.

The proposed project would affect existing transit and shuttle services to SFIA such that both systems would require expansion to serve the increased demand.

NOISE

Construction activities would temporarily increase noise levels in the vicinity of construction sites. Nearby noise-sensitive areas include residential land uses, schools and hospitals. During project construction, exterior noise levels at all these noise sensitive areas would exceed San Francisco Noise Ordinance standards.

In 1996, surface traffic due to the project would increase noise levels on local roads by a maximum of one decibel over 1996 baseline conditions. In 2006, surface traffic would increase noise levels by a maximum of one decibel over 2006 baseline conditions.

Noise levels from aircraft operations at SFIA are forecast to decrease from 1990 through 2006. Noise levels and single-event noise at almost all remote monitoring sites and study locations are forecast to decrease. These improvements in the future noise environment would occur despite increases in aircraft activity at SFIA forecast for the project, because of the increased use of newer, quieter aircraft.

Noise levels would also decrease in the future without the proposed project. The increase in aviation activity allowed by the project would have virtually no effect on overall noise levels because the additional flights would be performed by the quieter aircraft. The increase would contribute to single-event noise in a noticeable way although each noise event would be somewhat quieter than at present.

Even with the forecast decreases in aircraft noise levels, there would still be people within the 65dBA, CNEL contour in 1996 and 2006, who would continue to be adversely affected by the operation of the Airport. The number of people exposed to aircraft noise of 65 dBA, CNEL and above is forecast to decrease from 14,980 in 1990 to 6,600 in 2006.

AIR QUALITY

Project construction would temporarily affect local air quality in the project area through dust emissions generated by vehicle movement, building demolition, and other construction-related activities. Land clearing, excavation, and grading activities would generate particulate matter in the form of fugitive dust during the construction period.

Project-related surface traffic would add to cumulative regional pollutant emissions. Existing roadside CO concentrations at many intersections examined already violate State CO standards. Project-related surface traffic would further contribute to these violations, but would not cause any new violations at intersections examined. However, project-generated vehicular traffic would probably lead to an increase in the frequency of standards violations in the project area over future CO levels without the project. Project-related traffic would contribute more than one percent of transportation-related emissions resulting from development in the County, based on the BAAQMD Emissions Summary Report.

Emissions from aircraft and total Airport operations would increase in the future. In 1996, total SFIA emissions of CO, nitrogen oxides, hydrocarbons and fine particulate matter would make up 3.8, 4.7, 3.8 and 1.2 percent, respectively, of the countywide emissions. In 2006, these total SFIA emissions of CO, nitrogen oxides, hydrocarbons and fine particulate matter would increase to 11.7, 9.8, 11.6 and 4.4 percent, respectively, of the countywide emissions.

ENERGY

Electricity

SFIA has recently requested an additional 15 MW in peak power capacity by 1994 and another additional 10 MW by 2006. This increased demand would necessitate expansion of an existing PG&E substation.

Gas

The existing natural gas distribution system was found to be adequate. Consumption of natural gas at SFIA is not expected to increase, so additional enlargement of the natural gas distribution system would not be required and was not included as part of the SFIA Master Plan.

Aviation Fuel Supply

On a proportional basis, aviation fuel consumption at SFIA would increase from 50,000 to about 66,000 barrels a day in the near-term and to about 71,000 barrels a day in the long-term. SFIA's existing fuel distribution system would be capable of handling the increase in demand, though modifications and improvements could be necessary to enhance system efficiency.

CULTURAL RESOURCES

SFIA Master Plan construction and demolition projects would have no discernible effect on known prehistoric resources and would have little potential to affect historic resources. It is possible, but unlikely, that unsuspected archaeological deposits could be discovered by excavations associated with SFIA Master Plan projects that would extend beneath the artificial fill that covers the site. The thickness of the artificial fill at SFIA varies widely across the site, and on average ranges from about 8 to 16 feet. No roadways, mission outposts or adobe structures from the Spanish or Mexican periods are known to have existed on, or immediately adjacent to, the project area. However, the Jose Sanchez family did construct a levee and wharf southeast of present day Millbrae Avenue, just outside the southern land boundary of Airport property. During the early American period, shrimp and oyster industry activities and cement factory operations took place in the vicinity of the project site. At present, evidence exists of shrimp camp sites, oyster industry structures or cement company dredging equipment near or within the project area. These cultural resources would not be impacted by project implementation.

Pre-1946 airport structures that would be affected by SFIA Master Plan projects are representative of common building types found throughout the state and County. These buildings lack architectural distinction, are not the work of a master architect and are not associated with important people or significant historical events. The remaining SFIA buildings are post-1946 structures, most of which were constructed over the past three decades and appear to have no historical importance.

GEOLOGY AND SEISMICITY

Development at SFIA would be subject to ground settlement that could affect the structural integrity of buildings and utility lines. Construction activities would present hazards from potential underground pipe ruptures.

Development at SFIA would be subject to strong ground shaking during future moderate to large earthquakes in the San Francisco Bay Area. Portions of the site may be subject to ground failure during strong ground shaking. Development at SFIA would generally replace older structures that are in poor condition with modern, more seismically resistant structures. This should reduce the likelihood of structural damage due to strong ground shaking in future earthquakes. However, SFIA Master Plan projects would increase the number of employees, passengers and visitors at the airport who could be at risk of injury due to non-structural hazards in future earthquakes.

The proposed use of deep pile foundations would reduce or eliminate the impacts of settlement and seismically induced ground failure on buildings.

HAZARDS

Implementation of the SFIA Master Plan would affect hazardous-material handling during construction of new facilities and overall airport operations. The SFIA Master Plan proposes construction of new facilities and demolition of existing facilities in areas of known contamination. Construction activities could uncover hazardous materials in the soil or groundwater. Most of the known contamination at SFIA is the result of past petroleum fuel leaks. Some buildings planned for demolition are known to contain asbestos and may have PCB-containing equipment. Potential impacts pertaining to the health and safety of workers and the public that may result could be mitigated by site investigation and remediation of contaminated areas prior to excavation, dewatering or construction activities. In addition, buildings would be inspected for hazardous materials before demolition or renovation begins. PCBs, asbestos or other hazardous materials must be removed prior to demolition in accordance with applicable regulations.

Expansion of the Airport to accommodate increased Airport activity may result in an increase in hazardous material use and hazardous waste production. Hazardous-material use at line-maintenance and Airport-owned facilities is limited and any increase would have minimal effect if safe handling practices are continued. As no expansion is planned for the only "major" maintenance facility at SFIA, the United Airlines Maintenance Center, increases in hazardous-material use at this facility would not be expected. The industrial waste treatment facility at SFIA has the capacity to treat increased wastewater flow and higher contaminant concentrations than would result from SFIA Master Plan implementation. Increases in hazardous wastes produced may be lessened by recycling and treatment efforts, but may inevitably contribute to the shortage of landfill space for these wastes.

EMPLOYMENT AND HOUSING

Employment at SFIA under the proposed master plan is expected to increase from about 33,400 employees in 1990 to about 38,000 in 1996 and to about 42,300 employees in 2006. The majority of the new employees would be flight-crew and passenger-service personnel employed by the airlines.

Construction-related employment is expected to average 1,400 jobs between 1990 and 1996, peaking at about 2,400 jobs in 1993. Between 1997 and 2006, annual construction-related employment would fall to an average of about 200 jobs.

Employment growth associated with the near-term SFIA Master Plan (1990-1996) would generate demand for approximately 3,460 dwelling units. About 1,220 of these units would be needed in San Mateo County, about 960 in San Francisco and about 420 in Alameda County. Total SFIA Master Plan employment growth would generate demand for approximately 6,850 dwelling units by 2006. About 2,450 of these units would be needed in San Mateo County. About 1,940 units in San Francisco and about 810 in Alameda County would be needed.

UTILITIES

Water

The SFIA Master Plan would generate an additional near-term demand of about 0.42 million gallons per day (mgd) of water and an additional long-term demand of about 0.27 mgd over the near-term increases. The San Francisco Water Department projects a long-term demand of about 0.2 mgd less than the SFIA Master Plan and suggests that water conservation methods be adopted. Additional water infrastructure would not be required to service the site.

Sanitary Sewage

On the basis of 100 percent water demand, the existing SFIA sanitary sewer plant (present capacity 2.2 mgd) could accommodate the near-term demand increase of 25 percent. To meet the long-term demand of 2.4 mgd, SFIA sanitary sewer capacity would need to be increased. SFIA plans to add 0.8 mgd of capacity, which would raise the capacity of the plant to 3.0 mgd. The sanitary sewer system would then be able to meet the 2.4 mgd demand projected by the SFIA Master Plan for 2006.

Industrial Wastes

Currently, the SFIA industrial wastewater treatment plant has a capacity of 1.65 mgd and operates between 0.8 and 1.2 mgd. Proposed SFIA Master Plan projects are not expected to contribute more than five percent additional demand to the industrial-waste-collection system. The plant would not require additional capacity to accommodate SFIA Master Plan projects.

Solid Waste

San Mateo County annually generates one million tons of solid waste. SFIA's major activity centers contribute approximately 18,250 to 36,500 tons of the one million tons annual total for the County. The expansion area of the existing Ox Mountain landfill would be the likely disposal site for the solid waste generated at the Airport during the SFIA Master Plan period. However, increases in solid-waste generation would still further diminish the finite resource of landfill space.

PUBLIC SERVICES

Crash/Fire/Rescue

Projected growth in terminal passenger traffic could generate additional requests for SFIA Fire Department Services and could result in increased response times. Proposed SFIA Master Plan demolition and construction projects and increased traffic congestion in the passenger terminal area could hinder the SFIA Fire Department's ability to respond to a major emergency event.

Police

Projected growth in terminal passenger traffic could generate additional request for SFIA police services. Unless staffing levels were raised proportionately, SFIA police response times could increase as a result of SFIA Master Plan projects.

AVIATION SAFETY

Increasing operations at SFIA have the potential to approach and possibly exceed the capacity of the Airport. SFIA Master Plan projections would cause the hourly capacity of SFIA to be exceeded for certain hours of the day in both the near-term and long-term.

FAA regulations and the Air Traffic Control System limit the level of activity that can occur safely in the airspace of any airport. Therefore, if operations exceed the capacity of the Airport for a number of hours during the day, flights would be delayed.

The existing accident rate for SFIA in 1990 would be 0.83 accidents per year based on the National Transportation Safety Board accident rate average. The Airport is actually operating at an accident rate below this level; in 20 years of operation, five aircraft accidents have taken place at SFIA.

Implementation of the near-term SFIA Master Plan would increase the estimated accident rate to 0.97 per year using the National Transportation Safety Board accident rate average. In the long term, the estimated accident rate would increase to 1.0, using the same standard. Based on SFIA's existing record, the accident rate would be expected to be lower than this, but would still increase.

GROWTH-INDUCING IMPACTS

Increases in passenger volumes could induce pressure for hotel, restaurant and other travel-serving development, while increases in SFIA employment could stimulate demand for additional housing and public services in Airport environs cities. Ground transportation and parking needs of both employees and passengers could also induce growth of roadway, parking and transit land uses in Airport environs cities. However, while existing land uses could intensify, Airport-induced development would not likely divide or disrupt established communities, nor would new types of land uses likely be generated. Except in cities closest to the Airport (South San Francisco, San Bruno, Millbrae and Burlingame), development types induced by SFIA would not likely be distinguishable from background development although intensity and/or density could increase.

C. <u>MITIGATION MEASURES</u>

TRANSPORTATION

The major mitigation measures that are part of the SFIA Master Plan include:

- Building a new Ground Transportation Center, served by a people mover that distributes air passengers and employees to the terminal buildings;

- Adding parking in both lots and structures; and
- Widening two SFIA roads to four lanes in the immediate vicinity of SFIA.

Additional measures that are identified to address project and cumulative impacts include:

- Establishing a Transportation System Management (TSM) Program for SFIA, focused on reducing trips made to SFIA by single-occupant vehicles;
- Adding park-and-ride lots on US 101;
- Creating High-Occupancy Vehicle (HOV) lanes out of existing traffic lanes on US 101 from San Jose to San Francisco;
- Widening US 101 to eight lanes south of San Carlos;
- Requiring SFIA to provide a share of SamTrans, CalTrain and BART operating costs;
- Requiring an exclusive right-of-way rail or bus facility that connects SFIA to BART's planned station west of US 101;
- Modifying freeway ramps to serve the Ground Transportation Center , and providing direct ramp connections to the recommended HOV lanes so that buses, shuttles and carpool vehicles can move efficiently in and out of the Ground Transportation Center and terminal area;
- Installing variable message signs internal to the Ground Transportation Center and Short-Term Garage;
- Requiring right-of-way reservations for future high-speed rail;
- Providing bicycle travel lanes; and
- Generally enhancing transit services to and from SFIA.

NOISE

Major measures that are identified in this EIR to mitigate aircraft noise impacts include:

- Select the earliest practicable date by which the Airport is to achieve 100 percent Stage 3 operations, and amend the SFIA Noise Abatement Regulation to reflect the phase-out date (such an amendment is currently under consideration by the Airports Commission).

- Encourage the airlines to use larger long-range, two-engine aircraft as an alternative to four-engine aircraft. The use of the aircraft would allow more long-range flights to depart on Runways 1L and 1R over the Bay, and would reduce noise levels in areas under departure paths from Runway 28R.

- Together with the FAA, review and, if possible, revise the Quiet Bridge Approach to Runways 28L and 28R. Increasing the distance between approaching planes and Foster City could reduce noise levels there.

- Together with the FAA, study and, if possible, revise and expand the use of the "quiet departure" for aircraft departing on Runways 1L and 1R.

- Accelerate development of the Passive Aircraft Detection Instrument System so that it could be used to analyze flight tracks and to help develop and implement noise abatement measures.

- In conjunction with the FAA, California Department of Transportation, local agencies, Bay Area airports staffs, public interest groups, and area residents, conduct a regional study that would involve identifying the flight patterns and routes region-wide that are most environmentally desirable, determining how to establish and coordinate use of the routes while maintaining aircraft safety. SFIA could work with area airports, the FAA, and pilots to implement any changes to flight patterns or procedures.

- Continue studying the feasibility of and benefits from a new runway or extension(s) to the existing runway(s). These airfield improvements could provide a runway(s) able to handle departures by long-range, heavy aircraft such as the B-747, with flight paths over the Bay instead of the Peninsula. This measure could require bay fill and could have impacts on the aquatic environment.

- In coordination with the FAA and airlines serving SFIA, develop a "quiet climb" program to reduce the single-event noise of Stage 2 aircraft in areas near SFIA.

- Develop and implement a "quiet climb" program to reduce maximum single event noise of Stage 2 aircraft by delaying the application of climb power after cutback until reaching 5000 feet above ground level (or an altitude to be determined) or clear of populated areas.

Major measures that are identified in this EIR to mitigate construction noise impacts include:

- The construction contract would require that the project contractor muffle and shield intakes and exhausts, shroud or shield impact tools, and use electric-powered rather than diesel-powered construction equipment, as feasible.

- The project sponsor would require the general contractor to construct barriers around the site, and around stationary equipment such as compressors, which would reduce construction noise by as much as five dBA, and to locate stationary equipment in pit areas or excavated areas, as these areas would serve as noise barriers.

AIR QUALITY

The major measures identified in the EIR to mitigate air emissions include:

- The project sponsor would require the contractor to sprinkle demolition sites with water continuously during demolition activity; sprinkle unpaved construction areas with water at least twice per day; cover stockpiles of soil, sand, and other material; cover trucks hauling debris, soils, sand or other such material; and sweep streets surrounding demolition and construction sites at least once per day to reduce particulate emissions. The project sponsor would require the project contractor to maintain and operate construction equipment so as to minimize exhaust emissions of particulates and other pollutants, by such means as a prohibition on idling of motors when equipment is not in use or when trucks are waiting in queues, and implementation of specific maintenance programs to reduce emissions for equipment that would be in frequent use for much of the construction period.

- Mitigation measures designed to reduce aircraft emissions would be centered on reducing the time each aircraft spends in the taxi/idle phase. SFIA would require of each airline that aircraft engines not be started until the aircraft is ready to pull away from the gate. Long queues of idling planes on taxiways would not be permitted. When no gate is immediately available to unload newly arrived aircraft, aircraft engines would be turned off and aircraft would be towed when a gate becomes available.

SEISMICITY

The major measure identified in the EIR to mitigate seismicity is:

- Facilities earthquake safety inspections would continue and would be expanded to include all new facilities. Periodic training concerning earthquake preparedness and seismic hazards reduction would be conducted at all new facilities.

D. ALTERNATIVES

Three categories of alternatives to the proposed project are examined in this EIR: the No-Project Alternative (includes two variants), Onsite Alternative, and Offsite Alternative.

ALTERNATIVE A: NO PROJECT

The No-Project Alternative assumes no future development of SFIA landside facilities to meet forecast passenger, cargo and flight operation demand. Under both No-Project Alternative variants, only new facilities included in the September 1989

SFIA Five-Year Capital Projects Plan would be constructed at SFIA during the SFIA Master Plan period (1990 - 2006). Alternative A, Variant 1 reflects the SFIA Master Plan assumption that terminal facilities, and specifically boarding gates, represent the primary capacity constraint at SFIA. Alternative A, Variant 2 reflects the assumption of other agencies -- including Caltrans, Metropolitan Transportation Commission (MTC), and the FAA -- that airfield facilities, airspace and/or ground traffic congestion represent the primary capacity constraints at SFIA. Both variants are based on the existing SFIA facility inventory and the approved SFIA Five-Year Capital Projects Plan.

Two categories of environmental impacts could result from the No-Project Alternative: a) impacts associated with growth in aviation activity at SFIA, and b) impacts associated with unserved demand for expanded aviation services and facilities at SFIA. The second category of impacts is addressed under Offsite Alternatives. Impacts of demolition and construction associated with SFIA Master Plan projects would be avoided under both variants of the No-Project Alternative. Impacts of Variant 1 would generally be less than impacts of the project. Impacts of Variant 2 would be less than those of either the project or Variant 1.

ALTERNATIVE B: ONSITE

The Onsite Alternative (reduced-intensity SFIA landside development), which is similar to the "Preferred Concept Plan" in SFIA *Master Plan Working Paper B*, (except that no parking would be provided west of Bayshore) would not include a new international terminal and, overall, would require less demolition and construction than would the project. Operationally, however, impacts of the Onsite Alternative are based on the same passenger, cargo and aircraft operations forecasts as the SFIA Master Plan. Thus, impacts from this Alternative would be essentially the same as impacts of the project.

A second Onsite Alternative, incorporating proposed SFIA runway expansions, is not included in this EIR. A preliminary feasibility study for the expansion of SFIA runways, completed in June 1990, includes proposed new runway locations that could conflict with existing uses and proposed Master Plan projects in the East Field area.

Any future proposed runway expansions would require separate environmental review under the California Environmental Quality Act and the National Environmental Policy Act, and separate approval by the FAA, BCDC, and other agencies not involved in the SFIA Master Plan approval process.

ALTERNATIVE C: OFFSITE

Under the Offsite Alternatives, potential demand for aviation activity at SFIA not served under the No-Project Alternatives would be redistributed to other airports and transportation modes (intercity rail). Redistribution of aviation demand from SFIA to other airports is recommended by MTC, Caltrans Division of Aeronautics, FAA, and the other Bay Area air carrier airports (Metropolitan Oakland International and San Jose International). These agencies differ from SFIA and from one another in their forecasts of future passenger, cargo and aircraft operations, estimates of available and future airport capacities, and recommended actions to best accommodate forecast demand. This Alternative summarizes FAA and Caltrans assumptions and recommendations for redistribution of future aviation demand in the Bay Area.

Like SFIA, other Bay Area airports would have specific constraints and potential environmental impacts associated with either landside or airside expansion. The offsite expansions summarized and referenced in this EIR would not be caused exclusively by redistribution of demand from SFIA. Potential environmental impacts of action plan recommendations, many of which would require FAA and BCDC approval, airline policy decisions, and/or separate environmental review under NEPA, are associated with the regional aviation system as a whole and are therefore addressed only qualitatively in this EIR. For areas in the vicinity of SFIA, impacts from these Alternatives would be essentially the same as for the two variants of the No-Project Alternative. Impacts would occur in other geographic locations such as in Oakland and/or San Jose with this Alternative; environmental impacts would worsen in these other geographic locations.

II. PROJECT DESCRIPTION

A. OBJECTIVES OF THE PROJECT SPONSOR

The project evaluated in this Environmental Impact Report (EIR) is the proposed San Francisco International Airport (SFIA) *Final Draft Master Plan* (hereinafter referred to as the SFIA Master Plan), published in November, 1989. The SFIA Master Plan is a set of demand and facility requirements forecasts, proposed projects, and supporting information that is intended to serve as a framework for expanding, consolidating, remodeling and implementing other changes in SFIA landside (non-airfield) facilities over the 20-year planning period (1986 through 2006). For clarity, this EIR uses 1990 as base year.

SFIA is owned by the City and County of San Francisco and operated by a five-member Airports Commission appointed by the Mayor and a Director of Airports appointed by the Airports Commission. The Airports Commission is the SFIA Master Plan author and Project Sponsor. Unlike most other City departments, SFIA is self-contained in terms of planning, construction, maintenance and monitoring of its facilities. The Airports Commission establishes and enforces SFIA building codes./1/

Principal Airports Commission objectives for the SFIA Master Plan, as stated in the SFIA Master Plan Executive Summary, are:

1. To provide a coordinated development plan that will consolidate and relocate many of the existing landside facilities in order to increase the efficiency and cost effectiveness of landside operations; and

2. To respond to the projected economic growth of the Bay Area and ensure that the future development required to meet that demand at the airport is implemented in a manner compatible with the plan./2/

Served by over 50 airlines, SFIA is the principal air passenger and air cargo facility in the San Francisco Bay Area and, as of 1989, the seventh-busiest U.S. airport in terms of total passengers and total cargo tonnage. In 1989, SFIA handled about 30 million passengers (counted as enplanements and deplanements, including transfers but excluding through passengers); about 560,000 metric tons of cargo (total loaded and unloaded, including mail); and about 430,000 aircraft operations (total landings and takeoffs)./3/ Commercial jet carriers accounted for approximately 70 percent of SFIA aircraft operations and the remainder was shared by non-jet carriers (commuter and air taxi), General Aviation (private planes) and military aircraft (U.S. Coast Guard helicopters)./4,5/

Design capacity of the SFIA terminal complex is 31 million annual passengers./4/ In 1986, the SFIA Master Plan base year, SFIA accommodated approximately 27.8 million passengers and in 1989, the SFIA terminal complex operated at 29.9 million annual passengers, near its design capacity. Passenger estimates for 1990, the base year, are essentially the same as those for 1989. According to SFIA Master Plan aviation activity forecasts, SFIA passenger counts could reach about 42.3 million annual passengers by 1996 and about 51.3 million annual passengers by 2006, a potential 84 percent increase for the 20-year planning period (1986-2006) and a potential 71 percent increase from 1990./6/

To respond to this projected demand and to increase operational efficiency, the Airports Commission has proposed the following principal SFIA Master Plan projects:

- Construction of a new international terminal, additional boarding areas and aircraft gates;
- Construction of a Rental Car Garage / Ground Transportation Center and Automated People Mover (APM);
- Consolidation and expansion of air cargo facilities;
- Consolidation of airport administrative facilities;
- Consolidation and expansion of airline support, maintenance and administrative facilities;
- Modification and expansion of ground-vehicle parking and circulation systems; and
- Development of additional hotel, commercial and airport support facilities.

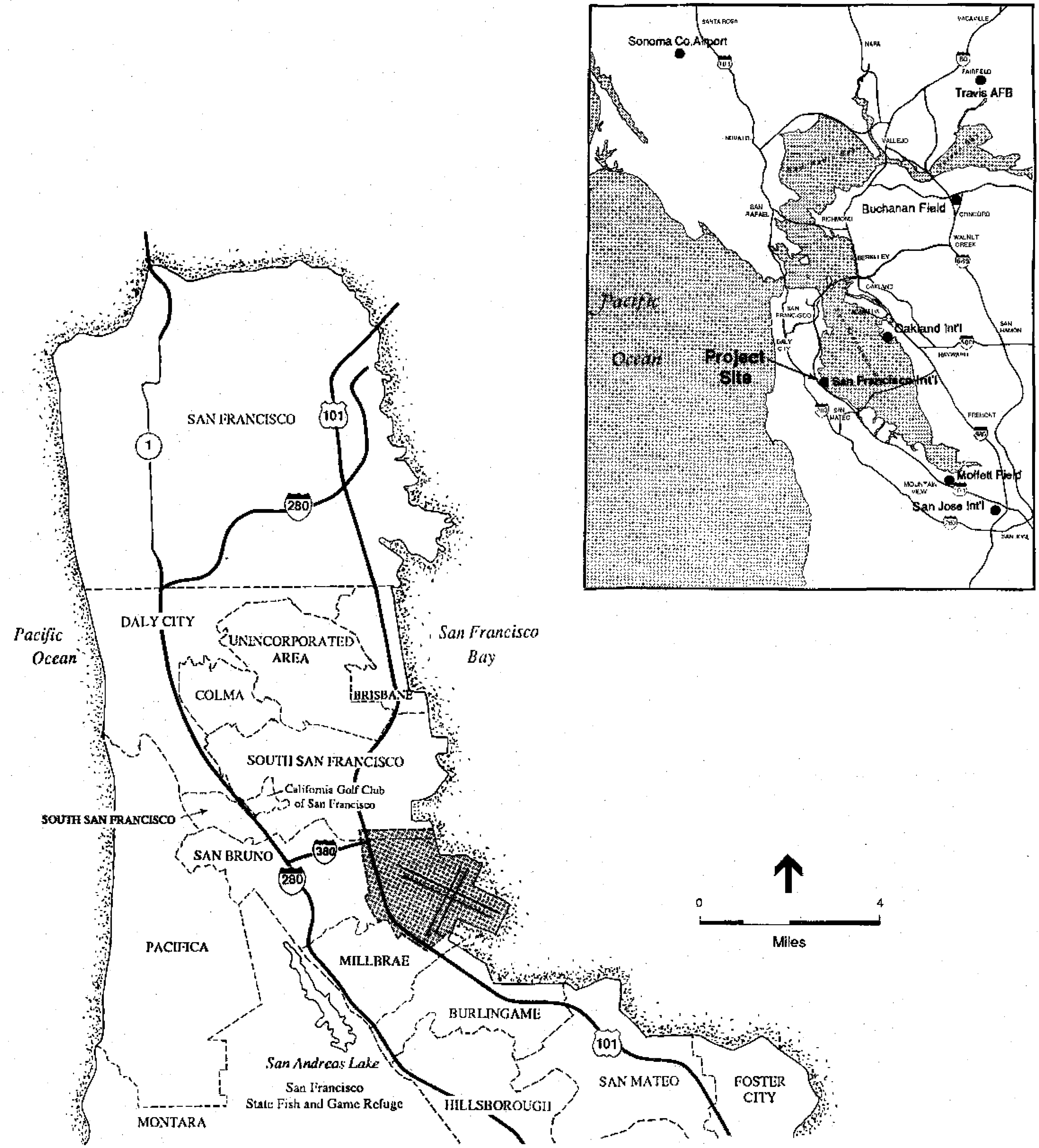
B. PROJECT LOCATION

SFIA encompasses approximately 5,200 acres in unincorporated San Mateo County, about 2,700 of which are land and about 2,500 of which are tideland./4/ SFIA is approximately 13 freeway-miles south of downtown San Francisco, 23 freeway-miles southwest of downtown Oakland and 36 freeway-miles northwest of downtown San Jose. The SFIA Master Plan Area (Project Area) includes about 2,500 acres of SFIA land, bounded by US 101 (Bayshore Freeway) to the west, North Field Access Road to the north and San Francisco Bay to the east and south. Not included in the Project Area are 180 acres of mostly undeveloped SFIA land west of US 101 (West-of-Bayshore site). This site was removed from the SFIA Master Plan process because it is a habitat for the San Francisco garter snake, an endangered species, and the red-legged frog, a candidate for the endangered species list./2/

The Project Area is occupied by the airport complex, including runways, passenger terminals, support services, airline maintenance and air freight facilities and over 550 acres of undeveloped land. Figure 1 shows the location of SFIA and adjoining jurisdictions within San Mateo County. The insert shows the location of SFIA, other airfields, principal cities and highways in the nine-county San Francisco Bay region (Bay Area).

SFIA is bordered on the east and south by San Francisco Bay, on the north by the City of South San Francisco, on the west by the City of San Bruno and on the southwest by the City of Millbrae. Other San Mateo County jurisdictions in the airport vicinity include the cities of Brisbane, Colma, Daly City, Pacifica, Burlingame, Hillsborough, San Mateo and Foster City. Also in the airport vicinity are the unincorporated areas of San Bruno Mountain and the San Francisco Water Department Lands, containing the San Andreas and Crystal Springs Reservoirs and a State Fish and Game Department easement.

● Within the nine-county San Francisco Bay region are four air carrier or commercial service airports (SFIA, Metropolitan Oakland International, San Jose International and Sonoma County Airport), four U.S. military airfields (one of which is closed), 21 public use General Aviation airfields, 20 private use General Aviation airfields and numerous heliports, most of them for medical or military



SOURCE: Environmental Science Associates, Inc.

San Francisco International Airport ■

● **Figure 1**
Project Location

●use./7/ Regional and interstate ground-transportation linkages to SFIA include US 101 (Bayshore Freeway), which bounds the Project Area's west side; U.S. Interstate Highway 280, west of and roughly parallel to US 101; and U.S. Interstate Highway 380, the east-west connector between Highways 101 and 280 in the vicinity of SFIA. Direct access between SFIA and US 101 is provided by four interchanges in the vicinity of SFIA. Interstate passenger rail (Amtrak) lines serve Oakland and San Jose; Amtrak motor coaches link the Oakland station with downtown San Francisco. The Caltrans commuter rail line (CalTrain) serving Peninsula cities from San Francisco to San Jose does not serve SFIA directly; the stations nearest SFIA are in downtown San Bruno and Millbrae. Extension of the Bay Area Rapid Transit (BART) system to the SFIA vicinity was approved by San Mateo County voters in February of 1990 and is slated for completion in 2001.

C. PROJECT CHARACTERISTICS

OVERVIEW

The proposed SFIA Master Plan is a physical/management design plan for facilities and circulation systems on all airport-owned lands, excluding the mostly undeveloped West-of-Bayshore site./8/ The proposed SFIA Master Plan would be implemented in two phases: near-term (1986-1996) and long-term (1997-2006). For clarity, this EIR uses 1990 as the base year and defines the near-term Master Plan as 1990-1996.

The following chapters are included in the SFIA Master Plan:

1.0 Introduction
2.0 Executive Summary
3.0 Local and Regional Plans
4.0 Environmental Setting
5.0 Ground Access
6.0 Inventory of Existing Facilities
7.0 Forecasts
8.0 Facility Requirements
9.0 Alternative Development Concepts
10.0 Recommended Master Plan
11.0 Budgetary Development Costs
12.0 Appendix

SFIA Master Plan projects are based on a facility requirements program, described in SFIA Master Plan Chapter 8.0, that was derived by the Airports Commission's planning consultant, Daniel, Mann, Johnson, & Mendenhall (DMJM). DMJM developed the facility requirements program on the basis of a set of SFIA Master Plan aviation activity forecasts prepared by Thompson Consultants International (TCI) and described in SFIA Master Plan Chapter 7.0. The SFIA Master Plan aviation activity forecasts, as shown in Table 1, reflect the Airports Commission's expectation that future regional economic growth will generate increased demand for SFIA operations in all key categories./2/ The number of total annual passengers is forecast to grow by about 41 percent in the near term (1990-1996) and by about 71 percent for the total SFIA Master Plan period (1990-2006). The international segment of SFIA passenger counts is forecast to grow more rapidly than the domestic segment, nearly doubling between 1990 and 2006. Total cargo and mail tonnage is forecast to grow by about 32 percent under the near-term Master Plan and by about 55 percent under the total Master Plan. International mail is forecast to grow by about 75 percent during the total Master Plan period.

Air carrier operations are forecast to grow by about 24 percent under the near-term Master Plan and by about 36 percent under the total Master Plan. Larger-capacity aircraft and higher load factors (proportion of available seats occupied) are among the factors expected to produce higher rates of growth in passenger counts than in aircraft operations. SFIA aviation activity forecasts and assumptions are discussed in II.D. Future Growth under the Project Compared to Other Future Scenarios, p. 61.

To accommodate forecast growth in aviation activity, the SFIA Master Plan process addressed SFIA "landside" facilities, which include the passenger terminal complex, aircraft aprons, air freight facilities, aircraft maintenance hangars, General Aviation facilities, and support facilities such as administration, parking and roadways. Development of "airside" facilities, which include SFIA's airfields and taxiways, was addressed during the master plan process "only to the extent of its impact on landside constraints and opportunities"/2/, meaning that airfields and taxiways are proposed for modification only where necessary to accommodate proposed physical changes in the SFIA landside facilities. SFIA Master Plan projects would modify on-airport facilities

TABLE 1: SFIA AVIATION ACTIVITY COMPARISON, ACTUAL 1990 AND SFIA MASTER PLAN FORECASTS, 1996 AND 2006

Aviation Activity	Actual 1990/a/	Master Plan Forecast 1996	Master Plan Forecast 2006	Percent Change 1990-1996	Percent Change 1990-2006
Annual Passengers/b/					
Domestic	26,263,136	36,620,000	44,110,000	39%	68%
International	3,676,699	5,660,000	7,220,000	54%	96%
Total	29,939,835	42,280,000	51,330,000	41%	71%
Cargo and Mail /c/					
Domestic Cargo	214,500	310,500	332,200	45%	55%
Int'l. Cargo	236,550	268,500	345,500	14%	46%
Mail	107,028	156,872	187,704	47%	75%
Total	558,078	735,872	865,404	32%	55%
Annual Aircraft Operations /d/					
Air Carrier /e/	302,460	375,105	411,564	24%	36%
Commuter /f/	87,266	91,700	100,000	5%	15%
General Aviation /g/	35,132	27,300	24,200	-22%	-31%
Military /h/	2,617	2,700	2,700	0%	0%
Total /i/	427,475	496,805	538,464	16%	26%

NOTES:

/a/ 1989 figures have been used as approximations of 1990, the EIR base year.

/b/ "Annual Passengers" is sum of enplanements and deplanements, including passenger transfers but excluding "through" passengers (continuing on the same flight). 1989 passenger figures are from "San Francisco International Airport Comparative Traffic Report," December 1989. Master Plan total passenger forecasts were developed by Thompson Consultants International (TCI) for *SFIA Master Plan Working Paper A*, San Francisco Airports Commission, 1987, and are cited in Final Draft Master Plan Table 7.2. Master Plan international passenger forecasts were developed by TCI in 1989 and cited in Master Plan Table 7.22. Domestic passenger forecasts represent the difference between total and international passenger forecasts. The Master Plan passenger forecasts represent the "unconstrained" scenario, which is based on the continuation of the existing pattern of growth in the Bay Area coupled with adequate ground access to the airport, and expansion of terminal and gate facilities (SFIA Master Plan, p. 2.4).

/c/ All cargo and mail figures are total metric tons loaded and unloaded. 1989 figures are from "San Francisco International Airport Comparative Traffic Report," December 1989. Master Plan cargo and mail forecasts were developed by TCI and cited in Final Draft Master Plan Tables 7.7 - 7.11.

(Continued)

TABLE 1: SFIA AVIATION ACTIVITY COMPARISON, ACTUAL 1990 AND SFIA MASTER PLAN FORECASTS, 1996 AND 2006 (Continued)

/d/ Aircraft operations include all takeoffs and landings. Air carrier operations, as defined by SFIA, are scheduled commercial jet operations. Commuter operations, as defined by SFIA, are "the operations of the trunk carriers' subsidiary airlines operating primarily turbo-prop aircraft." These operations are accounted for at SFIA by two carriers: United Express (affiliated with United Airlines) and American Eagle (affiliated with American Airlines). The FAA defines commuter/regional carriers as those which "operate aircraft with a maximum of 60 seats, provide at least five round trips per week between two or more points, or carry mail" (FAA "Terminal Area Forecasts, FY 1989 - 2005," Appendix B). General Aviation historically refers to all aviation activity other than airline and military activity. General Aviation operations at SFIA are those using the Fixed Base Operator (FBO) and Chevron Corporation facilities. Almost all military aircraft operations at SFIA are accounted for by U.S. Coast Guard helicopter activities.

/e/ 1989 air carrier operations total of 302,460 is from 1989 SFIA landing fee reports, which are based on fees paid to SFIA by runway users. SFIA landing fee report air carrier figures are about 2% lower than the FAA tower counts used in the SFIA Comparative Traffic Reports (the latter reported 309,126 air carrier operations for 1989). The SFIA landing fee report figure is cited here because it is used in SFIA Noise Abatement Program reports to the State, and because it is the basis of constrained and unconstrained fleetmix forecasts generated by Ken Eldred Engineering (KEE) for this EIR (telephone conversation with Ken Eldred, August 1, 1990). 1996 and 2006 Master Plan forecasts of air carrier operations were derived by KEE from actual 1989 SFIA fleetmix data, FAA national fleetmix forecasts, and SFIA Draft Master Plan "unconstrained" passenger forecasts and aircraft load factor forecasts (letter dated July 20, 1990 from Ken Eldred).

/f/ 1989 commuter operations total of 87,266 is from a letter dated July 14, 1990 from John Costas, SFIA, and matches the 1989 SFIA landing fee report figure. The 1989 commuter operations total from FAA tower counts, as reported in the "San Francisco International Airport Comparative Traffic Report," December 1989, was 83,595, which is approximately 4% less than the landing fee report figure. This discrepancy may derive from miscategorization of commuter and air carrier operations; as noted above, the 1989 FAA tower report air carrier figure is greater than the landing report air carrier figure. When air carrier and commuter figures from the respective reports are added, the discrepancy between the two sources is 2,995 operations, or about 0.8% (letter dated July 20, 1990 from Ken Eldred).

/g/ The 1989 General Aviation total, from FAA tower counts reported in the December 1989 SFIA Comparative Traffic Report, was 32,137. To reconcile total operations by category with FAA tower counts, the 2,995 operations noted above have been added to the General Aviation category, bringing it to an estimated 35,132 operations in 1989 (as recommended in letter dated August 2, 1990 from Ken Eldred). 1996 and 2006 Master Plan forecasts of General Aviation activity are from July 14, 1990 letter from John Costas, SFIA.

(Continued)

TABLE 1: SFIA AVIATION ACTIVITY COMPARISON, ACTUAL 1990 AND SFIA MASTER PLAN FORECASTS, 1996 AND 2006 (Continued)

/h/ Military aircraft operations are expected to remain near 1990 levels throughout the SFIA Master Plan period.

/i/ The total 1996 and 2006 aircraft operations forecasts represent combined KEE air carrier forecasts and figures from July 14, 1990 letter from John Costas, SFIA.

SOURCES: *SFIA Final Draft Master Plan*; San Francisco International Airport Comparative Traffic Reports, December 1987 and December 1989; Ken Eldred Engineering; Environmental Science Associates, Inc.

in all landside functional categories but would not affect runways. SFIA Master Plan airside projects include realignment of four existing taxiways (A, B, C and R) and extension of taxiways A and B (see Figure 4, Near-Term Master Plan, p. 42). SFIA airside operations, capacities and levels of service (delays) are discussed at the end of this section, beginning on p. 61.

Near-term and long-term SFIA Master Plan projects would together result in demolition of nearly 1.4 million square feet of existing SFIA building area (about 16 percent of total 1990 SFIA building area, excluding parking garages and utilities in buildings). By 2006, SFIA Master Plan projects would result in remodeling of about 0.8 million square feet of existing SFIA building area, and construction of over 4.2 million square feet of building area. Net new building area by 2006 would total nearly 2.9 million square feet, bringing SFIA building area, excluding parking garages and the proposed Rental Car Garage / Ground Transportation Center, to about 11.1 million square feet. From the 1989 total of about 8.2 million square feet, SFIA area in buildings would thus increase by about 35 percent as a result of proposed SFIA Master Plan projects.

The 2.9 million square feet of net new building area proposed for the combined near-term and long-term SFIA Master Plan (1990 through 2006) would include about 1,476,000 square feet of additional passenger terminal area and 22 or more additional aircraft gates; about 785,000 square feet of additional air freight area; about

275,000 square feet of additional airline maintenance area; about 226,000 square feet of additional administration/office area; about 90,000 square feet of additional commercial area; about 40,000 square feet of additional airline support area; and about 6,000 square feet of airport support and General Aviation area.

In addition to consolidation and expansion of SFIA building area, the combined near-term and long-term SFIA Master Plan projects would result in demolition, modification and/or construction of parking lots, garages, utilities and other non-building facilities. The proposed Rental Car Garage / Ground Transportation Center would comprise over one million square feet, and proposed parking garages DD and CC could total approximately 2.6 million square feet. Existing parking spaces would be eliminated under both near-term and long-term Master Plans, but new parking would more than offset the loss, for a net increase of approximately 7,340 short-term and long-term auto parking stalls (in both garages and surface lots) by 2006. This would represent about a 24 percent increase over 1990 SFIA auto parking capacity.

Non-building facilities that would be demolished, constructed or modified under the SFIA Master Plan include surface and elevated roadways, vehicle staging areas, pedestrian transit (automated people mover) facilities, aircraft hardstands (parking positions), terminal apron areas, aircraft taxiways, and multi-use harbor docking facilities (modifications to aircraft hardstands and apron facilities are not quantified in the Master Plan). SFIA Master Plan roadway projects would include widening of key intra-airport roads, construction of bi-level access roads for the proposed Rental Car Garage / Ground Transportation Center, and construction of two new ramps connecting SFIA and US 101. Airport utilities (electricity, natural gas, water, industrial waste, sanitary and storm sewers, and aircraft fueling facilities) would be upgraded and, in most cases, expanded.

About ten SFIA Master Plan projects, most of them affecting roadways and parking facilities, are also included in the approved SFIA Five-Year Capital Projects Plan (September 18, 1989), and will therefore likely be implemented whether or not the SFIA Master Plan is adopted./9/ These projects are analyzed in this EIR both as part of the SFIA Master Plan and as part of the No-Project alternative (see EIR Section IX. Alternatives, p. 439). Projects included in both the SFIA Master Plan and the approved SFIA Five-Year Capital Projects Plan are listed in Table 2, below. Projects included in the SFIA Five-Year Capital Projects Plan are listed in Appendix B, Table B-4.

TABLE 2: SFIA CAPITAL PROJECTS RELATED TO SFIA MASTER PLAN PROJECTS

Contract Number/Project		Program Year
Master Plan Projects in Approved 9/18/89 SFIA Capital Projects Plan		
1106	Frontage Road R-3 (McDonnell Road) Widening	1991-92
1680A	Parking Garage Restriping (for 800 more stalls - in design phase)	1988-89
1723	New Firehouse No. 2 (in construction)	1989-90
1730	North Access Road Realignment and Widening	1989-90
1731	Demolition of Flying Tiger Hangar (Plot 17)	1989-90
2102	Development of Parking Lot DD (3,000 auto stalls - in design phase)	1990-91
2103	Vehicular Bridge from Lot D to Lot DD (in design phase)	1990-91
2254	Relocation of Budget Rental Car (in design phase)	1989-90
2255	Relocation of Dollar Rental Car (in design phase)	1989-90
2084	Water Main Improvement - Plots 20, 22, 24 & 25	1990-91
2133	Contingency Facility (airport support functions)	1989-90

SOURCES: *SFIA Final Draft Master Plan*, 1989; SFIA Five-Year Capital Projects Plan, 1989.

EXISTING SFIA FACILITIES

While normally part of the Environmental Setting section, the following discussion of existing facilities is provided to help orient the reader so that the description of proposed new and remodeled facilities will be clear.

As noted, proposed SFIA facility modifications are categorized under thirteen functions in the Recommended Master Plan (SFIA Master Plan Chapter 10.0) and related Appendix tables. In the Inventory of Existing Facilities (SFIA Master Plan Chapter 6.0), most of the same functional categories are used, except that the Commercial, Administration/Office and Miscellaneous categories are aggregated into the Airline Support and Airport Support categories, and an additional category, Undeveloped Areas, is included. Master Plan Facilities Inventory graphics, on the other hand, identify five functional categories. Categorization of functions is further complicated by the existence in many instances of multiple functions within a single building. For example, while each of the existing airport terminal buildings contains commercial uses, airport administration and other support functions, only the overall terminal function is assigned these buildings under the Master Plan Facilities Inventory. Similarly, many of the hangars at the airport contain cargo, maintenance and associated support functions.

For consistency and ease of comparison in this EIR, the thirteen functional categories in SFIA Master Plan project description Appendix tables (Chapter 12.0) are used to describe both existing and proposed SFIA facilities./2/ An attempt has been made to identify each facility by its primary functional area and to note where other functions are also present. The thirteen functional categories include:

1.0	Terminal
2.0	Airline Support
3.0	Airline Maintenance
4.0	General Aviation
5.0	Air Freight
6.0	Airport Support
7.0	Commercial
8.0	Administration/Office
9.0	Transportation
10.0	Miscellaneous
11.0	Parking
12.0	Roads
13.0	Airside

Note that in the names of the functional categories, "airport" refers to SFIA and "airline" refers to the various carriers that use SFIA.

Existing facilities are further classified in this EIR as building or non-building facilities; although the parking category contains both lots and garages, it is included in the discussion of non-building areas. Utilities are also discussed under non-building facilities.

Existing SFIA Facilities in Buildings

As of 1990, SFIA building space, excluding parking garages and utilities in buildings, totaled about 8.2 million square feet./2,10/ Existing SFIA facilities in buildings (functional categories 1.0 through 8.0 and 10.0) are summarized in Table 3 and illustrated in Figure 2, p. 34. Note that building numbers in the table correspond to those in the figure, and that functions are aggregated into six categories in the figure. Buildings containing more than one function are listed by primary function, with secondary functions noted (where information is available). Most buildings on SFIA land are owned by the City of San Francisco and leased under various terms to airport users (airlines, rental car companies, etc.). Additional facility data, including ownership, tenant and lease status, acreage and associated aircraft and auto parking, are in SFIA Master Plan Table 6.3./2/

Functional Area 1.0: Existing Terminal Facilities

Located between Bayshore Freeway and the main runways, the SFIA passenger terminal complex totaled approximately 2,621,500 square feet as of 1989. The complex has been expanded and upgraded several times since its construction; implementation of the latest Terminal Master Plan (1985) was completed in 1988. The existing three-terminal configuration forms an arc, within which is a short-term, public auto parking garage and a bi-level roadway loop, and outside of which are the boarding piers, gate facilities and aircraft aprons (see Figure 2, p. 34). Six pedestrian tunnels and two bridges link the terminals with the five-level, circular auto parking garage.

The terminal complex includes six boarding piers and 80 jet aircraft gates, 48 of which can accommodate wide-body jets. The South Terminal, including boarding areas A, B and C, totals about 849,500 square feet. The Central (International) Terminal, including Boarding Area D, totals about 610,000 square feet. The North Terminal, including Boarding Areas E and F, totals about 1,161,000 square feet./2,4/

Functional Area 2.0: Existing Airline Support Facilities

Airline support functions are provided by, and complement the operations of, the airlines using SFIA. In many instances, these functions share facility space with freight, maintenance or other airline operations. Airline support functions inventoried in the SFIA Master Plan include catering, storage and warehousing, and administration (the latter is under functional category 8.0). About 81,800 square feet of Airline Support functions, not including those in mixed-use facilities, are at SFIA.

TABLE 3: EXISTING SFIA FACILITIES IN BUILDINGS BY FUNCTION, 1990

Facility Number/Name		Area in Square Feet/a/
1.0 TERMINAL		
	North Terminal /b/	1,161,000
	International Terminal /c/	610,000
	South Terminal /d/	849,500
	SUBTOTAL TERMINAL	2,620,500
2.0 AIRLINE SUPPORT (NONTERMINAL)		
	Catering:	
52	Host International	31,690
62	United Airlines Catering	13,800
	Supporting Facilities:	
31	United Warehouse	12,544
38	American Ground Services Equipment (GSE)	2,500
45	Delta Warehouse	7,200
90	ASII/Evergreen /e/	12,544
93	Pan Am Crew Baggage Holding	1,500
	SUBTOTAL AIRLINE SUPPORT (NONTERMINAL)	81,800
3.0 AIRLINE MAINTENANCE		
	Major:	
1-12	United Maintenance Center	2,870,950
	Line:	
32	Hangar (Vacant)	16,000
33	American Maintenance	392,240
39	Qantas Maintenance Hangar	168,761
42	Continental Maintenance Hangar	26,825
45,47	Delta Maintenance	136,875
60	United Airlines Service Center	90,000
65	Pan Am	161,825
67	TWA Service	9,800
84	JAL Maintenance Building	9,000
51	Northwest Maintenance Hangar	36,000
	SUBTOTAL AIRLINE MAINTENANCE	3,918,300

(Continued)

TABLE 3: EXISTING SFIA FACILITIES IN BUILDINGS BY FUNCTION, 1990 (Continued)

Facility Number/Name		Area in Square Feet/a/
4.0 GENERAL AVIATION		
40	Fixed Base Operator (FBO): Butler	48,112
54	Chevron, USA Hangar	40,000
	SUBTOTAL General Aviation	88,100
5.0 AIR FREIGHT		
	All-Cargo Carriers:	
16	Flying Tigers Hangar	108,036
43	U.S. Air Mail Facility	168,000
83	JAL Cargo Building	78,000
	Top-Off Carriers:	
41	Airborne Cargo Bldg./f/	60,000
46	Delta	21,000
53	Cargo Building No. 7	55,296
55	Northwest Orient Cargo	114,550
56	American Airlines Cargo	71,400
57	U.S. Air Cargo	6,356
58	United Cargo	113,720
68	TWA Cargo	71,387
	SUBTOTAL AIR FREIGHT	867,700
6.0 AIRPORT SUPPORT /g/		
49	Engineering Building	30,800
	Maintenance:	
50	Shops/Office /h/	56,000
48	Equipment Garage	20,000
88	Bus Maintenance	5,000
	Crash, Fire and Rescue:	
17	Contingency Building 1000	10,800
35	Fire Station No. 1	12,000
34	Fire Station No. 2	12,000
28	Community College Flight School	26,200
	SUBTOTAL AIRPORT SUPPORT	172,800

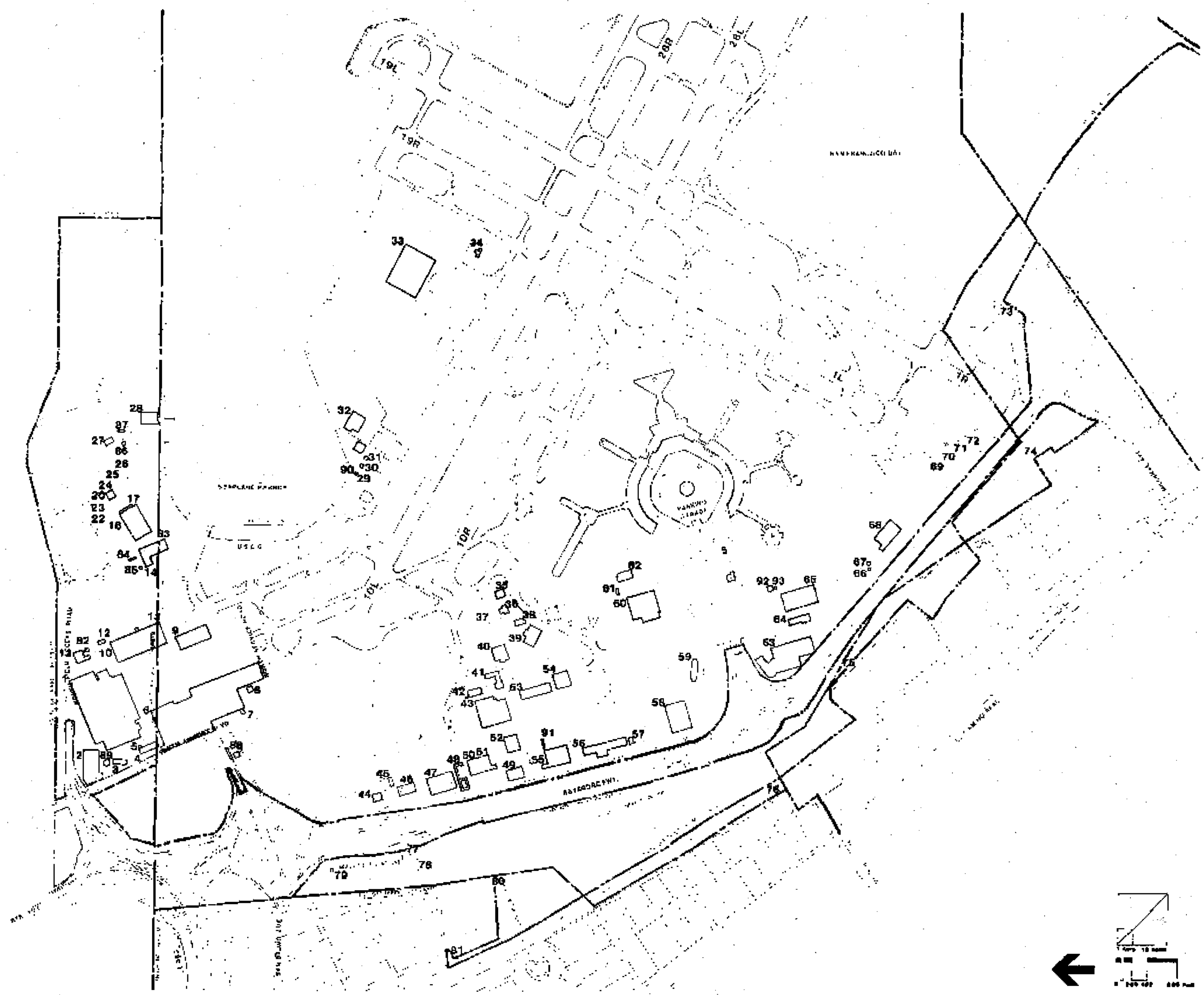
(Continued)

TABLE 3: EXISTING SFIA FACILITIES IN BUILDINGS BY FUNCTION, 1990 (Continued)

Facility Number/Name		Area in Square Feet/a/
7.0 COMMERCIAL /i/		
44	Bank of America	13,062
63	Hilton Inn	220,000
	Chevron Gas Station	900
	SUBTOTAL COMMERCIAL	234,000
8.0 ADMINISTRATION/OFFICE /j/		
59	United Administration	92,216
64	Pan Am Administration	33,852
	SUBTOTAL ADMIN./OFFICE	126,100
10.0 MISCELLANEOUS		
	U.S. Coast Guard Facilities	
	"A" Hangar	29,700
	"B" Administration Building	12,021
	"C" Barracks	25,000
	"D" Building	1,721
	"F" Building	14,000
	"H" Building	6,000
	SUBTOTAL MISCELLANEOUS	88,400
TOTAL 1990 SFIA BUILDING AREA /k/		8,197,700

/a/ Figures represent gross building areas; ancillary unbuilt areas (e.g., parking lots, outdoor work areas) are not included. Subtotals are rounded, as is the grand total.
/b/ Includes Boarding Areas E and F, as well as 4,500 square feet of Airport Police facilities. Terminals also contain commercial and administration/office space.
/c/ Includes Boarding Area D.
/d/ Includes Boarding Areas A, B and C.
/e/ Also contains air freight functions.
/f/ Also contains administration/office space.
/g/ Airport support utility structures are listed in EIR Section III.J, Utilities.
/h/ Not included is an adjacent 45,000-square-foot open maintenance yard.
/i/ Does not include commercial space within terminal facilities.
/j/ Does not include administration/office space in buildings with mixed functions (e.g., terminal and air freight facilities).
/k/ Total does not include selected utilities in buildings, for which data are not available, or building area in parking garages.

SOURCES: Table 6.3, *SFIA Final Draft Master Plan*, 1989; Airports Commission, 1990; U.S. Coast Guard, 1990; Environmental Science Associates, Inc.



Key

AIRFREIGHT:
- 18 – Flying Tigers
- 39 – Cargo Bldg.
- 41 – Airborne Cargo Bldg.
- 43 – Air Mail Facility
- 46 – Delta
- 53 – Cargo Bldg. No. 7
- 55 – NWO
- 56 – American
- 57 – U.S. Air Cargo*
- 58 – United
- 68 – TWA
- 83 – JAL
- 90 – Evergreen Office Bldg.

AIRCRAFT MAINTENANCE:
- 1-12 – United Maintenance Base
- 33 – American Maintenance Hangar
- 42 – Maintenance Hangar (Continental)
- 45, 47 – Delta Maintenance
- 51 – Maintenance Hangar (Northwest)
- 60 – United Service Center
- 65 – Pan Am
- 84 – JAL

AVIATION SUPPORT: (Non-Terminal)
- 31 – United Warehouse
- 38 – American Warehouse
- 41 – Airborne Office Bldg.
- 45 – Delta
- 52 – Host
- 59 – United Administration
- 61 – United Boiler House
- 62 – United In-Flight Kitchen
- 64 – Pan Am Administration
- 67 – TWA Service Center
- 89 – United Water Storage Tank
- 91 – NWO Cold Storage
- 93 – Pan Am, Crew Baggage Handling

GENERAL AVIATION:
- 40 – Butler FBO
- 54 – Standard Hangar

AIRPORT SUPPORT:
- 32 – Vacant Hangar
- 48 – Equipment Garage
- 49 – Engineering Bldg.
- 50 – Maintenance Shops/Yards/Office
- 88 – Bus Maintenance
- 14, 22, 29, 37, 75, 77 – Electric Substations
- 30, 36 – Wastewater Pumping Plants
- 73, 74, 76, 79 – Drainage Pumping Plant
- 27, 87 – Water Quality Control
- 86 – Pumphouse
- 85, 92 – Pump Station
- 78 – Main Substation
- 24 – Chevron Fuel Farm
- 25 – PST Fuel Farm
- 26 – Shell Oil Fuel Farm
- 69 – Shell Storage Tanks
- 70 – Union Storage Tanks
- 71, 72 – PST Storage Tanks
- 17 – Emergency Warehouse
- 35 – Fire Station No. 1
- 34 – Fire Station No. 2
- 28 – Community College
- 44 – B of A
- 63 – Airport Hilton

City Limits

SFIA Boundaries

SOURCE: San Francisco International Airport Master Plan

San Francisco International Airport ■

Figure 2
Facility Inventory

Functional Area 3.0: Existing Airline Maintenance Facilities

All major maintenance for the United Airlines (UAL) aircraft fleet is performed at SFIA. ("Major" maintenance includes full overhauls; "line" maintenance includes primarily routine procedures.) The UAL Maintenance Center occupies nearly 2.9 million square feet of building space on 170 acres in the North Field area, and employs over 9,000 people in a three-shift, seven-day-per-week operation.

Seven other airlines operate line maintenance facilities, the largest of which, at approximately 392,200 square feet, is the American Airlines superbay hangar in the east field area. Airline maintenance facilities at SFIA, including the UAL center, total approximately 3.9 million square feet.

Functional Area 4.0: Existing General Aviation Facilities

General Aviation historically refers to all aviation activity other than airline and military activity, and may include agricultural, industrial, recreational, air charter, air ambulance service, aerial photography, police patrol, fire control or Federal, State and local government aircraft operations./11/ These operations represent a relatively small portion of total SFIA aviation activity (approximately ten percent or less). SFIA's fixed-base operator (FBO) is Butler Aviation, which occupies approximately 48,100 square feet of building space in the West Field area. Chevron Corporation operates a 40,000-square-foot hangar in the same area.

Functional Area 5.0: Existing Air Freight Facilities

Air freight operations at SFIA are of two types: all-cargo and top-off. All-cargo carriers, which transport freight only, do not require access to the passenger terminal. Top-off carriers require proximity to the passenger terminal because they use excess capacity in scheduled passenger flights for transporting freight.

All-cargo carriers, whose facilities are in the north and east field areas, include Flying Tigers (Federal Express), Japan Airlines (JAL), DHL and Evergreen. An Environmental Impact Report was certified in 1980 for a proposed addition to the adjacent Flying Tigers and JAL facilities. The project included replacement of the existing approximately 108,000-square-foot Flying Tigers Hangar with a 112,000-square-foot warehouse and maintenance center, and construction of a 35,000-square-foot cargo/warehouse addition to the existing 78,000-square-foot JAL facility. (NOTE: This project, which has not been implemented, would be superseded under the near term SFIA Master Plan by construction of the proposed North Field Cargo Maintenance Facility. Only the project proposed in the SFIA Master Plan is addressed by this EIR.)

Top-off carrier operations are concentrated in the north side of the passenger terminal in the west field area, with the exception of Pan Am and TWA, whose facilities are adjacent to the South Terminal. (In Table 2, p. 28, the Pan Am facility is listed under the maintenance category). Most of the top-off carriers lease space in shared facilities such as Cargo Building 7, or sub-lease space from another carrier. All-cargo and top-off carrier functions at SFIA together occupy approximately 868,000 square feet of building area.

Functional Area 6.0: Existing Airport Support Facilities

In contrast to airline support facilities, by which the airlines using SFIA support their own operations, airport support functions relate directly to operations of the airport. The SFIA Master Plan Facilities Inventory, on page 6.11 of the SFIA Master Plan, broadly defines airport support to include airport administration, airport engineering, building and field maintenance, Crash/Fire/Rescue facilities, utilities, airport police, commercial enterprises, and rental cars. This broad definition appears to consider commercial enterprises that generate revenue for the SFIA as airport support functions. For the purposes of defining program requirements and proposing specific projects, however, SFIA Master Plan categories are more detailed: commercial enterprises are in category 7.0, airport administration is in category 8.0 and parking is in category 11.0. This EIR uses the more detailed categorization, and discusses non-building utilities separately. Existing administration/office and commercial facilities within the terminal buildings were not inventoried in the SFIA Master Plan and are discussed only qualitatively in this EIR.

The SFIA engineering building, maintenance shops, equipment garage and bus maintenance facilities together occupy about 111,800 square feet of space in separate facilities (the main shops are in a hangar shared with DHL, north of the passenger terminal).

Crash/Fire/Rescue facilities include two 12,000-square-foot fire stations and a support building. A replacement facility for Fire Station No. 2, at the intersection of runways 10L-28R and 1L-19R, is under construction. Fire Station No. 1 is north of the passenger terminal, adjacent to Butler Aviation. Airport police maintain a 4,500-square-foot station within the North Terminal.

The approximately 26,000-square-foot San Francisco Community College Flight School is in the North Field area, adjacent to the Seaplane Harbor.

Functional Area 7.0: Existing Commercial Facilities

Excluding rental car operations (discussed under functional category 11.0) and commercial facilities within the passenger terminals (which were not inventoried in the SFIA Master Plan), existing commercial facilities at SFIA include an approximately 220,000-square-foot Hilton Inn, a Chevron gas station and a Bank of America branch. The hotel and gas station are located between the terminal complex and US 101; the bank is north of the air freight area near McDonnell Road (Frontage Road R-3).

Functional Area 8.0: Existing Administration/Office Facilities

Airport administration functions are located within the existing terminal complex and were not inventoried in the SFIA Master Plan. Airline administration is in many cases combined with other functions; United Airlines and Pan Am maintain administration functions in separate facilities of about 92,200 square feet and 33,800 square feet, respectively. The facilities are north and south of the terminal access road, relatively near US 101.

Functional Area 9.0: Transportation (Rental Car Garage / Ground Transportation Center)

This is a new functional area under the SFIA Master Plan; it does not currently exist.

Functional Area 10.0: Existing Miscellaneous Facilities (in Buildings)

The U.S. Coast Guard maintains helicopter base facilities at SFIA, including approximately 88,400 square feet of building space in barracks and shops. The U.S. Coast Guard facilities are adjacent to the Seaplane Harbor, on federal government property.

Existing SFIA Non-Building Facilities

As of 1989, undeveloped SFIA-owned area (excluding approximately 2,500 acres of tidelands and the 180-acre West-of-Bayshore site) included an 18-acre parcel near the San Bruno Avenue and Interstate 380 interchange; a 150-acre parcel in the north field area near the Flying Tigers and JAL freight facilities; and a 400-acre parcel in the east field area.

Existing airport utility systems include aircraft fueling, airfield lighting (approximately 65 miles of lines), power supply and distribution (approximately 80 miles of lines), water supply and distribution, sanitary sewage collection and treatment, industrial waste collection and disposal, natural gas supply and distribution, and storm drainage and collection (approximately 45 miles of pipelines)./2,4/ These systems are described in EIR Sections III.H. Hazardous Materials, p. 201, and III.J. Utilities, p. 232.

Functional Area 11.0: Existing Parking Facilities

Auto parking facilities at SFIA, including employee, rental car and short- and long-term public parking, totaled about 30,730 stalls in 1990. Approximately 6,790 stalls, most of them for short-term public use, were in the five-level, 3.7-million-square-foot main parking garage, adjacent to the passenger terminal complex. Long-term parking is available in Lot D (approximately 3,560 public stalls and 970 employee stalls). Existing rental car parking lots, containing a total of about 2,010 auto parking stalls, are concentrated in the area between the passenger terminal and US 101 (see Figure 3). About 12,930 city and tenant employee parking stalls are at scattered locations on airport grounds (including the 970 employee stalls in Lot D), about 180 stalls are in the terminal courtyard area and about 5,170 parking stalls are located off-site in the airport vicinity. No Ground Transportation Center (RCP/GTC) facilities currently exist, apart from the curb areas between the terminals and the bi-level terminal loop roadway. SFIA parking facilities are detailed in EIR Section III.B, Transportation.

Functional Area 12.0: Existing Roads

Freeway access to SFIA is available via U.S. Highway 101 (US 101), U.S. Interstate Highway I-380 (I-380) and U.S. Interstate Highway I-280 (I-280) via I-380 (see Figure 1, p. 21). Four interchanges provide direct access to SFIA from US 101: Millbrae Avenue interchange, Terminal Access Road interchange, San Bruno Avenue interchange and North Access Road (I-380) interchange. Arterial streets that serve SFIA, in addition to Millbrae Avenue and San Bruno Avenue, include Old Bayshore Highway and South Airport Boulevard. As of 1989, roadways on SFIA property totaled about 18 miles, including the terminal access loop and the frontage road R-3 (McDonnell Road). SFIA roadway and pedestrian facilities are detailed in EIR Section III.B, Transportation.

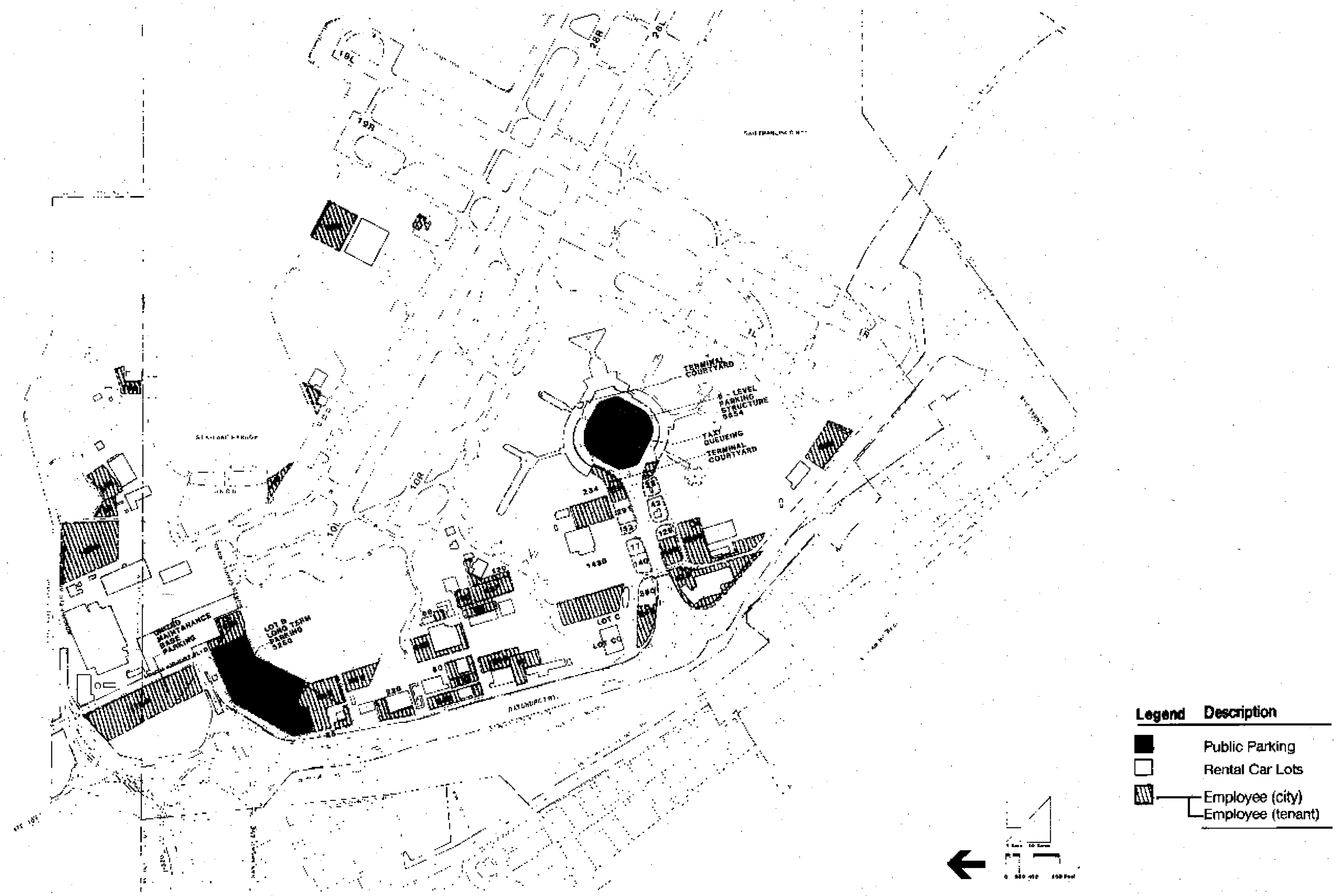
Functional Area 13.0: Existing Airside Facilities

SFIA runways are inventoried in the SFIA Master Plan but are not included in near-term and long-term projects (SFIA Master Plan airside projects include six proposed modifications on four taxiways). Existing runways and taxiways are also depicted graphically in the SFIA Master Plan (see Figure 2, p. 34).

The four existing SFIA runways, completed in 1951, lie on land created in the 1930s and 1940s by filling of San Francisco Bay. Each of the four intersecting runways is 200 feet wide and paved, and three runways are equipped for Instrument Flight Rule (IFR) landing operations. Lengths of the parallel east-west runways 28R-10L and 28L-10R are 11,870 feet and 10,600 feet, respectively. Lengths of the parallel north-south runways 1R-19L and 1L-19R are 9,500 feet and 7,000 feet, respectively.

SFIA MASTER PLAN PROJECTS

Proposed SFIA near-term and long-term Master Plan projects and demolition plans are illustrated in Figures 4 to 7, pp. 42 to 45. Projects under functional Parking categories



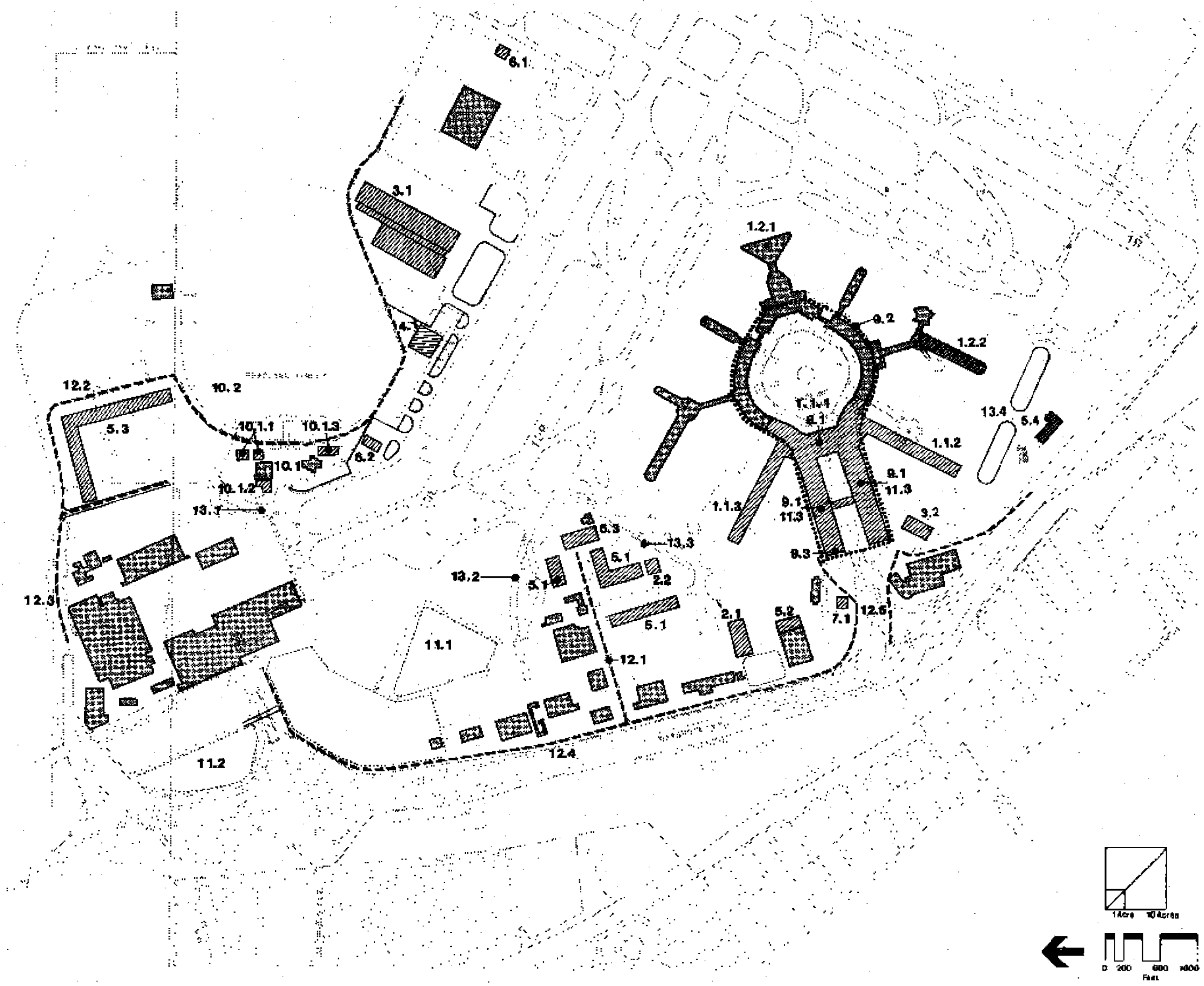
SOURCE: San Francisco International Airport Master Plan

Figure 3
Parking

1.0 through 10.0 are summarized in Tables 4 to 7, pp. 46 to 49, and are presented in further detail in Appendix B, Table B.1, pp. A.18-31, respectively. Master Plan Summary tables in the Airports Commission's more abbreviated format are presented in Appendix B, Table B.2. Proposed changes in functional categories 11.0 through 13.0 (Parking, Roadway and Airside) are described briefly below and in more detail in EIR Sections III.B. Transportation, and III.C. Noise. Some SFIA Master Plan projects are in the approved September, 1989 SFIA Five-Year Capital Projects Plan (see Table 2, p. 28). Approved Capital Plan projects are analyzed in this EIR as part of both the project (SFIA Master Plan) and No-Project alternative.

Under the near-term SFIA Master Plan, about 1.2 million square feet of building space would be demolished and about 3.7 million square feet would be constructed, for a net increase of approximately 2.5 million square feet, bringing total 1996 SFIA building area to about 10.7 million square feet (figures do not include proposed parking garages and Rental Car Garage / Ground Transportation Center facilities). This net change would represent a 31 percent increase from the approximately 8.2 million total square feet of existing building area at SFIA. Under the long-term SFIA Master Plan, about 0.1 million additional square feet of building space would be demolished and about 0.5 million square feet would be constructed, for a net increase of about 0.4 million square feet in the 1997-2006 period.

Near-term and long-term SFIA Master Plan projects would together result in demolition of about 1.4 million square feet of existing building area and construction of about 4.2 million square feet of new building area, for a net increase of about 2.9 million square feet of building area. This total net change for combined SFIA Master Plan near-term and long-term projects represent a 35 percent increase from the existing 1989 SFIA building area total of about 8.2 million square feet. About 0.8 million square feet of existing building area would be remodeled and about 7,340 net new parking stalls would be added under combined near-term and long-term SFIA Master Plan projects.



Key

FUNCTIONAL CATEGORY	PROJ. NO.	PROJECT DESCRIPTION	STATUS*
TERMINAL	1.1.1	International Terminal	New
	1.1.2	Boarding Area A	Rep.
	1.1.3	Boarding Area G	New
	1.2.1	Boarding Area D	Rem.
	1.2.2	Boarding Area B, Phase I	Rep.
AIRLINE SUPPORT	2.1	UAL Catering	Rep.
	2.2	American GSE	Rep.
AIRLINE MAINTENANCE	3.1	E. Field Maint. Hangar	Rep./New
	3.2	Pan Am Maint. Hangar	Rel.
GENERAL AVIATION	4.1	FBO	Rep.
AIRFREIGHT	5.1	W. Field Cargo/Maint.	Rep./New
	5.2	UAL Cargo Facility Expansion	New
	5.3	N. Field Cargo/Maint.	Rep./New
	5.4	TWA Cargo	Rem.
AIRPORT SUPPORT	6.1	CFR No. 2	Rep.
	6.2	Multipurpose Facility	Rep.
	6.3	CFR Support Bldg.	Rep.
COMMERCIAL	7.1	Service Station	Rep.
ADMINISTRATION	8.1	International Terminal Levels 4, 5, 6, 7 & 8	Rep./New
TRANSPORTATION	9.1	Transport./Rental Car Center	New
	9.2	Automated People Mover	New
	9.3	APM Maint. Facility	New
MISC. FACILITIES	10.1	Relocation of Coast Guard Facilities	Rel.
	10.2	Seaplane Harbor Dock Facility	New
PARKING	11.1	Addition to Lot D	New
	11.2	Lot DD & Overpass	New
	11.3	Transportation Center 5th Level	New
ROADS	12.1	Widening of R-8	
	12.2	Rdwy. @ USCG Perimeter	
	12.3	Widening of North Access Road	
	12.4	Widening of R-3	
	12.5	Caltrans Ramps & Elev. Rdwys.	New
AIRSIDE	13.1	Taxiway C Realignment	
	13.2	Taxiway R Realignment	
	13.3	Taxiway A&B Realignment	
	13.4	Taxiway A&B Extension	

*Rel. = Relocation Rem. = Remodel Rep. = Replacement

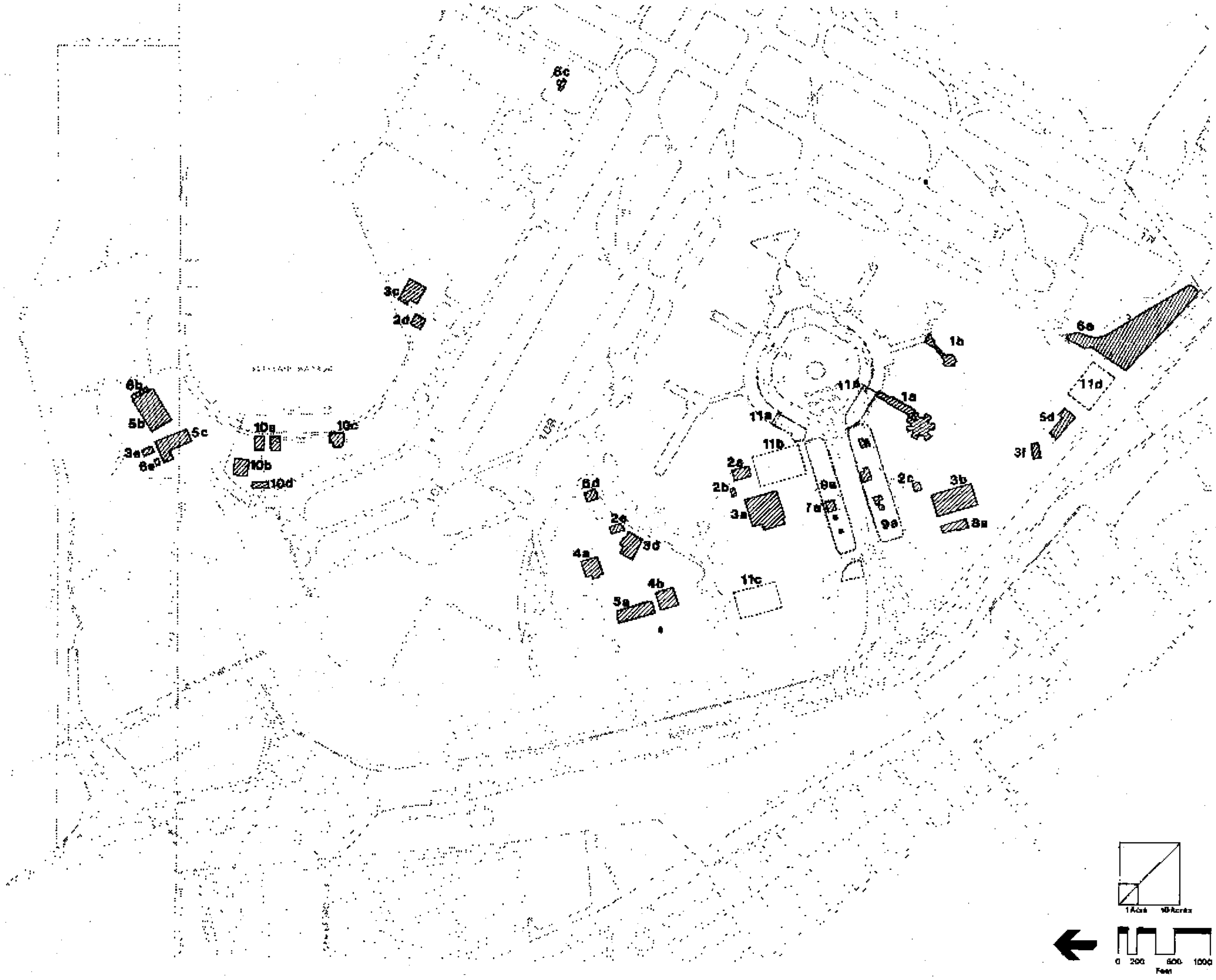
Legend

A.P.M. (Automated People Mover)
Road Improvements & Additions
Parking Improvements & Additions
Near-Term Projects · Facilities
Existing Facilities

SOURCE: San Francisco International Airport Master Plan

San Francisco International Airport ■

Figure 4
Near-Term Master Plan



Key

CATEGORY	CODE NO.	EXISTING FACILITY TO BE DEMOLISHED	ACTION*
TERMINAL	1a	Boarding Area A	Rep.
	1b	Boarding Area B, I	Rep.
	Subtotal		
AIRLINE SUPPORT	2a	UAL Catering	Rel.
	2b	UAL Boiler House	Rel.
	2c	Pan Am Crew Baggage	Rel.
	2d	ASII/Evergreen	Rel.
	2e	American GSE	Rel.
	Subtotal		
AIRLINE MAINTENANCE	3a	UAL Service Center	Rel.
	3b	Pan Am Maint. Hangar	Rel.
	3c	Hangar Building	Demol.
	3d	Maint. Hangar	Rel.
	3e	JAL Maintenance	Rel
	3f	TWA Service Center	Rel
	Subtotal		
GENERAL AVIATION	4a	Butler FBO	Rel
	4b	Chevron Hangar	Rel.
	Subtotal		
AIRFREIGHT	5a	Cargo Bldg 7	Rep.
	5b	Flying Tigers	Rel.
	5c	JAL Cargo	Rel.
	5d	TWA Cargo	Rec.
	Subtotal		
AIRPORT SUPPORT	6a	Day Storage Tanks	Demol
	6b	Building 1000	Rel
	6c	CFR 2	Rel.
	6d	CFR 1 Support Bldg.	Rel.
	6e	Pump Station	Rel.
	Subtotal		
COMMERCIAL	7a	Service Station	Rel.
ADMIN./OFFICE	8a	Pan Am Admin.	Rel.
TRANSPORTATION	9a	Rental Car Lots	Rep.
MISCELLANEOUS	10a	USCG Ramps, Pumps, Fuel Hydrants	Rel.
	10b	Tank Farm	Rel.
	10c	Barracks	Dem
	10d	Shop Bldg.	Rel.
PARKING	11a	Tenant Parking	
	11b	UAL Service Center Parking	
	11c	UAL Emp. Parking (Plots 5&6)	
	11d	TWA Parking	Rec.

*Demol. = Demolish Facility with No Replacement
Rel. = Relocated Facility to New Site
Rep. = Replaced Facility on Existing Site
Rec. = Reconfigure

Legend

Demolition Projects – Parking

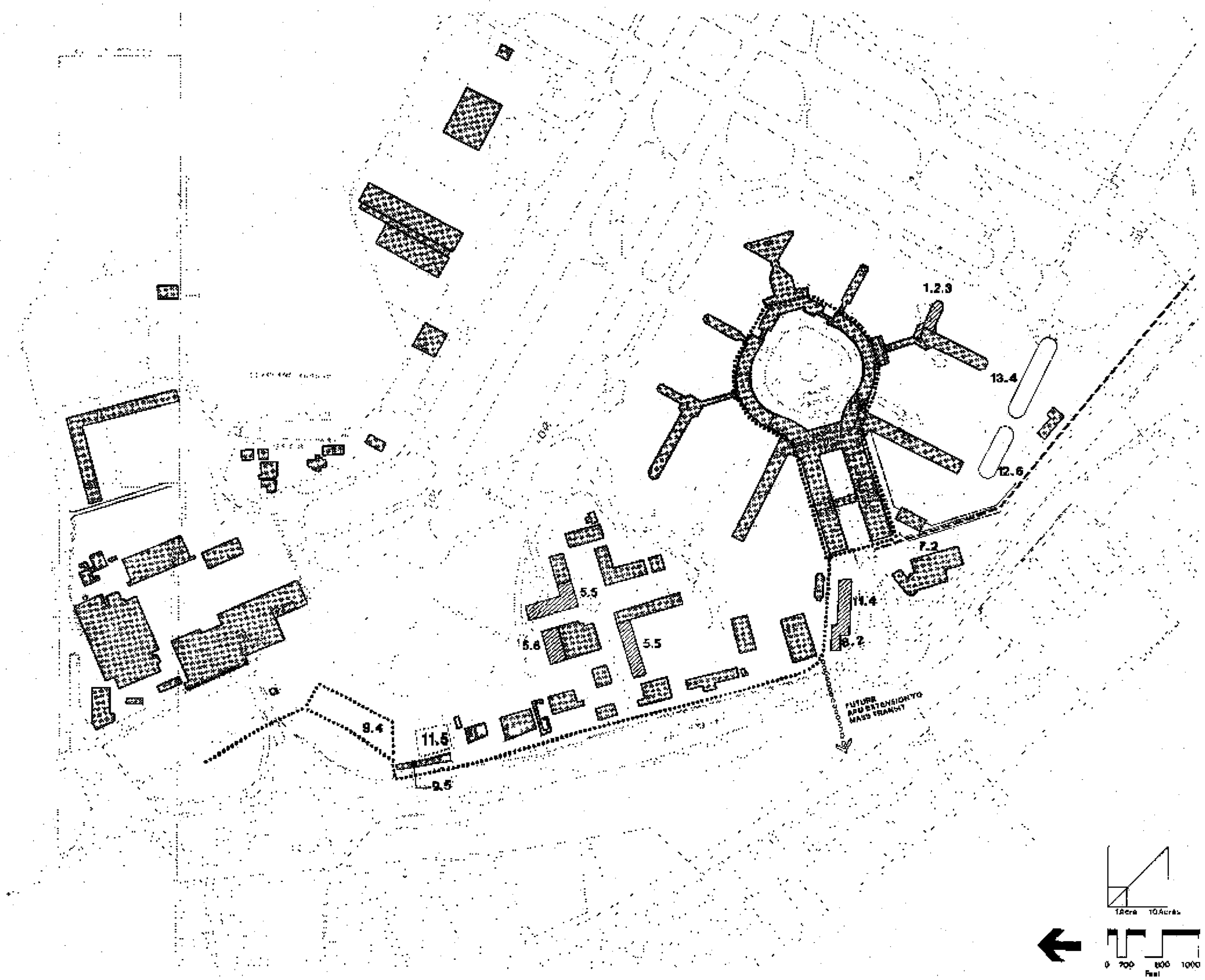
Demolition Projects – Facilities

SOURCE: San Francisco International Airport Master Plan

San Francisco International Airport

Figure 5

Near-Term Demolition Projects



Key

FUNCTIONAL CATEGORY	PROJ. NO.	PROJECT DESCRIPTION	STATUS*
TERMINAL	1,2,3	Boarding Area B, Phase II	Rep.
AIRFREIGHT	5.5	W. Field Cargo/Maint,	New
	5.6	Mail Facility Expansion	New
COMMERCIAL	7.2	Hilton Hotel Expansion/ Renovation	Rem.
ADMIN./OFFICE	8.2	Office	New
TRANSPORTATION	9.4	APM - Phase II	New
	9.5	APM Maint. Facility	New
PARKING	11.4	New 5 Level Parking Structure	New
	11.5	Lot D Expansion to B of A Lot	New
ROADWAY	12.6	Widening of R-2	

*Rem. = Remodeled Facility
Rep. = Replaced Facility on Existing Site

Legend

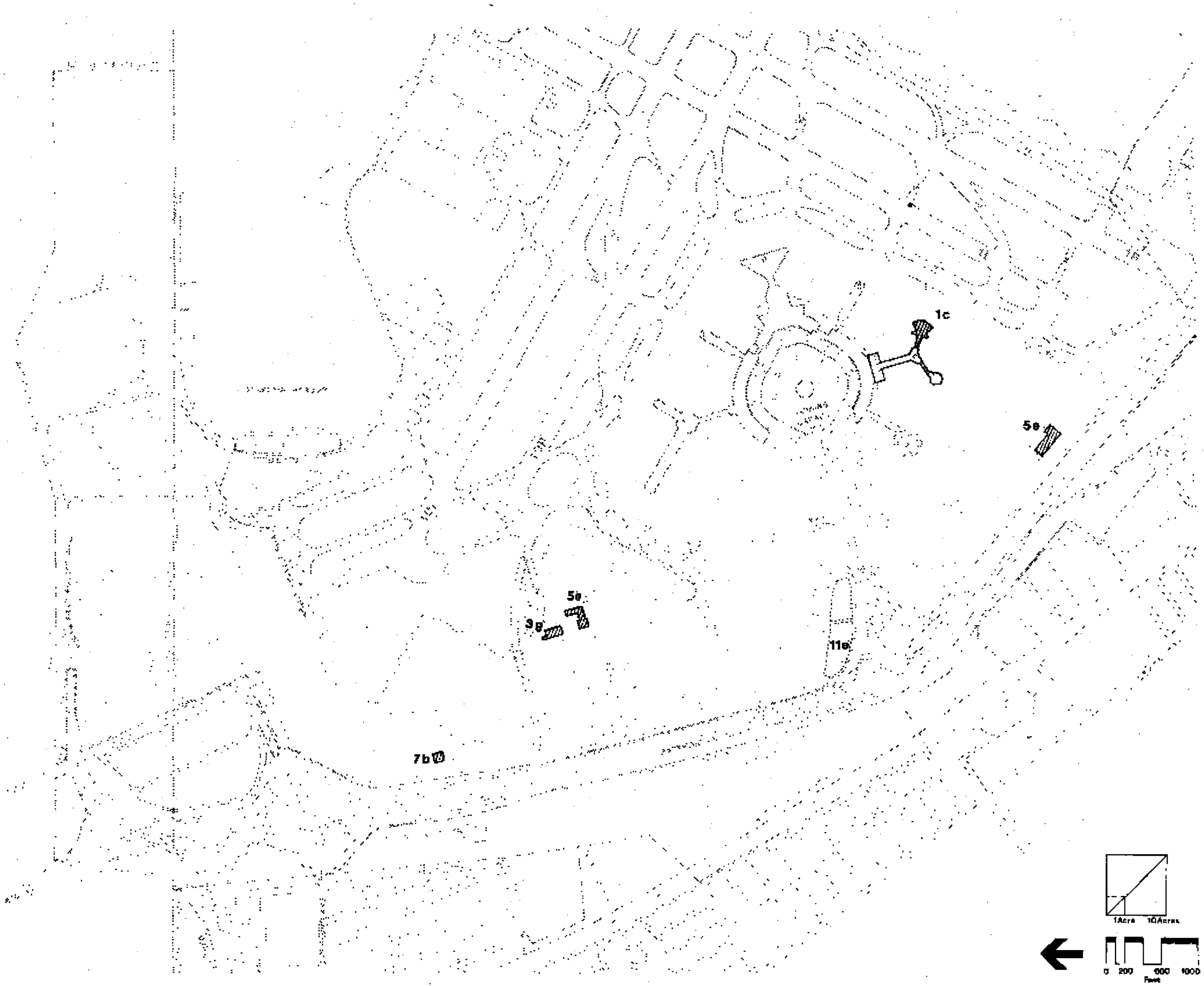
- A.P.M. (Automated People Mover)
- Road Improvements & Additions
- Parking Improvements & Additions
- Long-Term Projects Facilities
- Existing and Near-Term Facilities

SOURCE: San Francisco International Airport Master Plan

San Francisco International Airport ■

Figure 6

Long-Term Master Plan



Key

CATEGORY	CODE NO.	EXISTING FACILITY TO BE DEMOLISHED	ACTION*
TERMINAL	1c	Boarding Area B, Phase II	Rep.
AIRLINE MAINTENANCE	[illegible]	Bldg. 42 Maint Hangar	Rel.
	Subtotal		
AIRFREIGHT	5e	Airborne Cargo	Rel.
	Subtotal		
COMMERCIAL	7b	Bank of America	Rel.
PARKING	11e	Lots C&CC Tenant Parking	Rel.

*Rel. = Relocated Facility to New Site
Rep. = Replaced Facility on Existing Site

Legend

Demolition Projects - Parking
Demolition Projects Facilities

SOURCE: San Francisco International Airport Master Plan

San Francisco International Airport

Figure 7
Long-Term Demolition Projects

TABLE 4: NEAR-TERM SFIA MASTER PLAN PROJECTS BY FUNCTIONAL AREA (1990-1996) - SUMMARY /a/

	Function	Existing 1990	Demolish	Construct	Net New Construction/b/	Remodel	No Change/c/	1996 Total/d/
1.0	SUBTOTAL TERMINAL	2,620,500	(245,600)	1,650,000	1,404,400	490,000	1,884,900	4,024,900
2.0	SUBTOTAL AIRLINE SUPPORT (NONTERMINAL)	81,800	(30,300)	70,000	39,700		51,500	121,500
3.0	SUBTOTAL AIRLINE MAINT.	3,918,300	(455,400)	757,500	302,100		3,462,900	4,220,400
4.0	SUBTOTAL GENERAL AVIATION	88,100	(88,100)	90,000	1,900			90,000
5.0	SUBTOTAL AIR FREIGHT	867,700	(241,300)	792,300	551,000	71,400	555,000	1,418,700
6.0	SUBTOTAL AIRPORT SUPPORT	172,800	(34,800)	39,000	4,200		138,000	177,000
7.0	SUBTOTAL COMMERCIAL	234,000	(900)	101,000	100,100		233,100	334,100
8.0	SUBTOTAL ADMIN./OFFICE	126,100	(33,900)	160,000	126,100		92,200	252,200
10.0	SUBTOTAL MISCELLANEOUS	88,400	(88,400)	63,400	(25,000)			63,400
TOTAL NEAR-TERM PLAN		**8,197,700**	**(1,218,700)**	**3,723,200**	**2,504,500**	**561,400**	**6,417,600**	**10,702,200**

NOTE: Negative values are in parentheses.

/a/ All figures are in gross building square feet. Detailed building project summaries by function are in Appendix B, Table B.1.
/b/ Net New Construction = Construct square feet minus Demolish square feet.
/c/ No Change = Existing 1990 square feet minus (Demolish square feet + Remodel square feet).
/d/ Total 1996 = Construct square feet + Remodel square feet + No Change square feet OR Existing 1990 square feet + Net New Construction square feet.

SOURCES: Table 6.3 and Appendix 12.5, *SFIA Final Draft Master Plan*, 1989; SFIA Airports Commission, 1990; U.S. Coast Guard, 1990; Environmental Science Associates, Inc., 1990.

TABLE 5: LONG-TERM SFIA MASTER PLAN PROJECTS BY FUNCTIONAL AREA (1997-2006) - SUMMARY/a/

	Function	1996 Total	Demolish	Construct	Net New Construction/b/	Remodel	No Change/c/	2006 Total/d/
1.0	SUBTOTAL TERMINAL	4,024,900	(32,000)	104,000	72,000		3,992,900	4,096,900
2.0	SUBTOTAL AIRLINE SUPPORT (NONTERMINAL)	121,500					121,500	121,500
3.0	SUBTOTAL AIRLINE MAINT.	4,220,400	(26,800)		(26,800)		4,193,600	4,193,600
4.0	SUBTOTAL GENERAL AVIATION	90,000					90,000	90,000
5.0	SUBTOTAL AIR FREIGHT	1,418,700	(60,000)	294,000	234,000		1,358,700	1,652,700
6.0	SUBTOTAL AIRPORT SUPPORT	177,000					177,000	177,000
7.0	SUBTOTAL COMMERCIAL	334,100	(13,100)		(13,100)	220,000	101,000	321,000
8.0	SUBTOTAL ADMIN./OFFICE	252,200		100,000	100,000		252,200	352,200
10.0	SUBTOTAL MISCELLANEOUS	63,400					63,400	63,400
TOTAL LONG-TERM PLAN		**10,702,200**	**(131,900)**	**498,000**	**366,100**	**220,000**	**10,350,300**	**11,068,300**

NOTE: Negative values are in parentheses.

/a/ All figures are in gross building square feet. Detailed building project summaries by function are in Appendix B, Table B.1.
/b/ Net New Construction = Construct square feet minus Demolish square feet.
/c/ No Change = 1996 Total square feet minus (Demolish square feet + Remodel square feet).
/d/ Total 2006 = Construct square feet + Remodel square feet + No Change square feet OR 1996 Total square feet + Net New Construction square feet.

SOURCES: Table 6.3 and Appendix 12.5, *SFIA Final Draft Master Plan*, 1989; SFIA Airports Commission, 1990; U.S. Coast Guard, 1990; Environmental Science Associates, Inc., 1990.

TABLE 6: TOTAL SFIA MASTER PLAN PROJECTS BY FUNCTIONAL AREA (1990-2006) - SUMMARY/a/

	Function	1990 Total	Demolish	Construct	Net New Construction/b/	Remodel	2006 Total/c/
1.0	TOTAL TERMINAL	2,620,500	(277,600)	1,754,000	1,476,400	490,000	4,096,900
2.0	TOTAL AIRLINE SUPPORT (NONTERMINAL)	81,800	(30,300)	70,000	39,700		121,500
3.0	TOTAL AIRLINE MAINT.	3,918,300	(482,200)	757,500	275,300		4,193,600
4.0	TOTAL GENERAL AVIATION	88,100	(88,100)	90,000	1,900		90,000
5.0	TOTAL AIR FREIGHT	867,700	(301,300)	1,086,300	785,000	71,400	1,652,700
6.0	TOTAL AIRPORT SUPPORT	172,800	(34,800)	39,000	4,200		177,000
7.0	TOTAL COMMERCIAL	234,000	(14,000)	101,000	87,000	220,000	321,000
8.0	TOTAL ADMIN./OFFICE	126,100	(33,900)	260,000	226,100		352,200
10.0	TOTAL MISCELLANEOUS	88,400	(88,400)	63,400	(25,000)		63,400
GRAND TOTAL MASTER PLAN		**8,197,700**	**(1,350,600)**	**4,221,200**	**2,870,600**	**781,400**	**11,068,300**

NOTE: Negative values are in parentheses.

/a/ All figures are in gross building square feet. Detailed building project summaries by function are in Appendix B, Table B.1.
/b/ Net New Construction = Construct square feet minus Demolish square feet.
/c/ Total 2006 = Existing 1990 square feet + Net New Construction square feet.

SOURCES: Table 6.3 and Appendix 12.5, *SFIA Final Draft Master Plan*, 1989; SFIA Airports Commission, 1990; U.S. Coast Guard, 1990; Environmental Science Associates, Inc., 1990.

TABLE 7: SFIA MASTER PLAN BUILDING AREA CHANGES, 1996 AND 2006 /a/

Function		Building Area Total 1990	Near-Term Master Plan (1990 - 1996)			Total Master Plan (1989 - 2006)		
			Building Area Total 1996	Net Change 1990-1996	Percent Change 1990-1996	Building Area Total 2006	Net Change 1990-2006	Percent Change 1990-2006
1.0	Terminal	2,620,500	4,024,900	1,404,400	54%	4,096,900	1,476,400	56%
2.0	Airline Support	81,800	121,500	39,700	49%	121,500	39,700	49%
3.0	Airline Maint.	3,918,300	4,220,400	302,100	8%	4,193,600	275,300	7%
4.0	General Aviation	88,100	90,000	1,900	2%	90,000	1,900	2%
5.0	Air Freight	867,700	1,418,700	551,000	64%	1,652,700	785,000	90%
6.0	Airport Support	172,800	177,000	4,200	2%	177,000	4,200	2%
7.0	Commercial	234,000	334,100	100,100	43%	321,000	87,000	37%
8.0	Admin./Office	126,100	252,200	126,100	100%	352,200	226,100	179%
10.0	Miscellaneous	88,400	63,400	(25,000)	(28%)	63,400	(25,000)	(28%)
TOTAL BUILDING AREA		8,197,700	10,702,200	2,504,500	31%	11,068,300	2,870,600	35%

NOTE: Negative values are in parentheses.

/a/ All figures are in gross building square feet. Detailed building project summaries by function are in Appendix B, Table B.1.

SOURCES: Appendix 12.5, *SFIA Final Draft Master Plan*, 1989; U.S. Coast Guard, 1990; Environmental Science Associates, Inc., 1990.

- <u>Proposed Facility Projects in Buildings</u>

- 1.0 Terminal Facilities: SFIA Master Plan Projects

<u>Near-Term SFIA Master Plan (1990 - 1996)</u>. A 250,000-square-foot International Terminal would be constructed on the west side of the terminal complex, above the existing terminal area access road. The building would have seven levels; the lower three levels would accommodate 250,000 square feet of passenger terminal functions and the upper four levels would accommodate about 160,000 square feet of administration and office functions and 100,000 square feet of hotel space (the latter are described under functional areas 7.0 and 8.0). A two-level roadway system would be constructed to provide access to the enplaning and deplaning levels. Two bi-level, 500,000-square-foot boarding piers (replacement Boarding Area A and new Boarding Area G) would be constructed adjacent to the new International Terminal. Each pier would extend approximately 1,200 feet and provide up to 13 gate positions.

Existing Boarding Area A (185,600 square feet) and 60,000 square feet of existing Boarding Area B would be demolished. A 400,000-square-foot boarding area (replacement Boarding Area B, Phase I) would be constructed to serve the existing South Terminal. Net additional terminal building area (excluding administration/office and hotel space in the new terminal) would total approximately 1,404,400 square feet. About 490,000 square feet of existing international terminal and boarding area would be remodeled for domestic terminal use.

<u>Long-Term SFIA Master Plan (1997 - 2006).</u> The remaining 32,000 square feet of Boarding Area B would be demolished and replaced with 104,000 square feet (replacement Boarding Area B, Phase II), for a net addition of 72,000 square feet. Combined near-term and long-term terminal projects would result in demolition of about 277,600 square feet and construction of about 1,754,000 square feet, for a total net addition of approximately 1,476,400 square feet of building area, including 22 or more additional aircraft gates.

2.0 Airline Support Facilities: SFIA Master Plan Projects

<u>Near-Term SFIA Master Plan (1990 - 1996).</u> A boilerhouse and four buildings, comprising about 30,300 square feet of area, would be demolished: United Airlines (UAL) Catering, American Airlines Ground Services Equipment (GSE) building, ASII/Evergreen building and Pan Am Crew Baggage Holding. A two-level,

60,000-square-foot replacement UAL Catering building and a single-level, 10,000-square-foot replacement American GSE would be constructed in the West Field area, totaling 70,000 square feet of new construction and about 39,700 square feet of net new building area. Pan Am Crew Baggage Holding would be accommodated in the proposed Pan Am Maintenance/Administration/Cargo Facility south of the terminal access road (under Functional Area 3.0), and ASII/Evergreen would be accommodated in the proposed North Field Cargo/Maintenance Facility (under Functional Area 5.0).

Long-Term SFIA Master Plan (1997 - 2006). No additional Airline Support projects would be included in the Long-Term SFIA Master Plan.

3.0 Airline Maintenance Facilities: SFIA Master Plan Projects

Near-Term SFIA Master Plan (1990 - 1996). Six buildings, comprising about 455,400 square feet of area, would be demolished: Vacant Hangar (Building 32), Qantas Maintenance Hangar, United Airlines Maintenance Center, Pan Am Maintenance, TWA Service Building and Japan Airlines (JAL) Maintenance Building. A 495,000-square-foot East Field Maintenance Hangar would be constructed to accommodate future expansion and to consolidate functions from the demolished maintenance buildings in the West Field area (all of the above-named except JAL and Pan Am). A 262,500-square-foot replacement Pan Am building, to house maintenance, administration and air freight functions, would be constructed in the vicinity of the existing Pan Am building, which would be demolished to accommodate the proposed expansion of Boarding Area A. JAL Maintenance would relocate to the proposed North Field Cargo/Maintenance facility (described under 5.0 Air Freight, below). Airline maintenance facility construction would total about 757,500 square feet; net new building area would total about 302,100 square feet.

Long-Term SFIA Master Plan (1997 - 2006). The Continental Maintenance Hangar (Building 42), containing about 26,800 square feet of building area, would be demolished. Combined near-term and long-term airline maintenance projects would result in demolition of about 482,200 square feet and construction of about 757,500 square feet, for a total net addition of approximately 275,300 square feet of building area.

4.0 General Aviation Facilities: SFIA Master Plan Projects

Near-Term SFIA Master Plan (1990 - 1996). The 48,112-square-foot Butler Aviation Fixed Base Operator (FBO) facility, and the 40,000-square-foot Chevron Hangar, both now located in the West Field area, would be demolished. A new, 90,000-square-foot replacement facility would be constructed in the East Field area, near the proposed East Field Maintenance Hangar.

Long-Term SFIA Master Plan (1997 - 2006). No additional General Aviation projects would be included in the Long-Term SFIA Master Plan.

5.0 Air Freight Facilities: SFIA Master Plan Projects

Near-Term SFIA Master Plan (1990 - 1996). Three air freight facilities, totaling about 241,300 square feet, would be demolished: Flying Tigers Hangar (Federal Express), JAL Cargo Building, and Cargo Building Number 7. (The Flying Tigers Hangar is slated for demolition in 1989-90 under the approved SFIA Capital Projects Plan; the demolition is analyzed in this EIR as part of the SFIA Master Plan and also as part of the No-Project alternative.) A 324,000-square-foot, four-building West Field Cargo/Maintenance facility, and a 432,000-square-foot North Field Cargo/Maintenance facility would be constructed. A 36,300-square-foot addition to the existing United Cargo facility, located in the West Field area, would also be constructed. Air Freight facility construction would total about 792,300 square feet; net new building area would total about 551,000 square feet. The TWA Cargo facility, about 71,400 square feet, would be remodeled.

Long-Term SFIA Master Plan (1997 - 2006). The 60,000-square-foot Airborne Cargo Building, located in the West Field Area, would be demolished. Three buildings, totaling about 162,000 square feet, would be constructed as part of the West Field Cargo/Maintenance facility, and a 132,000-square-foot addition would be constructed for the nearby U.S. Air Mail facility, bringing total construction under the long-term SFIA Master Plan to about 294,000 square feet of building area. Combined near-term and long-term Air Freight projects would result in demolition of about 301,300 square feet and construction of about 1,806,300 square feet, for a total Master Plan net addition of approximately 785,000 square feet of building area.

6.0 Airport Support Facilities: SFIA Master Plan Projects

Near-Term SFIA Master Plan (1990 - 1996). Day storage fuel tanks in the South Field area, and the Shell Garage/Warehouse in the North Field area would be demolished. All three Crash/Fire/Rescue facilities, totaling about 34,800 square feet of building area, would be demolished and replaced by three facilities totaling about 39,000 square feet of building area. (Replacement of CFR Building #2, scheduled for 1989-90 under the approved SFIA Five-Year Capital Projects Plan, is ongoing.)

Airport support projects would also include installation of additional utilities, including new water lines, sanitary sewage lines, industrial waste sewer lines, storm drainage lines, and electrical transmission lines. Changes to existing utility structures are listed in Table 8. Proposed utility projects are further described in EIR Section IV.J. Utilities.

Long-Term SFIA Master Plan (1997 - 2006). Beyond completion of new utility systems, no additional airport support projects would be included in the Long-Term SFIA Master Plan.

7.0 Commercial Facilities: SFIA Master Plan Projects

Near-Term SFIA Master Plan (1990 - 1996). The 900-square-foot Chevron gas station, north of the terminal roadway, would be demolished and a 1000-square-foot replacement facility would be constructed nearby. Approximately 100,000 square feet of hotel area would be constructed in conjunction with the 160,000 square feet of administrative/office space planned for levels four through eight of the proposed new international terminal.

Long-Term SFIA Master Plan (1997 - 2006). The approximately 13,100-square-foot Bank of America, on the north end of the West Field area, would be demolished. Replacement area would be provided near the terminal roadway in the proposed 100,000-square-foot office building (described under 8.0 Administration/Office, below). The 220,000-square-foot Hilton Inn would be remodeled. Combined near-term and long-term commercial projects would result in demolition of about 14,000 square feet, remodeling of about 220,000 square feet, and construction of about 101,000 square feet, for a total Master Plan net increase of approximately 87,000 square feet of building area.

TABLE 8: MISCELLANEOUS STRUCTURES AFFECTED BY MASTER PLAN PROJECTS (1990-2006)

Facility		Demolish	Construct
AIRLINE SUPPORT			
61	United Boilerhouse	x	x
AIRPORT SUPPORT			
	Day Storage:		
69	Shell Storage Tanks	x	
86	Shell Garage/Warehouse	x	
70	Union Storage Tanks	x	
71	PST Tanks	x	
72	PST Tanks	x	
MISCELLANEOUS			
	U.S. Coast Guard Facilities		
	Ramps	x	x
	Pumps	x	x
	Fuel Hydrants	x	x
	Tank Farm	x	x
	Multi-Use Harbor Dock	x	x

SOURCE: *SFIA Final Draft Master Plan*, 1989.

8.0 Administration/Office Facilities: SFIA Master Plan Projects

Near-Term SFIA Master Plan (1990 - 1996). The approximately 33,900-square-foot Pan Am Administration building, near the Pan Am Maintenance facility in the South Field area, would be demolished. Replacement area would be provided in the 160,000-square-foot, four-level office/administration area to be constructed over the proposed three-level International Terminal. The airport administration offices, currently situated in the existing International Terminal, would relocate to the new terminal as well. (As described above under Functional Area 1.0, 100,000 square feet of hotel space would also be built above the International Terminal.) Net new

Office/Administration construction under the near-term SFIA Master Plan would total about 126,100 square feet of building area. Note: administration/office space in existing terminal buildings, not inventoried in the SFIA Master Plan, would continue in those uses. The existing International Terminal would be converted to domestic use.

Long-Term SFIA Master Plan (1997 - 2006). A 100,000-square-foot office building (with adjoining five-level parking Garage CC) would be constructed in the West Field area, near the terminal roadway. Combined near-term and long-term Administration/Office projects would result in demolition of about 33,900 square feet and construction of about 260,000 square feet, for a total net addition of approximately 226,100 square feet of building area.

9.0 Rental Car Garage / Ground Transportation Facilities: SFIA Master Plan Projects

Near-Term SFIA Master Plan (1990 - 1996). A 960,000-square-foot, multi-level Rental Car Garage / Ground Transportation Center (RCG/GTC) would be constructed on both sides of, and above, existing terminal roadways R-1N and R-1S. North and south portions of the Rental Car Garage / Ground Transportation Center would be connected by vehicle bridges and would be served by a new elevated roadway system designed to segregate traffic from the existing airport entrance and terminal roadway system. Level 1 would accommodate rental car shops, offices, car washing and garage facilities; Level 2 would accommodate bus and shuttle van staging areas; Level 3 would accommodate rental car pickup and return areas; Level 4 would accommodate rental car staging and storage; and Level 5 would accommodate short-term public, permit and city employee parking. Underground fuel storage for rental car agencies would be installed at the outside perimeter of the proposed Rental Car Garage / Ground Transportation Center./12/

Existing rental car facilities and the Chevron gas station would be relocated to accommodate the Rental Car Garage / Ground Transportation Center (relocation of Dollar and Budget rental car companies is included in the approved SFIA Capital Projects Plan). Existing underground utilities would also be removed and reconstructed to accommodate the Rental Car Garage / Ground Transportation Center./12/

An Automated People Mover (APM) system, consisting of a dual fixed guideway alignment with trains moving in both directions, would be constructed along the circumference of the terminal roadway. A 30,000-square-foot interim APM maintenance facility would be constructed within the proposed Rental Car Garage / Ground Transportation Center. A parking Garage DD, approximately two million square feet in area, would be constructed adjacent to parking Lot D. Transportation construction under the near-term SFIA Master Plan would total approximately 3,180,000 square feet of building area (parking facilities are described further under functional area 11.0). Note: Rental Car Garage / Ground Transportation Center building area is not included in the totals shown in the SFIA Master Plan Project Summary Tables 3 - 6, pp. 31-33, 46-48, but is instead included with the SFIA Master Plan parking garage project totals, shown in Table 9, p. 57.

<u>Long-Term SFIA Master Plan (1997 - 2006)</u>. The APM system would be extended to the existing and proposed new remote long-term parking Lots D and DD. The interim APM maintenance facility would be demolished and converted into additional Transportation Center parking (approximately 80 spaces). A 60,000-square-foot, permanent APM maintenance facility would be constructed in parking Lot D. A parking Lot CC, approximately 440,000 square feet in area, would be constructed next to the proposed new office building. Combined near-term and long-term transportation projects would result in a net addition of approximately 3,648,000 square feet of building area. As above, this building area is shown in Table 9, p. 57.

10.0 Miscellaneous Facilities: SFIA Master Plan Projects

<u>Near-Term SFIA Master Plan (1990 - 1996)</u>. Existing U.S. Coast Guard facilities (about 88,400 square feet of barracks and shops, as well as ramps, pumps, fuel hydrants and tank farm) would be demolished and all but the 25,000-square-foot barracks reconstructed at a new location to accommodate Master Plan projects in the North and East Field areas. (Realignment of Taxiway C, and construction of a new roadway through the U.S. Coast Guard property, would also be implemented.)

Existing SFIA dock facilities (about 10,000 square feet) at the seaplane harbor would be demolished and replaced with an approximately 20,000-square-foot multi-use harbor dock facility. Other proposed demolition and reconstruction of miscellaneous structures are shown in Table 8, p. 54.

TABLE 9: RENTAL CAR GARAGE / GROUND TRANSPORTATION CENTER, AUTOMATED PEOPLE MOVER (APM) AND PARKING GARAGE AREAS - NEAR-TERM AND LONG-TERM MASTER PLAN

Facility	Area in Square Feet
Near-Term Master Plan	
Rental Car Garage / Ground Transportation Center	960,000
Automated People Mover (APM) Maintenance (interim)	30,000
Garage DD	2,190,000 /a/
Subtotal, Near-Term Plan	3,180,000
Long-Term Master Plan	
APM Maintenance (interim)	(30,000)
APM Maintenance (permanent)	60,000
Garage CC	438,000
Subtotal, Long-Term Plan	468,000
TOTAL MASTER PLAN	3,648,000

/a/ Garage areas are estimated from number of stalls listed in SFIA Master Plan, using a factor of 365 square feet per stall. The proposed Garage DD would have about 6,000 stalls and the proposed garage CC would have about 1,200 stalls.

SOURCES: *SFIA Final Draft Master Plan; Transportation and Traffic Engineering Handbook*, Second Edition, Institute of Transportation Engineering, Washington, D.C., 1982; Environmental Science Associates, Inc.

Airport utility systems would be expanded and upgraded under both near- and long-term Master Plans, as described in EIR Section IV.J. Utilities Impacts.

Long-Term SFIA Master Plan (1997 - 2006). Beyond completion of utility systems, no additional miscellaneous facility projects would be included in the long-term SFIA Master Plan.

11.0 Parking Facilities: SFIA Master Plan Projects

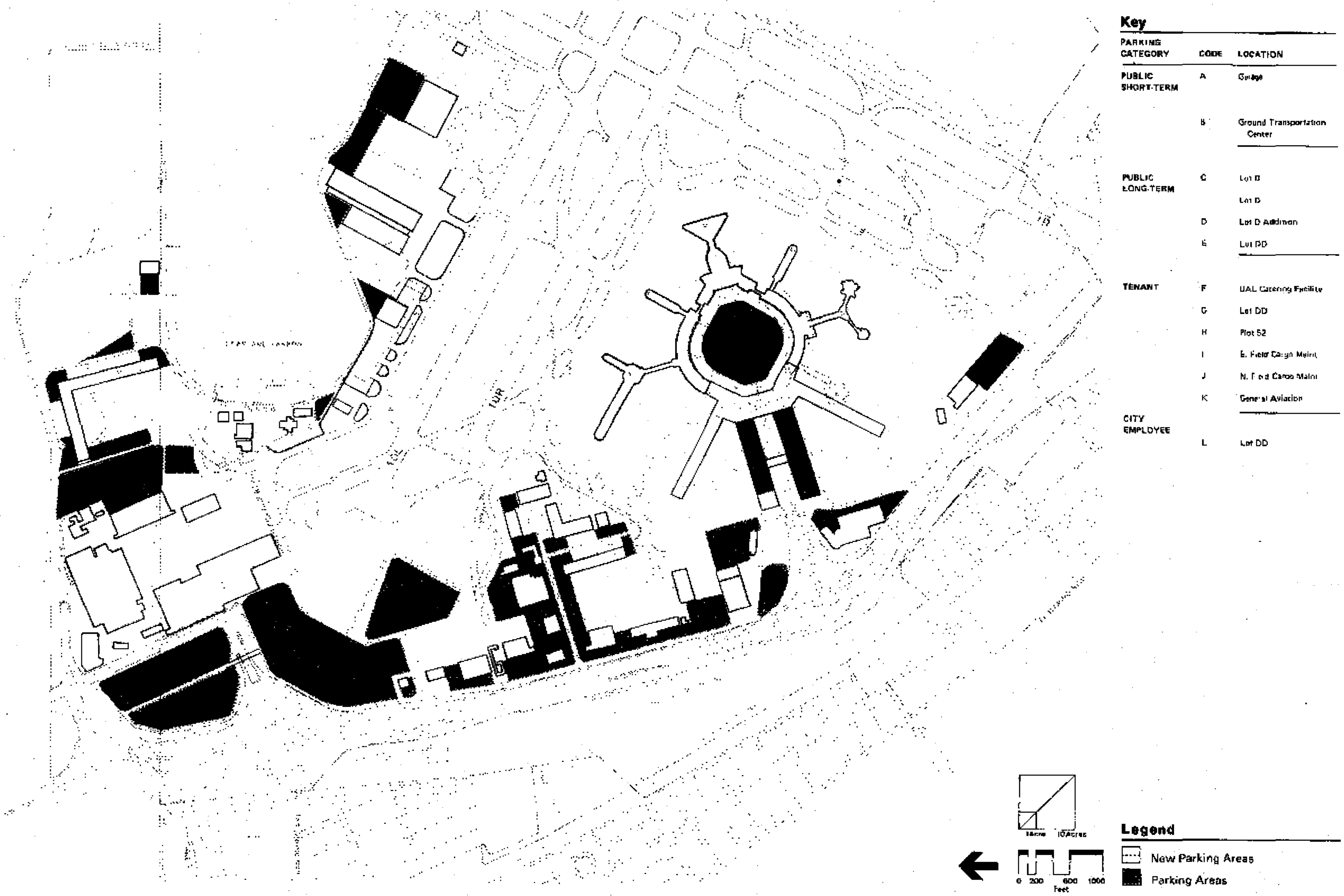
Near-Term SFIA Master Plan (1990 - 1996). Parking Lot D (long-term) would be expanded by about 3,000 auto stalls and a two- or three-level parking structure DD of about 2.2 million square feet (6,000 stalls) would be constructed adjacent to Lot D. A vehicle bridge would be constructed to link the two facilities (expansion of Lot D and construction of the vehicle bridge to Garage DD are included in the approved SFIA Capital Projects Plan; these projects are analyzed in this EIR as part of the SFIA Master Plan and also as part of the No-Project alternative). The top (fifth) level of the proposed Rental Car Garage / Ground Transportation Center would also be used for public parking (about 850 stalls). Accounting for stalls lost as a result of other Master Plan projects, net new near-term parking would total about 7,010 stalls.

Long-Term SFIA Master Plan (1997 - 2006). Long-term Parking Lot D would be further expanded and a multi-story parking structure C and CC of about 440,000 square feet (1,200 stalls) would be constructed adjacent to the proposed 100,000-square-foot office building (described above, under 8.0 Administration/Office). Accounting for stalls lost as a result of other Master Plan projects, total parking would increase by about 2,500 stalls under the long-term plan. Combined near-term and long-term SFIA Master Plan parking projects would result in net addition of about 7,340 stalls.

Building areas of the proposed Rental Car Garage / Ground Transportation Center, Automated People Mover (APM) and parking garages are summarized in Table 9, p. 57. Near-term and long-term SFIA Master Plan parking projects are shown in Figures 8 and 9, pp. 59 - 60. SFIA Master Plan parking projects are further detailed in EIR Section III.B. Transportation.

12.0 Roadway Facilities: SFIA Master Plan Projects

Near-Term SFIA Master Plan (1990 - 1996). Several near-term SFIA Master Plan roadway projects are programmed as part of the approved SFIA Five-Year Capital Plan. These include the widening of Frontage Road R-3 (McDonnell Road) from two lanes to four lanes (scheduled for implementation in 1991/92), and widening of North Access Road from two lanes to four lanes (scheduled for implementation in 1989/90,

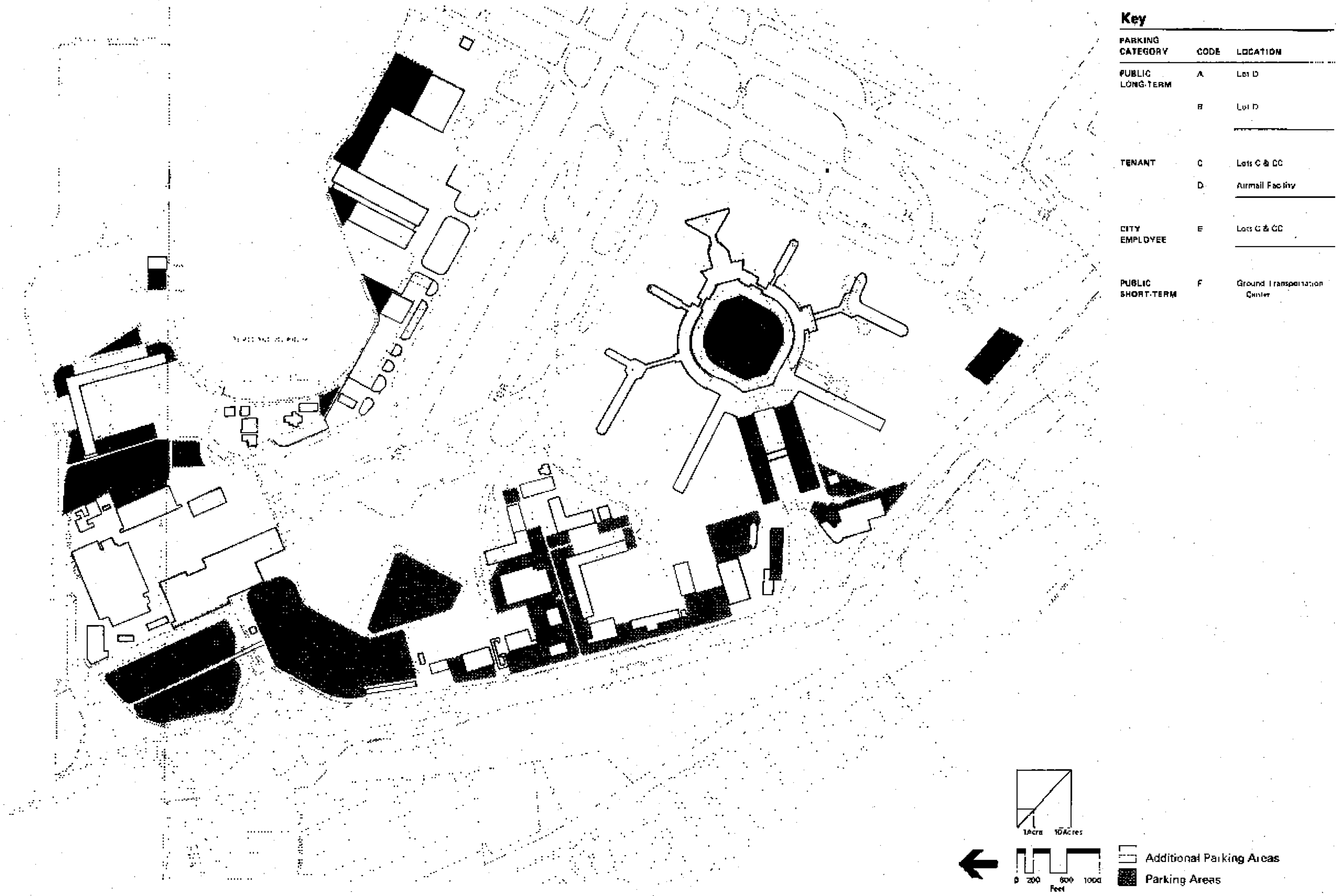


SOURCE: San Francisco International Airport Master Plan

San Francisco International Airport ■

Figure 8

Near-Term Parking Plan



SOURCE: San Francisco International Airport Master Plan

San Francisco International Airport ■

Figure 9

Long-Term Parking Plan

but not done as of February 1991). These projects are analyzed in this EIR as part of the SFIA Master Plan and also as part of the No-Project alternative. SFIA Master Plan roadway projects not included in the SFIA Five-Year Capital Projects Plan include widening of Roadway R-6, construction of a new perimeter roadway to the U.S. Coast Guard facilities, reconfiguration of the US 101 - terminal area interchange and reconfiguration of the Interstate 380 - SFIA interchange. Roadway projects are further detailed in EIR Section IV.B. Transportation.

Long-Term SFIA Master Plan (1997 - 2006). Additional roadway projects under the long-term Master Plan would include the widening of Frontage Road R-2 (south of the passenger terminal).

13.0 Airside Facilities: SFIA Master Plan Projects

Near-Term SFIA Master Plan (1989 - 1996). Airfield modifications included in the near-term SFIA Master Plan include realignment of Taxiways A, B, C and R, and extension of Taxiways A and B. Other airfield improvements are programmed as part of the SFIA Five-Year Capital Projects Plan. These include installation of a microwave landing system, extension of Taxiway L to Runway 19L, extension of Taxiway V to Taxiway L, and construction of two high-speed exit taxiways -- one at Runway 19L and Taxiway F and one at Runway 10L and Taxiway L.

Long-Term SFIA Master Plan (1997 - 2006). One additional airfield project is included in the long-term Master Plan: expansion of the south terminal ramp area to accommodate reconfiguration of Boarding Area B and extension of Taxiways A and B.

D. FUTURE GROWTH UNDER THE PROJECT COMPARED TO OTHER FUTURE SCENARIOS

The SFIA Master Plan was developed on the basis of forecasts of aviation activity and requirements for Airport facilities to meet forecast demand. As discussed in Chapter 7 of the SFIA Master Plan, the SFIA activity forecasts were developed from a set of assumptions about the characteristics of activity in the Bay Area region and at SFIA.

Other forecasts have been developed for SFIA, using different assumptions about the characteristics of regional and Airport activity. If the future characteristics of activity are as assumed by those forecasts, future aviation activity at SFIA could be different from that forecast in the SFIA Master Plan.

The master planning process is intended to be flexible and respond to unforeseen changes in activity./16/ However, the capability of the future landside facilities currently planned under the project to accommodate future activity could be affected if the activity is different from that forecast in the SFIA Master Plan.

The capability of the existing SFIA airfield (airside facilities) to accommodate future activity with "acceptable" delays is also affected by the level and characteristics of the activity.

This section includes a comparison of the SFIA Master Plan forecasts for SFIA with forecasts prepared by the California Department of Transportation in the *California Aviation System Plan (CASP)*, and by the FAA in the document *Terminal Area Forecasts, FY 1989-2005.*/17,18/ A discussion of regional passenger forecasts prepared by the CASP and FAA is provided in Section III.A. Land Use and Plans, beginning on p. 107

Aviation Activity Forecasts

A summary of the forecasts developed in the SFIA Master Plan is provided in Table 1, p. 24, and in Appendix B, Table B-2, pp. A.32-35. Key assumptions made in developing the forecasts include:

- The Bay Area region will continue to experience strong passenger growth.
- SFIA will continue to capture the major share of passenger demand.
- SFIA will continue to be the primary facility serving international activity.
- Larger aircraft will be serving SFIA in the future, and more passengers will be on each aircraft.
- Continued growth in activity is accommodated by increased utilization of aircraft and Airport facilities.
- Existing and future landside facilities will be available to satisfy demand.

In the CASP forecasts, total passenger traffic in California is the sum of individual forecasts at each of the state's existing and projected air carrier airports. For each airport, a service area relating to county boundaries was defined. The SFIA service area includes the nine counties that make up the Bay Area region (some of which are also part of the service areas for Metropolitan Oakland International and San Jose International Airports)./17/

Historic passengers at SFIA were compared to historic population within the SFIA service area to obtain factors for enplaned passengers per capita. For example, enplaned passengers per capita at SFIA increased from about 0.6 in 1980 to about 0.91 in 1985.

Forecasts were then made of the enplaned-passengers-per-capita factors. For example, enplaned passengers per capita at SFIA are forecast to increase to 1.5 in 1995 and 2.3 in 2005. These factors were applied to forecast service area population to determine forecast passengers.

In the FAA forecasts, growth factors developed through the use of a terminal area forecast data base were applied to individual airports. At some airports, the forecasts were modified to reflect forecasts for major hubs. The hub forecasts were developed using analysis of trends, the characteristics of activity at each airport within the hub, and socioeconomic trends and forecasts./18/

Summary of SFIA Annual Passenger and Operations Forecasts. Table 10 shows a comparison of the annual activity forecasts for SFIA developed in the SFIA Master Plan, CASP, and FAA studies. The table shows that:

- The CASP passenger forecasts for 2006 are 3 percent higher than the SFIA Master Plan forecasts, but the CASP air carrier operations forecasts for 2006 are 74 percent higher (or 40 percent higher if commuter operations are included in the SFIA Master Plan forecast). The difference is due to differing assumptions about aircraft size and load factors.

- The FAA passenger forecasts for 2006 are 21 percent lower than the SFIA Master Plan forecasts, but the FAA air carrier operations forecasts for 2006 are 8 percent lower. Although the aircraft size and load factors assumed by FAA are not available, they are likely to be lower than the corresponding aircraft size and load factors assumed in the SFIA Master Plan.

TABLE 10: COMPARISON OF ANNUAL ACTIVITY FORECASTS FOR SFIA, 1996 AND 2006

	SFIA Master Plan/a/	CASP/b/	FAA/b/
Annual Passengers			
1996	42,280,000	39,268,000 /c/	35,668,000 /c/
2006	51,330,000	52,770,000 /c/	40,567,000 /c/
SFIA Share of Region's Passengers			
1996	71%	69%	69%
2006	70%	65%	63%
Average Seats Per Aircraft			
1996	175 /d/	137 /e/	NA
2006	180 /d/	138 /e/	NA
Average Load Factor			
1996	59%	54% /e/	NA
2006	65%	53% /e/	NA
Annual Air Carrier Operations			
1996	375,100	534,600 /f/	346,000 /g/
2006	411,600	715,300 /f/	378,000 /g/
Annual Total Operations			
1996	496,800	605,900	498,000
2006	538,500	802,300	536,000

NA = Not available

/a/ See Table 1 for assumptions about activity forecast in the SFIA Master Plan.
/b/ CASP and FAA forecasts for 1995 and 2005 are adjusted to reflect forecast activity in 1996 and 2006.
/c/ Includes passengers on commuter flights.
/d/ During the average day of the peak month.
/e/ During the average day of the year.
/f/ Includes flights by commuter aircraft.
/g/ Classified as air carrier by the FAA Airport Traffic Control Tower.

SOURCES: Chapter 7, SFIA Master Plan; California Department of Transportation, Division of Aeronautics, The California Aviation System Plan, July 1989; U.S. Department of Transportation, Federal Aviation Administration, Terminal Area Forecasts, FY 1989 - 2005, April 1989.

- Both the CASP and FAA forecasts were developed assuming that SFIA would capture a smaller proportion of the region's demand than was assumed in the SFIA Master Plan.

- The SFIA Master Plan forecasts were prepared assuming that aircraft size and load factors would increase, in response to an increasingly capacity-constrained environment. The CASP forecasts were prepared assuming that aircraft size and load factors would remain virtually constant, and that "as traffic and service reach design capacity limits, air service growth for the Bay Area will increasingly be re-directed..."/17/

Future Landside Facilities

In the SFIA Master Plan, terminal requirements were developed on the basis of forecast passengers and operations during the average day of the peak month, and the peak hour. The requirements for other landside facilities were developed using the relationship between forecast passengers and operations and building areas, surveys of Airport tenants, and general planning criteria.

If the scenario forecast in the CASP occurs, there would be more passengers and more operations, by generally smaller aircraft, than forecast in the SFIA Master Plan. If the scenario forecast by the FAA occurs, there would be fewer passengers and operations than forecast in the SFIA Master Plan.

The master planning process involves continually reassessing the level and nature of demand and adjusting plans for development accordingly. "Ideally, the master plan should reflect an up-to-date assessment of what exists and what is required."/16/ If such a reassessment is performed, future landside facilities at the Airport could be modified to accommodate changes in future activity.

However, if the other forecast scenarios described were to occur and landside facility plans were not modified, future Airport facilities might not be able to provide a high or adequate level of service, and crowding and delays in loading and unloading aircraft might result.

Analysis of Airfield Capacity and Aircraft Delay

This section includes a discussion of analyses of airfield capacity and aircraft delay prepared for the SFIA Master Plan, San Francisco Bay Area Airports Task Force Capacity Study, and CASP.

Airfield capacity, as analyzed in the SFIA Master Plan and Task Force studies, is the maximum number of aircraft operations that can take place in a given time, under specified conditions. "Congestion results whenever the volume of aircraft operations at an airport approaches airfield capacity."/19/

The annual service volume was estimated for purposes of evaluating airfield capacity in the CASP:

> "The [annual service volume] ASV is the annual volume of aircraft operations beyond which the average delay to each aircraft increases rapidly with relatively small increases in aircraft operations (and beyond which the levels of service on the airfield deteriorate).
>
> "The ASV is a reasonable estimate of an airport's annual capacity in terms of aircraft operations that may be used as a reference in airport planning....However, it is recognized that for many airports...the peak hour...capacity is a more important and relevant measure of an airport's airfield capacity than the annual service volume..."/20/

SFIA Master Plan

The analysis of airfield capacity was based on a survey of scheduled airline operations in 1986, FAA Engineered Performance Standards, the Task Force study, and FAA aviation forecasts. "Practical" and "calculated" airfield capacities at SFIA were estimated for various runway uses (configurations) and weather conditions. Practical capacity was defined as "a function of passenger and airline tolerance of delays." Calculated capacity is the theoretical maximum capacity of the airfield.

Table 11 shows the practical and calculated capacities during VFR (visual flight rules) and IFR (instrument flight rules) conditions and for the primary runway configurations at SFIA, along with the percent of the time each combination of weather conditions and runway use occurs.

As shown in the table, the practical capacity of the airfield during VFR conditions, with Runways 28L and 28R used for arrivals and 1L and IR used for departures, is 103 operations per hour. It is estimated that this maximum capacity use can occur

TABLE 11: SFIA AIRFIELD CAPACITIES DURING VARIOUS WEATHER AND RUNWAY USE CONDITIONS, SFIA MASTER PLAN

Runway Use		Airfield Capacity (Operations Per Hour)		Percent Annual
Visual Flight Rules/a/				
Arrivals	Departures	Practical/b/	Calculated/c/	Use/d/
28L, 28R	1L, 1R	103	109	61.4%
28L, 28R	28L, 28R	90	84	24.6
19L, 19R	10L, 10R	85	77	6.6
				92.6%
Instrument Flight Rules/a/				
Arrivals	Departures			
28L, 28R	1L, 1R	53	68	5.6%
28L, 28R	28L, 28R	53	62	0.4
19L, 19R	10L, 10R	53	53	1.4
				7.4%

/a/ Visual flight rules conditions occur when the cloud ceiling is at 1,000 feet or above and visibility is at least 3 miles. Instrument flight rules conditions occur when the ceiling and visibility are below those minima.
/b/ "Practical" capacity reflects passenger and airline tolerance of delays, and can vary among airports.
/c/ "Calculated" capacity is the maximum capacity of the airfield.
/d/ Given the percent occurrence of various ceiling, visibility, and wind conditions.

SOURCE: SFIA Master Plan, Section 7.3.

about 61 percent of the year. Other runway configurations during VFR conditions result in lower airfield capacities. Practical airfield capacity during IFR conditions is estimated to be 53 operations per hour.

As shown in Appendix J, Table J-1, p. 179, in 1990 there were 94 aircraft operations during the peak hour, 69 of which were performed by airline aircraft. Total peak hour operations are forecast to increase to 120 by 2006; airline peak hour operations are forecast to increase to 96 by 2006. A comparison of the peak-hour activity in Table J-1 with the estimated capacities in Table 11 shows that under VFR conditions, forecast airline activity during the peak hour would be less than estimated capacity while total aircraft operations would be higher than capacity during the peak hour in 2006. Under IFR conditions, forecast airline activity during the peak hour would be about 1.8 times higher than estimated capacity.

Section 7.3 of the SFIA Master Plan includes the following conclusions regarding airfield capacity and aircraft delay:

- "Under VFR conditions, there appears to be adequate capacity to accommodate the forecast levels of demand for scheduled air carriers."
- "Increasing delays during peak periods may result in the 'squeezing out' of general aviation aircraft, passenger acceptance of delays, spreading of peak activity over longer periods, cancellation of flights, or greater use of other airports.
- "Under IFR conditions, the existing airfield capacity limit...may be expected to result in an unmanageable situation for the forecast levels of traffic."
- "The effects of this...will result in the implementation of...technological innovations..., increased utilization of other airports..., additional improvements to the airfield."

FAA Capacity Task Force

The San Francisco Bay Area Airports Capacity Task Force was established by the FAA to analyze capacity and existing and forecast delays and evaluate proposed actions to increase capacity and reduce delays at the Bay Area's airports. The study was performed jointly by the FAA, Bay Area international airport staffs, the Air Transport Association, and the airlines serving the Bay Area./19/

The study was based on aircraft operations in 1986 and two forecast years (1990 and 1995). Table 12 shows total annual, average day of the peak month, and peak hour operations at SFIA in 1986 and forecast for 1990 and 1995.

The Task Force analysis of airfield capacity was based on estimated "maximum throughput" and "acceptable delay" capacities for various runway uses and weather conditions. Acceptable delay was defined as an average of four minutes for arriving aircraft./19/ Table 13, p. 70 shows then-current airfield capacities at SFIA.

TABLE 12: ACTUAL AND FORECAST AIRCRAFT OPERATIONS AT SFIA, CAPACITY TASK FORCE STUDY

Time Period	Actual 1986	Task Force Forecast 1990	Task Force Forecast 1995
Annual	450,000	500,000	525,000
Average Day, Peak Month	1,307	1,451	1,540
Peak Hour (All Operations)	96	105	108

SOURCE: U.S. Department of Transportation, Federal Aviation Administration, San Francisco Bay Area Airports Task Force Capacity Study of SFO, SJC, and OAK International Airports, 1987.

As shown in Table 13, "acceptable delay" capacity during VFR conditions, with Runways 28L and 28R used for arrivals and 1L and 1R for departures, was 93 operations (assuming arrival priority and 50 percent arrival demand). This maximum capacity use can occur up to about 61 percent of the year.

As shown by comparing the peak hour forecasts in Table 12 with the estimated capacities in Table 13, forecast peak hour activity is higher than estimated capacity under all weather conditions and runway configurations.

In the Task Force study, average delays (above the "acceptable" delay of four minutes) were estimated to be 11 minutes per operation in 1986 and forecast to be 17 minutes in 1990 and 24 minutes in 1995. These delays were estimated to result in direct airline operating costs of about $170 million in 1986, $270 million in 1990, and $370 million in 1995./19/

TABLE 13: SFIA AIRFIELD CAPACITIES DURING VARIOUS WEATHER AND RUNWAY USE CONDITIONS, CAPACITY TASK FORCE STUDY

Runway Use Visual Flight Rules/a/ Arrivals	 Departures	Airfield Capacity (Operations Per Hour)/b/ Acceptable Delay/c/	 Maximum Throughout/d/	Percent Annual Use/e/
8L, 28R	1L, 1R	93	109	61.4%
8L, 28R	28L, 28R	92	107	24.6
9L, 19R	10L, 10R	75	97	6.6
				92.6%
Instrument Flight Rules/a/				
Arrivals	**Departures**			
28R	1L, 1R	67	71	5.6%
28L, 28R	28L, 28R	57	67	0.4
19L	10L, 10R	52	55	1.4
				7.4%

/a/ Visual flight rules conditions occur when the cloud ceiling is at 1,000 feet or above and visibility is at least 3 miles. Instrument flight rules conditions occur when the ceiling and visibility are below those minima.

/b/ Assuming arrivals are given priority by air traffic control, and that arrivals are 50% of all operations. Capacities for arrivals and departures (shown separately in the Task Force study) are added.

/c/ Assuming that a four-minute delay is considered acceptable.

/d/ Assuming that there is always an aircraft waiting to arrive or depart.

/e/ Given the percent occurrence of various ceiling, visibility, and wind conditions. Some of the runway uses shown in the Task Force study are combined in this table.

SOURCE: U.S. Department of Transportation, Federal Aviation Administration, San Francisco Bay Area Airports Task Force Capacity Study of SFO, SJC, and OAK International Airports, 1987.

The Task Force studied 19 proposals for increasing airfield capacity and reducing aircraft delay. The 16 proposals recommended for implementation are listed in Appendix I, p. A.173. The recommended improvements providing the largest annual savings in delay costs were the extension of Runways 28L and 28R and the distribution of traffic more evenly among the three Bay Area airports.

CASP

In the CASP study of statewide system requirements, the estimated annual service volume at each airport was compared with forecast aircraft operations through the year 2005. Where forecast operations were higher than the annual service volume, proposed actions to alleviate the "capacity shortage" were evaluated in terms of their effects on a system-wide as well as individual airport basis./20/

The annual service volume for SFIA was estimated to be 500,000 annual aircraft operations. Total aircraft operations are forecast to increase to about 780,000 by the year 2005, according to the CASP. The projected capacity shortage in 2005 is about 280,000 operations, or about 56 percent of the existing airfield capacity.

Because projected capacity shortages are concentrated at the air carrier airports in the Los Angeles Basin, San Francisco Bay Area, and San Diego area, the impacts of potential "air carrier airport scenarios," consisting of combinations of remedial actions, were evaluated. Remedial actions evaluated included the redistribution of air carrier operations to other airports, relocation of general aviation operations, rescheduling of operations to off-peak hours, implementation of air traffic control improvements, and addition of facilities at existing or new airport sites./20/

The preliminary CASP recommendations for the San Francisco Bay Area are listed in Appendix I, p. A.173. The recommendations include the redistribution of operations among the Bay Area airports, construction of a new runway at Metropolitan Oakland International Airport, extension of a runway at San Jose International Airport, and addition of air carrier service to Travis Air Force Base.

Forecasts and Future Airside Facilities

The analyses of capacity and delay prepared as part of the Task Force and CASP studies cannot be compared directly to the SFIA Master Plan, as they were developed on the basis of different forecasts. However, it is likely that, if future activity at SFIA occurs as forecast in the SFIA Master Plan, the delays and delay costs estimated by the Task Force for 1990 would occur at SFIA by 1996 and the delays and costs estimated for 1995 would occur at SFIA in or before 2006.

If future activity at SFIA occurs as forecast in the CASP, delays could be longer and costs higher than estimated in the Task Force study, depending on the number of operations, mix of aircraft types serving the airport, and distribution of future activity during the day.

Assumptions for Evaluation of Environmental Effects

The capability of facilities at SFIA to accommodate forecast activity could affect future environmental conditions near the Airport. For example, delays to aircraft on the apron or taxiways result in increased aircraft noise, air pollutant emissions, and fuel consumption. The spreading of aircraft operations into non-peak hours (as a result of delays or rescheduling) can result in increased noise during evening or nighttime hours. Aircraft delays may affect the feasibility of implementing current or proposed noise abatement procedures.

As discussed in Section II.C. Project Characteristics, p. 22, the landside improvements proposed under the project are designed to accommodate the forecasts of activity developed in the SFIA Master Plan. If future activity occurs as forecast in the SFIA Master Plan, airport landside facilities with the project would not constrain the activity such that the constraints cause additional environmental effects. If future activity occurs as forecast under the CASP, however, SFIA landside facilities with the project may constrain the activity such that the constraints cause additional environmental effects. Those effects cannot be estimated specifically.

According to SFIA, the existing airfield could accommodate SFIA Master Plan related growth. This EIR evaluates whether the existing airfield could accommodate the forecast growth, and whether there could be airfield constraints that could cause additional environmental effects.

Because no major airside improvements are proposed as part of the SFIA Master Plan, the evaluation of future environmental conditions (with or without the project) must reflect projected delays to aircraft using the existing airfield. The effects of average delays, as estimated in the Task Force study, on aircraft noise, air pollution, and fuel consumption at SFIA are discussed in Sections IV.C. Noise, IV.D. Air Quality, and IV.E. Energy.

E. PROJECT APPROVALS AND SCHEDULE

MASTER PLAN APPROVAL PROCESS

Background

Development of the SFIA Master plan began in late 1986, with site inventories and development of demand forecasts. Findings were published in SFIA Master Plan Working Paper A (June 1987)./13/ On the basis of review and comment on Working Paper A from interested agencies and individuals, SFIA Master Plan facilities programs and alternatives were developed and published in Working Paper B (August 1988)./14/ Further refinements of the facilities programs, alternatives and costs were incorporated into Working Paper C (published in June 1989)./15/ The Final Draft SFIA Master Plan was published in November 1989./2/

Environmental Review

An Initial Study for the SFIA Master Plan EIR was published by the San Francisco Department of City Planning (DCP) on August 11, 1989. On the basis of the Initial Study, DCP determined that the proposed project might have a significant effect on the environment and that an EIR was therefore required according to the California Environmental Quality Act (CEQA). Notice that a Draft Environmental Impact Report (DEIR) was required was provided to local agencies and individuals at that time. On July 9, 1990, a formal Notice of Preparation was circulated via the State Clearinghouse to state agencies. Responses were received from interested individuals and local and state agencies.

Publication of the DEIR will be followed by a 45 to 60-day public comment period, including at least one public hearing on the Draft EIR before the San Francisco City Planning Commission (the certifying body of the "lead agency" under CEQA). Following the public hearing on this Draft EIR, responses to written and oral comments will be prepared. The Draft EIR, plus the Summary of Comments and Responses document containing instructions for revising the Draft EIR, will serve as the Final EIR (FEIR). The FEIR will be presented to the San Francisco City Planning Commission for certification as to accuracy, objectivity and completeness. The certified Final EIR will be used by the San Francisco Airports Commission in its decisions both on the proposed SFIA Master Plan and, if adopted, on projects carried out pursuant to the SFIA Master Plan. No actions pursuant to the SFIA Master Plan permits may be taken until the Final EIR is certified. Approval of the SFIA Master Plan is a separate action from EIR certification, and will include public hearings to be held by the Airports Commission.

This EIR is classified as a Program EIR under Section 15168 of the State CEQA Guidelines. A Program EIR is intended to provide a comprehensive assessment of all cumulative project impacts but does not examine each specific project component in detail. In the case of the SFIA Master Plan, this comprehensive assessment, when certified, would be intended to serve as a framework for implementing all project components included in the near-term SFIA Master Plan programs, without requiring further component-specific EIRs.

<u>SFIA Master Plan Approval Requirements</u>

Because SFIA is owned by and under the jurisdiction of the City and County of San Francisco, which is not subject to land use regulations of San Mateo County, no zoning ordinance amendments, General Plan amendments or conditional use authorizations or other approvals would be required from San Mateo County for implementation of the proposed SFIA Master Plan. Permits would likely be required from regional, state and federal agencies that have regulatory authority over aspects of SFIA land use and operations ("responsible agencies" under CEQA).

Bay Conservation and Development Commission (BCDC) approval would be required for construction of a public roadway adjacent to the U.S. Coast Guard sea wall that would permit employees and visitors to access East Field area facilities from the North Field access road, and for alteration or construction of a new multi-use dock facility, located adjacent to the U.S. Coast Guard Station at Seaplane Harbor. In considering the proposed dock in Seaplane Harbor, BCDC must find, among other things, that the use of the dock would be water-oriented, that the dock itself would be the minimum size necessary to achieve its purpose, that there was no feasible upland location for some or all of the dock, that the placement of the dock would minimize any harmful effects on fish and wildlife resources, water quality, and marshes and mudflats, and that any significant impacts on the Bay would be mitigated./20a/

- In considering the expansion of the roadway, BCDC must find that the use of the roadway would be consistent with the airport priority use designation and that the maximum feasible public access consistent with the project would be provided. All other proposed improvements outside BCDC's jurisdiction but within the Airport appear to be generally consistent with the airport priority use designation of the Bay Plan./20a/

  The Regional Water Quality Control Board, San Francisco Bay Region (RWQCB) would be responsible for regulating additional sewer and industrial wastewater discharges resulting from SFIA Master plan project implementation (see Section IV.J. Utilities).

- The proposed SFIA Master Plan project is located on historic and/or existing tidelands and submerged lands granted in trust by the California Legislature to the City and County of San Francisco pursuant to Chapter 987, Statutes of 1943, as amended. Uses involving granted tidelands must be consistent with the public trust and the applicable granting statutes. The City, as grantee, has the day-to-day administration of these lands and the State Lands Commission retains oversight authority. A permit from the State Lands Commission will, therefore, not be required. /20b/

Changes in freeway ramp configurations at the SFIA interchange with US 101, and at the I-380/US 101 interchange, as described in Section IV.B. Transportation, would require Caltrans action, in concert with SFIA. Discussions between Caltrans and SFIA are ongoing.

Caltrans Division of Aeronautics administers state noise standards and issues state permits for all airports. (See Section IV.C. Noise, for an analysis of noise impacts due to the SFIA Master Plan.) Since no runway extensions, relocations or additions are included in the SFIA Master Plan, the State Airport Permit for San Francisco International Airport should not be affected by the project. /20c/

SFIA Master Plan projects would not alter runways, aircraft approach zones or flight paths. Federal Aviation Administration (FAA) clear zone regulations currently affecting portions of Burlingame, Millbrae, San Bruno, South San Francisco and unincorporated areas of San Mateo County owned by SFIA would not change as a result of SFIA Master Plan implementation. Therefore no FAA action would be necessary for the SFIA Master Plan projects. Aviation safety issues are in FAA's purview and are discussed in Sections III.L and IV.M. Aviation Safety.

The U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act, is required to ensure that the continued existence of any endangered or threatened species is not jeopardized as a result of federally funded or authorized action. This Act applies to projects that would adversely modify or destroy habitat critical to these species. The West of Bayshore site has been identified as the habitat of the San Francisco garter snake, an endangered species, and the red-legged frog, a candidate for the endangered species list. This site is not included for development in the SFIA Master Plan.

Under the 1972 Federal Water Pollution Control Act, the Corps of Engineers was assigned permit authority over all dredging and filling operations in all waters of the United States. This definition includes San Francisco Bay up to the mean higher high water mark and adjacent wetlands, marshes, bogs, and similar areas. The Corps' principal concerns are the impacts that dredging or filling would have on water quality and marine life, erosion potential, and water supplies. Any person or public agency proposing to locate a structure, excavate, or discharge dredged or fill material into waters of the US or to transport dredged material for the purpose of dumping it into ocean waters must obtain a "404" permit. The construction of the Seaplane Harbor dock facility may fall under the jurisdiction of the COE and evoke the "404" permit requirement.

SFIA MASTER PLAN IMPLEMENTATION SCHEDULE AND COSTS

Near-term SFIA Master Plan projects would commence upon certification of the Final Environmental Impact Report and approval of the Master Plan, in autumn of 1991, or later. The bulk of demolition and construction would be completed within the first four to five years of SFIA Master Plan implementation. Total SFIA Master Plan costs are estimated at approximately $1.7 billion, with near-term demolition and construction projects representing nearly 70 percent of total costs.

NOTES - Project Description

/1/ Costas, John, Assistant Administrator, Planning and Construction, San Francisco International Airport, letter to Barbara Sahm, San Francisco Environmental Review Officer, dated October 15, 1990.

/2/ Airports Commission, San Francisco International Airport, *Final Draft Master Plan*, November 1989. (1989 figures have been used as approximations of 1990, the base year.)

/3/ 1989 aviation activity figures are primarily from "San Francisco International Airport Comparative Traffic Report," December 1989. Unrounded figures are presented in Table 1.

/4/ Airports Commission, San Francisco International Airport, "Information Package," September 1989.

/5/ Military aircraft operations are limited to the U.S. Coast Guard heliport facility in the East Field area of SFIA, which is Federal Government property.

/6/ 1986 and 1989 passenger figures are from "San Francisco International Airport Comparative Traffic Report," December 1987 and December 1989. SFIA Master Plan passenger forecasts were developed by Thompson Consultants International, in SFIA Master Plan Working Paper A, San Francisco Airports Commission, 1987.

● /7/ Metropolitan Transportation Commission, Draft Regional Airport System Plan Update Inventory, May 22, 1991. Military airfields include: Hamilton Air Force Base/Army Airfield (surplus); Travis Air Force Base; Alameda Naval Air Station; and Moffett Field Naval Air Station (potential surplus). Public use General Aviation airfields include: Hayward Air Terminal, Livermore Municipal Airport and Oakland North Airfield in Alameda County; Buchanan Field, and Byron Airport in Contra Costa County; Gnoss Field in Marin County; Napa County Airport and Parrett Field in Napa County; Half Moon Bay and San Carlos Airports in San Mateo County; Palo Alto, Reid-Hillview and South County Airports in Santa Clara County; Nut Tree and Rio Vista Airports in Solano County; and Cloverdale, Healdsburg, Petaluma, Santa Rosa Air Center, Sonoma Sky Park and Sonoma Valley Airport in Sonoma County. Private use General Aviation airfields include: Fremont (closed), Meadow Lark and Sky Soaring Airports in Alameda County; Antioch and Delta Airports in Contra Costa County; Marin Airport and Commodore Seaplane Base in Marin County;

- Calistoga (closed), Inglenook Ranch, Moskowite, Mysterious Valley and Pope Valley Airports in Napa County; Blake, Garibaldi, Maine Prairie, Travis Air Force Base Aero Club, Vaca-Dixon (closed), and Vacaville Airports in Solano County; and Graywood and Sea Ranch Airports in Sonoma County.

/8/ City and County of San Francisco, Department of City Planning, Notice that an Environmental Impact Report is Determined to be Required, San Francisco International Airport Master Plan, August 11, 1989.

/9/ San Francisco International Airport, Five-Year Capital Projects Plan, Project Descriptions, September 18, 1989.

/10/ The SFIA Master Plan Facility Inventory has been updated from 1986 on the basis of information provided by John Costas, Assistant Administrator, Planning and Construction, San Francisco International Airport.

/11/ California Department of Transportation, Division of Aeronautics, *California Aviation System Plan, Element VI: Report on Action Plan*, July, 1989.

/12/ Airports Commission, San Francisco International Airport, Draft Rental Car Garage / Ground Transportation Center (RCG/GTC) Project Description, June 1990.

/13/ Airports Commission, San Francisco International Airport, *Master Plan Working Paper A*, June 1987.

/14/ Airports Commission, San Francisco International Airport, *Master Plan Working Paper B*, August 1988.

/15/ Airports Commission, San Francisco International Airport, *Master Plan Working Paper C*, June 1989.

/16/ U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5070-6A, *Airport Master Plans*, June 1985.

/17/ California Department of Transportation, Division of Aeronautics, *The California Aviation System Plan, Element II: Forecasts*, July 1989.

/18/ U.S. Department of Transportation, Federal Aviation Administration, *Terminal Area Forecasts, FY 1989-2005*, April 1989.

/19/ U.S. Department of Transportation, Federal Aviation Administration, *San Francisco Bay Area Airports Task Force Capacity Study of SFO, SJC, and OAK International Airports* (prepared jointly by FAA, Bay Area international airports staffs, Air Transport Association, and the airlines serving the San Francisco Bay Area), 1987.

/20/ California Department of Transportation, Division of Aeronautics, *The California Aviation System Plan, Element IV: System Requirements*, July 1989.

● /20a/ McAdam, Steven A., San Francisco Bay Conservation and Development Commission, letter, August 5, 1991.

● /20b/ Jones, Diane, State Lands Commission staff, letter, August 14, 1991.

● /20c/ Hesnard, Sandy, California Department of Transportation, Division of Aeronautics, letter, September 5, 1991.

III. ENVIRONMENTAL SETTING

INTRODUCTION

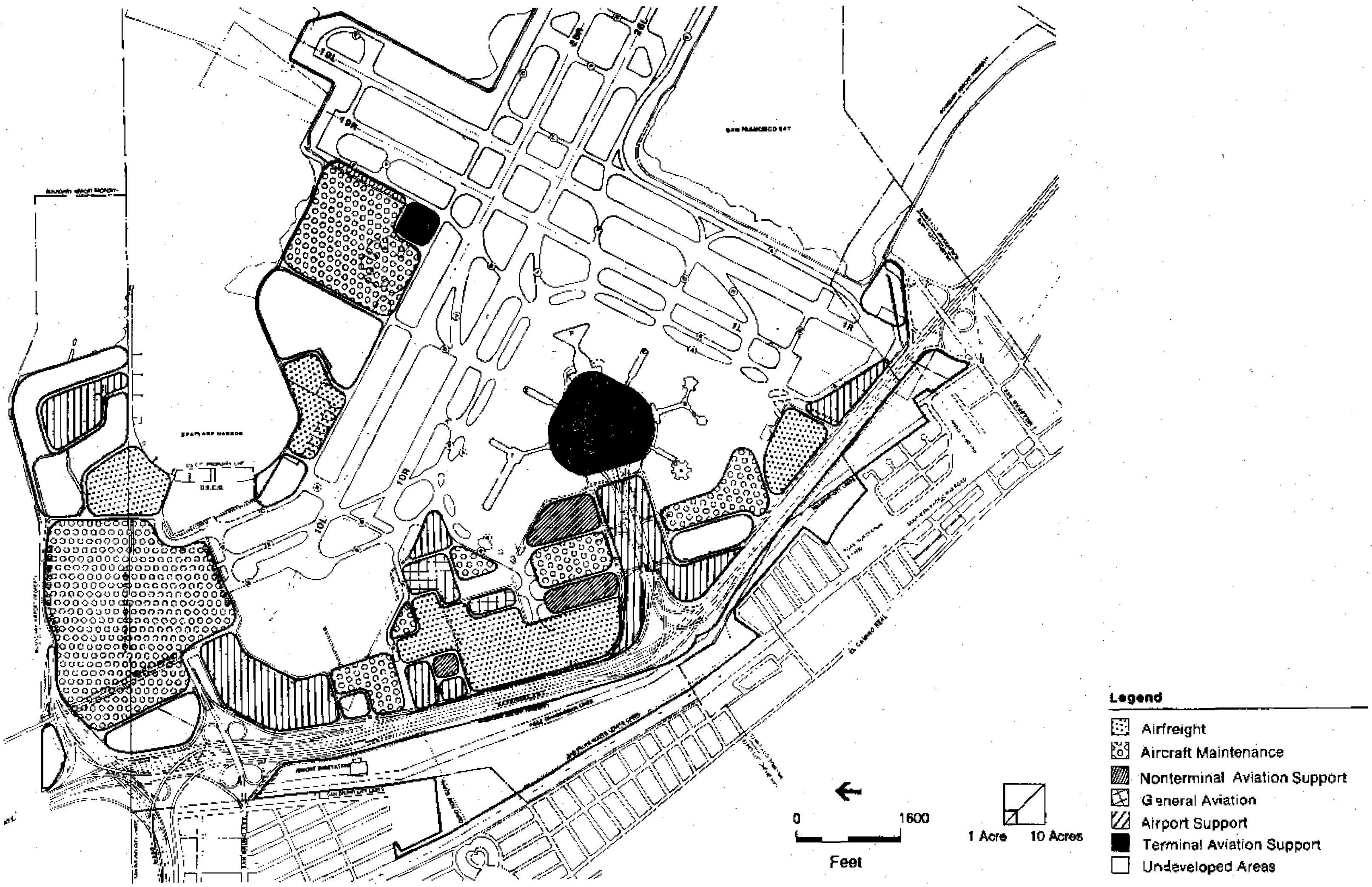
This chapter contains a rather extensive description of San Francisco International Airport and its surroundings. Even so, much of the quantitative data for issues such as transportation, noise and air quality, have been placed in Chapter IV. Environmental Impacts. This has been done to make comparison of existing and future conditions easier.

A. LAND USE AND PLANS

EXISTING AIRPORT LAND USE /1/

Land use at the San Francisco International Airport (SFIA) is governed principally by the City and County of San Francisco. Although SFIA is located in unincorporated San Mateo County, SFIA is owned by the City and County of San Francisco and is therefore not subject to the land use regulations of the County of San Mateo. Other agencies that have planning or regulatory powers in portions of SFIA are the Bay Conservation and Development Commission (BCDC), U.S. Army Corps of Engineers, U.S. Coast Guard and U.S. Fish and Wildlife Service (USFWS).

SFIA covers approximately 5,200 acres. About 2,700 acres have been developed for airport use and 2,500 acres are tideland, which have not been developed. Land uses at SFIA are categorized broadly into airside and landside land uses. The airside category consists of the runway and taxiway systems and occupies approximately 1,700 acres. The landside category is divided into twelve functional classes: terminal complex, non-terminal airline support, airline maintenance, General Aviation, air freight, airport support, commercial, administration/office, transportation, miscellaneous, parking and roads. These categories of land uses occupy approximately 1,000 acres and are shown in Figure 10.



SOURCE: San Francisco International Airport Master Plan

San Francisco International Airport

Figure 10

SFIA Existing Land Use

Airside Land Uses /2/

There are four intersecting runways, two parallel east-west runways and two parallel north-south runways. All runways are 200 feet wide. Three runways are equipped with instrument landing systems for arrivals. East-west runway 28R-10L is 11,870 feet long, paved, and instrument-rated Category IIIA. The parallel is 28L-10R, which is 10,600 feet long, paved, and instrument-rated Category I. North-south runway 1R-19L is 9,500 feet long, paved and instrument-rated Category I. The parallel is 1L-19R, which is 7,000 feet long, paved, and not instrument-rated. The runways are built on land that was reclaimed from bay tidelands during and shortly after World War II.

Existing runways and taxiways are depicted in Figure 2 in Chapter II. Project Description .

Landside Land Uses

The terminal complex (terminal and garage buildings) covers approximately 6,320,000 sq. ft. The terminal complex includes a central garage, six terminal buildings and the terminal apron. The terminals are built in a six-pier configuration with several pedestrian bridges and tunnels connecting the terminal to a central garage. The terminal complex is divided into North, South and Central (International) Terminals which house the ticket and boarding areas for domestic and international flights. The terminal apron frontage has a capacity of 80 gates to accommodate a mix of aircraft. The central garage is a five-level structure with about 6,800 parking stalls.

Airline support land uses consist of in-flight kitchens, catering services, employee cafeterias and parking lots, offices, storage facilities, ground transportation, non-aircraft maintenance facilities, and an airline training school. About 60 acres are committed to this land use. With a few exceptions, these aviation support facilities are intermingled with airline, air cargo, and maintenance facilities.

Airline maintenance land uses are those buildings, facilities and land areas used for routine maintenance or major overhaul of air carrier aircraft, engines, parts, accessories, and equipment. Approximately 3.9 million sq. ft. of building space is used for aircraft maintenance. Nine airlines have maintenance hangars at the airport. United Airlines provides maintenance services to other carriers as well as its own fleet. The United Airlines Maintenance Center alone has over 2.8 million sq. ft. of building space, accounting for over half the space dedicated to aircraft maintenance. Approximately 262 acres, including parking, are devoted to aircraft maintenance operations.

General Aviation land uses involve commercial General Aviation services offered to the general public. These services include aircraft storage, servicing, repair, maintenance, fueling and charter services. Approximately five acres of land are devoted to these General Aviation land uses.

Air freight land uses include the buildings, facilities and land areas involved in the handling and storage of air cargo and mail. Existing air cargo functions are accommodated in over 11 buildings, totaling approximately 868,000 sq. ft. of building area. The associated land area covers approximately 90 acres.

Airport support land uses are differentiated from airline support land uses in that they serve public interests as well as private interests. Airport support includes crash/fire/rescue (CFR) stations; facilities relating to utility supplies and distribution; storm and sewer drainage facilities; airport administration; airport engineering, maintenance, and storage facilities; public parking; and bank and hotel services. Bulk storage facilities for aviation operations are on the north side of the airport and are also considered as airport support land uses. Airport administration facilities are within the existing terminal complex. Approximately 87 acres are devoted to airport support land uses.

The U.S. Coast Guard operates a 21-acre air station as a helicopter base on federally owned land at the west end of the Seaplane Harbor, and leases approximately two more adjacent acres for parking. Buildings, shops and hangars contain approximately 88,400 sq. ft./3/

The San Francisco Community College District's Department of Aeronautics leases 3.5 acres of land at the extreme end of the North Access Road for its flight training school.

Over 700 acres of airport property are undeveloped. Approximately 180 of these acres are west of the Bayshore Freeway and not included in the SFIA Master Plan.

Auto parking facilities at SFIA include employee, rental-car and short- and long-term public parking. SFIA parking, roadway and pedestrian facilities are detailed in EIR Section III.B. Transportation. That section also covers details of SFIA roadway and pedestrian facilities.

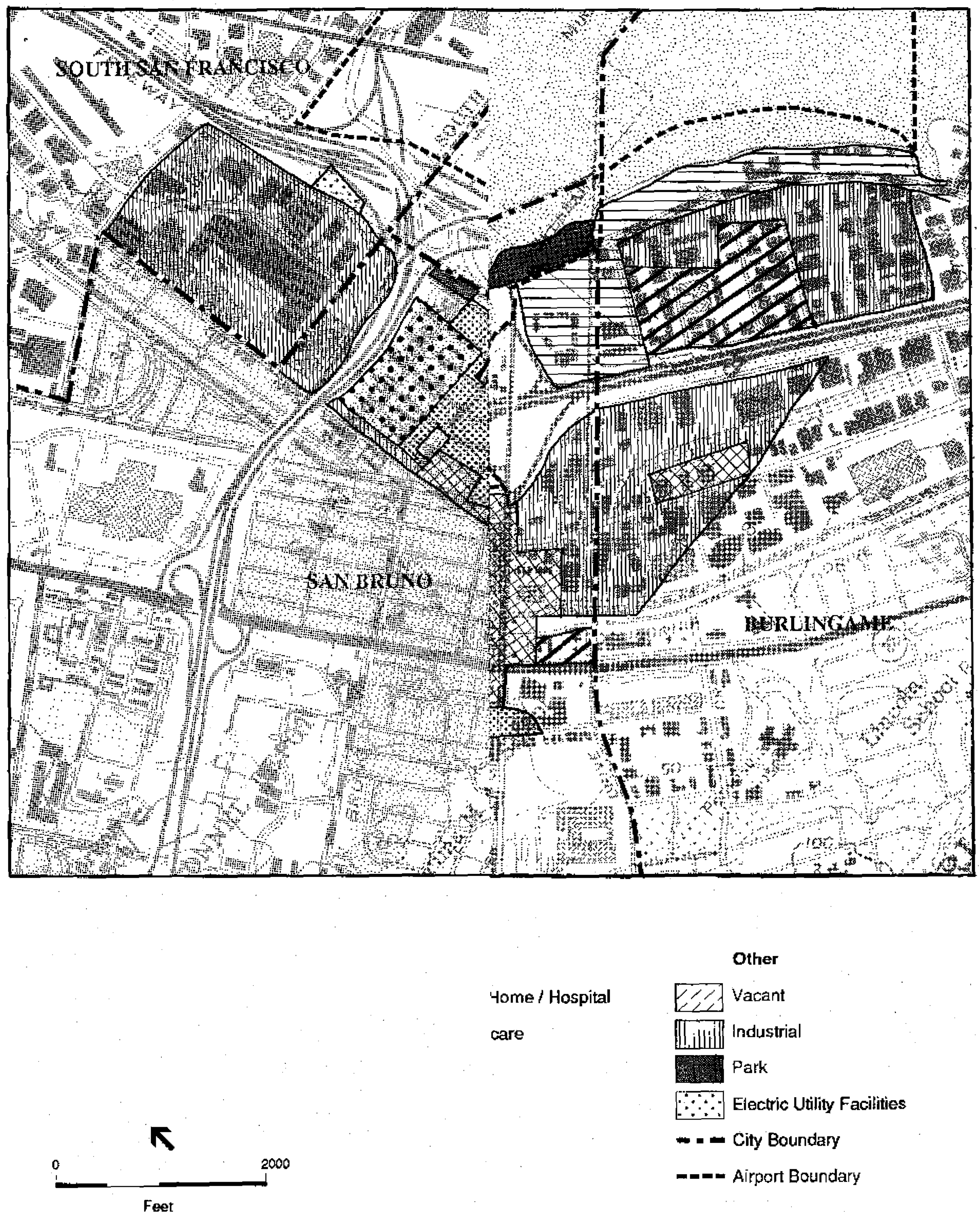
AIRPORT ENVIRONS CITIES LAND USE

Areas in San Mateo County within the 1987 65+ Community Noise Equivalent Level (CNEL) contours and considered airport-influenced are classified in the SFIA Master Plan as Airport Environs Areas. CNEL contours are contours of equal energy noise exposures and are used as the basis for determination of noise/land-use compatibility. These areas include portions of the cities of: Brisbane, Burlingame, Colma, Daly City, Foster City, Hillsborough, Millbrae, Pacifica, San Bruno, San Mateo, and South San Francisco. The locations of these cities relative to SFIA are shown in EIR Chapter II. Project Description, Figure 1, p. 21. General Plan land use designations immediately adjacent to SFIA are shown in Figure 11.

<u>City of Brisbane</u>

Community Setting and Land Use

The City of Brisbane is northwest of SFIA, with an estimated population of about 3,070 in 1990./4/ Brisbane is about 1,450 acres in size and was incorporated in 1961. The Brisbane General Plan estimates a holding capacity of 3,600 persons, because of the physical constraints of development within the city limits./5/ Because of its proximity to major transportation corridors, Brisbane is a gateway between San Francisco and the urban areas of San Mateo and Santa Clara Counties. In 1990, Brisbane had a population of about 2,950 persons, and about 1,390 households with a mean household income of about $45,100, compared to a Countywide mean household income of $55,100./4,6,7/



SOURCE: Environmental Science Associates, Inc.; United States Geological Survey

● Figure 11
Existing Land Use and City Boundaries Adjacent to SFIA

Brisbane is a predominantly residential city, but most of the land has been zoned for commercial or industrial uses. The General Plan states: "Light industrial use comprises 20.94 percent of the city's area, while streets account for 13.13%. Single-family residential accounts for 5.13%, multi-family only 0.22% and duplexes 0.17%."/8/ In 1980, over half of the city's land was vacant. The southeastern portion of Brisbane, the Sierra Point area, is designated for commercial, retail, and office uses. The General Plan states:

> "The City has reached a critical point in providing services that meet the demands of its citizens. Either additional revenue must be found or lower levels of service must be accepted by the public. For this reason City planning priorities are oriented to the future development of Sierra Point and other lands in the eastern portion of the City./9/. . . The Southern Pacific Switching Yard is planned to be removed and the land developed as an industrial park with warehousing and distribution centers."/10/

Land Use / Noise Compatibility

The General Plan states:

> "The Noise Contour Map, contained in the 1976 Noise Element, shows the primary sources of surface noise in Brisbane to be vehicular traffic on US 101 and Bayshore Highway, aircraft, and trains . . . The Day-Night Average levels range from 55 dB in the Candlestick Point and Brisbane Acres to almost 80 dB along US 101. The 65 dB noise contour from the 1979 SFIA / San Mateo Joint Land Use Study includes all of Sierra Point. The 70 dB noise contour parallels the eastern edge of Sierra Point. Most of Brisbane is below the 60 dB Community Noise Equivalent Level (CNEL), however, changes in San Francisco International Airport flight paths or proposed levels of testing could raise the CNEL. In addition, there is increasing awareness of low frequency noise reverberations that affect central Brisbane because of its bowl-like terrain.
>
> "Since the residential section of Brisbane is contained primarily in central Brisbane, nearly all of the population lives in a relatively quiet environment.
>
> "Viewing future noise levels indicates that State and Federal requirements to reduce noise from vehicles and reductions in energy consumption will result in reduction in surface traffic noise levels by 5 dB in 1985 and an additional 7 dB by 1995. The reduction in aircraft noise is less easy to determine. Proposed shifts of flights over the industrial area of Brisbane and the Bay could raise CNEL noise levels above 65 dB by 1986. These shifts are an environmental constraint that could affect land use policies on Sierra Point."/11/

The SFIA Master Plan would accommodate more aircraft traffic in the future and could contribute to environmental constraints affecting land use policies in Brisbane. However, Brisbane is currently outside the 65 dBA, CNEL contour and will continue to be so with or without implementation of the project.

Safety

The Safety Element of the General Plan discusses the Southern Pacific Tank Farm, located northwest of the Tunnel Avenue / Lagoon Way intersection between the railroad tracks and Tunnel Avenue in Brisbane's Baylands Subarea. The tank farm has two pipelines, one 10-inch pipeline and one 12-inch pipeline coming from the oil refineries in the Richmond / Benicia / Martinez area. There are also two 8-inch lines exiting the tank farm, one which earlier served the Southern Pacific Roundhouse and the other which carries jet fuel to SFIA. The Southern Pacific Roundhouse is no longer in operation. The Southern Pacific Tank Farm facilitates onward transportation of jet fuel to SFIA./12/

City of Burlingame

Community Setting and Land Use

The City of Burlingame is south of San Francisco and had an estimated population of about 27,400 in 1990./4/ It is surrounded by the cities of Hillsborough and San Mateo to the south; San Francisco Bay to the east; and Millbrae to the north and west. Burlingame does not share a common land boundary with SFIA. Its northern border is about one-half mile south of the southern boundary of the airport. Burlingame had a population of about 26,800 persons in 1990./6/ Mean household income in 1990 was about $52,700, and the total number of households was estimated to be about 12,840./4,7/

Major transportation facilities serving Burlingame are U.S. Highway 101 (US 101), Interstate Highway 280 (I-280), State Route 82 (El Camino Real), Southern Pacific Railroad and CalTrain, and SFIA.

The city is almost built-out as predominantly residential. New land developments in the city are concentrated in the Bayfront planning area, a strip of land at the northeastern corner of the city adjacent to SFIA./13/ The Bayfront is bounded on the east by San Francisco Bay and on the west by US 101. Airport operations and land use developments affect the pattern of land use in Burlingame; airport-oriented hotels, restaurants, and airport parking are within the northern portion of the city./13,14/

The Bayfront Specific Plan contains a policy recommendation that recognizes the special locational value of proximity to SFIA./14/ The Specific Plan encourages accommodation of expansion at SFIA, citing the relationship between the volume of air travel and the demand for hotel space. It also recommends development of waterfront-commercial uses that either depend on, or benefit directly from, waterfront location. Recommended waterfront uses include airport-dependent activities such as hotels and restaurants. The SFIA Master Plan would not conflict with the Bayfront Specific Plan.

Land Use / Noise Compatibility

According to the Burlingame General Plan, SFIA noise affects industrial, commercial, and residential land uses in Burlingame. Residential areas are most affected during the winter and early spring. Regarding the 1974 CNEL Average Annual contours from the San Francisco Airport Environmental Impact Assessment Report (EIAR), the city's General Plan states:

> "These seasonal contours were based upon runway utilization distributions during the months of May and June; the worst-case months during which Burlingame is affected by airport noise are historically October, December, January, February, and March. During these latter five months, southerly and southwesterly winds necessitate takeoff and landing patterns to shift so that aircraft arrive and depart over the City of Burlingame.
>
> "These calculations indicate that while these worst-case months are not reflected in the average annual impact of airport noise in Burlingame and do not show up on average annual noise contours, the City of Burlingame is more heavily affected by noise for certain months of each year than others. During these months, some aircraft take off over Burlingame's industrial area, make a left turn over Peninsula Hospital and fly south above El Camino Real; other aircraft land in approximately the reverse pattern.
>
> "Although the worst-case months were not able to be monitored during this study, many measurements were taken to assess the airport's contribution to Burlingame's noise climate."/15/

Airport Land Use Commission (ALUC) height restrictions for development in areas beneath flight paths into and out of SFIA are in effect in Burlingame. (See discussion of ALUC height limitations beginning on p. 104.)

Safety

The most likely hazard relating to SFIA is danger of a plane crash. According to the city's 1975 Safety Element, Burlingame has not studied fire department and medical aid response to an airplane crash within a residential district of the city. The City of Burlingame has not issued a study regarding fire department and medical aid response in the case of an airplane crash. However, since 1975, the Burlingame Fire and Police Departments have entered into contractual mutual aid and automatic response agreements with San Mateo County and with surrounding cities. These agreements allow the City of Burlingame to respond to a disaster such as an airplane crash. The City of Burlingame also participates in mock plane-crash drills sponsored by SFIA so that it can better respond in case of air-crash emergency./16/

Town of Colma

Community Setting and Land Use

The Town of Colma was incorporated in 1924 and is approximately two miles from the southern border of San Francisco./17/ "Colma is a greenbelt community with attractive cemeteries and agricultural fields surrounding a regionally oriented core commercial area."/16/ The town, with a total area of 1.95 square miles, is bounded on the north and west by Daly City, on the south by South San Francisco, and on the east by San Bruno Mountain Park in unincorporated San Mateo County. The population of Colma in 1990 was about 1,100 persons; the mean household income was about $41,700./4,6,7/

The Association of Bay Area Governments (ABAG) projects steady growth in population and employment for all Bay Area cities to the year 2000. Although ABAG estimates that the population of Colma could reach 2,500 by the year 2000, the Colma City Council has adopted a goal of no more than 1,500 (a doubling of the population) in the same time period.

About 1.5 percent of the area within the town limits is currently committed to residential uses. Historically, the town has emphasized cemetery land uses and interests in its planning policy. Currently, about 15 percent of the land area is designated as industrial and about 77 percent as cemetery and agricultural. Regional commercial facilities, including two shopping centers, are centered along Serramonte Boulevard, with a concentration of automobile and truck dealerships./18/ Aircraft noise is not identified as a constraint to housing development./18/ Thus, implementation of the SFIA Master Plan would not conflict with Town of Colma noise policies.

City of Daly City

Community Setting and Land Use

Daly City was incorporated in 1911 and is immediately south of the City and County of San Francisco. The 1990 population was estimated to be about 92,310 persons; the mean household income was about $48,600./6,7/ The city was 96 percent built-out in 1987./19/

Daly City's predominant land use is residential. In 1987, approximately 53 percent of the land was in residential use, 10 percent in commercial use, 13 percent in public use, 16 percent open space, and 8 percent vacant. The majority of commercial land uses are retail and neighborhood-serving establishments along transportation corridors./19/

Land Use / Noise Compatibility

The city considers land uses in the southeastern tip of the city, the Serramonte neighborhood, which is largely single-family residential and adjacent to Pacifica, to be airport-influenced, because of the frequency of flights over that area./19/ Daly City's Land Use Policy 10.4 states:

> "The City shall encourage San Francisco International Airport to increase the use of the shoreline take off route and discourage the use of the gap departure route. From a land use standpoint, however, increases in air traffic would affect all types of land uses within the City. Depending on the usage of a particular departure route, there could be a negative impact in terms of safety and noise on the residential section of the City."/19/

Implementation of the SFIA Master Plan would accommodate additional aircraft flights and could be in conflict with this policy.

Land Use Policy 11.1 states that "the City should actively participate in land use decisions that are made by the County, adjacent cities, and jurisdictions that have regional influence, when these decisions affect Daly City." The Land Use Element of the General Plan recognizes that "land use plans for the San Francisco Airport have regional implications for the entire County"./19/

The following objectives and policies are from the Noise Element of the city's General Plan:

> "Objective 2. Ensure that noise levels appropriate to protect the public health and well-being are maintained.
>
> "Policy 2.7: Avoid noise impacts from intensification or alteration of existing land uses.
>
> "Objective 3. Reduce aircraft noise exposure by five decibels.
>
> "Policy 3.1: Participate in Regional Planning Committee activities.
>
> "The City is currently a member of the Regional Planning Committee which is the designated Airport Land Use Commission for the County of San Mateo. The RPC responds to airport matters, produces an airport land use plan, and develops policy in order to provide for the safe and orderly growth around airports. The City should continue this activity.
>
> "Policy 3.2: Participate in the airport planning process.
>
> "Active participation by affected municipalities and citizenry driving the airport planning processes will assist in reducing noise impacts. The City has participated in airport planning processes by commenting on draft noise regulations, the proposed amendments to Title 21, the Airport Master Plan, and through the Regional Planning Committee. Participation such as this should be continued. The City should actively encourage the citizenry of Daly City to actively participate in the process.
>
> "Policy 3.3: Coordinate, as appropriate, with other municipalities to facilitate an integrated effort to reduce airport related noise.
>
> "Airport noise affects many cities in San Mateo County. Hours of airport operation and selection of flight paths used will affect different cities in different ways and to various levels of impact. There does exist, however, in some areas commonalities of impact, either in the types of noise regulation adopted by the airport or by the operating hours of the airport. Whenever possible these commonalities should be identified through staff meetings with various cities in order to develop an integrated approach to airport noise issues. Daly City, has in the past, worked with other cities such as South San Francisco, in responding to airport operations; this cooperative action should be continued."/20/

<u>City of Foster City</u>

Community Profile

Foster City was incorporated in 1971 and is bordered by the City of San Mateo on the west, Belmont on the south, and Redwood City to the southeast. The city is built on about 2,592 acres (approximately four square miles) of reclaimed tidal marsh of San Francisco Bay. The 1990 population was about 30,140./4/ Because of the limited remaining land area of the city, a total residential population of 31,300 is projected. The estimated year of build-out is the end of 1990./21/

There were about 11,340 households and about 28,180 persons in Foster City in 1990./4,6/ The mean household income was $65,600, compared to $55,100 for all of San Mateo County./7/

Land Use

The city's predominant land use is residential, with commercial development occurring in the northern section./21/ When the city is fully builtout, approximately 53 percent of the land will be in residential use, 18 percent in commercial / industrial use, 5 percent in public use, and 24 percent will be open space./21/

Land Use / Noise Compatibility

Pages 19 and 20 of the Noise Element of the Foster City General Plan state:

> "The most pervading noise source within Foster City is from aircraft using San Francisco International Airport and San Carlos Airport. Aircraft noise is found in varying degrees within every neighborhood. The most adversely affected area is Neighborhood 2 which is located almost directly under the approach to runway 28 L to San Francisco International Airport. The frequency of this approach pattern is such that this is considered as a major noise problem for most people in this area. Flights from San Carlos Airport have less effect upon the community as a whole but do have a greater impact upon the residents of Neighborhood 8 which is located at the northern end of the runway approach to that facility. The City has extremely limited ability in the control of noise generated by these sources. The regulation of these noise sources is administered by Federal agencies and the City is restricted only to controlling the noise by requiring insulation of buildings and regulating land use patterns."/22/

Furthermore, recommendations listed under "Findings and Recommendations" of the Noise Element include the following:

> "Standards for the control of the most significant noise sources, aircraft and motor vehicles are established by Federal and State regulations. Noise impacts of aircraft operations can be mitigated by cooperative efforts of local governments and aircraft, airline and airport officials."
>
> "The control of noise along its path or at the receiver places the burden of attenuation on those who do not produce the noise. It is therefore most desirable to the City of Foster City to control noise at its source."/22/

Implementation of the SFIA Master Plan would not conflict with the Noise Element of the Foster City General Plan.

Safety

The entire area of Foster City is flown over by aircraft and is therefore at risk of aircraft accidents. Section 8200 of the Safety Element of the Foster City General Plan states:

> "In the event of a major air disaster occurring in San Mateo County, the County Civil Defense organization has prepared an emergency plan called Code 1000. It involves interjurisdictional response to a major air disaster in San Mateo County. If Foster City were to experience a major air disaster, Foster City would notify the Redwood Fire Control Center via radio and advise the Control Center of the approximate location of the air disaster. Once the initial communication has been made, the next step involves the establishment of a command post to direct operations. In the event of an air disaster striking Foster City, the Cities of Brisbane, Burlingame, Daly City, Hillsborough, Millbrae, San Bruno and San Carlos will send one engine each to the City; the Cities of Belmont, Menlo Park and Redwood City will send two engines each to the City; the California Division of Forestry will send two engines. In addition to these, the City of Foster City currently has three engines and one truck, all of which have pumping capabilities available in the event of an air disaster."/23/

<u>Town of Hillsborough</u>

Community Setting and Land Use

The Town of Hillsborough is approximately 12 miles south of San Francisco. Hillsborough is bordered by Burlingame on the north; San Mateo on the east and south; and the San Francisco Fish and Game Refuge on the west. With the exception of assorted public facilities, Hillsborough is exclusively a single-family residential community. It was incorporated in 1910. The population of Hillsborough in 1990 was about 10,670./6/ Mean household income was about $140,700, the highest in San Mateo County./7/

Hillsborough comprises over 4,000 acres of incorporated land, of which 68 percent is single-family residential, 17 percent is occupied by public uses, and approximately 15 percent is developable vacant land.

Land Use / Noise Compatibility

Airport and aircraft noise is identified as a source of noise pollution by the Town of Hillsborough. Part "A" under Proposed Remedial Action on (Noise) Sources in the Noise Element of Hillsborough's General Plan states:

> "Maintain active status in planning to stay aware of developments and exert a continuing effort to see that existing standards are enforced and reasonable compliance maintained. Assist in promoting and supporting relevant legislation for proper planning of land use and noise reduction through joint efforts with adjacent jurisdictions."/24/

Under Projected Conditions, Part "A", the Noise Element states that there would be "expected increase in Aircraft activities and a limited decrease in source noise."/23/

Implementation of the SFIA Master plan would not conflict with the Noise Element of the Hillsborough General Plan.

City of Millbrae

Community Setting and Land Use

The City of Millbrae is bordered by both San Francisco Bay and the San Francisco International Airport, whose boundaries it overlaps, to the east; San Francisco Watershed lands, owned by the Water Department of the City and County of San Francisco, to the west; the City of San Bruno to the north; and the City of Burlingame to the south. Millbrae occupies approximately 2,050 acres or about 3.2 square miles. The population in 1990 was about 20,410 persons, and the mean household income was $60,600./6,7/ Almost all developable land in Millbrae has been developed. The estimated build-out population is 25,000./26/

The city's General Plan was adopted in 1974./25/ Emphasis of the General Plan is on preservation of the residential character of the City. To the west of the airport along the Bayshore Freeway are three residential subdivisions, Bayside Manor, Marina Vista, and the north Millbrae Subdivision./26/ To the south and east, along the old Bayshore Highway, the land is zoned for industrial uses. SFIA lands within the City of Millbrae are designated Industrial/Utility east of US 101, and designated Open Space west of US 101, by the City of Millbrae General Plan. These lands are zoned Industrial east of US 101, and zoned Open Space west of US 101, by the City of Millbrae Zoning Ordinance./26a/ These SFIA lands are within the City of Millbrae's Sphere-of Influence.

The Airport Land Use Commission height restrictions for development in areas beneath flight paths into and out of SFIA are in effect in the city. (See discussion of ALUC height limitations beginning on p. 104.)

The City of Millbrae General Plan lists the following land-use recommendations for the San Francisco International Airport under Recommendations, Area D:

"10. The City should negotiate for the use of the Airport-owned property, between the Airport and Old Bayshore, for use as an airplane viewing area.

"13. Any development of the Airport property should result in an attractive appearance from the freeway.

"14. Signs on Airport property should be strictly regulated as to size, height, type, and location."/26/

In addition, Policy 13 under Environmental Resources Management of the General Plan states:

> "The Airport should be encouraged to continually monitor the level of pollutant emissions generated by Airport activity. All possible reductions in these emissions should be encouraged."/27/

SFIA does not currently monitor pollutant emissions nor is air monitoring proposed as part of the SFIA Master Plan.

Land Use / Noise Compatibility

According to Recommendation 5 of the Community Development Section of the 1974 City of Millbrae General Plan,

> "Noise levels should be monitored by the Airport Land Use Commission and the City to determine the effectiveness of remedial practices. This information should be requested and reviewed by the City on a regular basis to insure conformance with State law requiring reduction of 15 dBA by 1985."

Community Development Policies 18 and 19 of the General Plan state:

"18. The City should incorporate noise standards in zoning ordinances and building codes which are consistent with the Airport Land Use Plan recommendations.

"19. The Airport, the FAA and other State and Federal agencies should be encouraged to use all operative controls under their jurisdiction to reduce aircraft noise levels."/26/

City of Pacifica

Community Setting and Land Use

The City of Pacifica is on the Pacific Ocean side of San Mateo County, approximately three miles south of San Francisco. It is bordered by Daly City on the north; San Bruno and South San Francisco on the east; unincorporated areas of San Mateo County on the south; and the Pacific Ocean on the west. The City of Pacifica was incorporated in 1957. The city comprises 7,800 acres (about 12.2 square miles), about half of which had been developed by 1980. The population of Pacifica in 1990 was about 37,670 persons, and the mean household income was $51,100./6,7/

In 1980, almost 40 percent of the approximately 3,870 acres of developed land within the city limits was single-family residences. Parks and public areas occupy 28 percent of the developed land, while streets and other public uses constitute about 25 percent. Slightly more than half of Pacifica's total acreage is vacant or in agricultural use. Of the approximate 3,930 acres of underdeveloped land, almost 3,300 acres are within the Hillside Preservation District. Although some of this vacant land is suitable for development, most is too steep under current regulations to permit development./28/

Land Use / Noise Compatibility

- The adopted Noise Element of the General Plan states that aircraft noise is not considered a problem for the City of Pacifica./29/ The SFIA 1976 65 dB CNEL contour did not cross into Pacifica's city limits. However, participation in the Airport/Community Roundtable (see p. 167) and at other community meetings concerned with aircraft noise has indicated that noise, particularly single-event noise levels and overflight patterns, is currently perceived as a problem by some City of Pacifica residents./29a/

- Nevertheless, the primary source of surface noise in Pacifica is the arterial / collector street system. According to the Noise Element of the 1980 City of Pacifica General Plan:

> "Highest levels, 75 dB, are generated by Highway 1. No stationary noise sources have been identified, since Pacifica has no significant industrial areas where fixed noise sources are usually located.
>
> "When looking at the number of people exposed to higher noise levels (above 60 dB) the Noise Inventory Chart shows that 79 percent of the population lives in a relatively quiet environment. Of the remaining 21 percent, 13 percent are subject to 60-65 dB, 7 percent are subject to 65-70 dB, and less than one percent are subject to over 70 dB.
>
> "A look at future noise levels indicates that State and Federal requirements to reduce noise from vehicles and reduction in energy consumption will result in reductions in surface traffic noise levels by 5 dB in 1985 and an additional 7 dB by 1995. The reduction in aircraft noise is less easy to determine, although studies for San Francisco Airport indicate a 5 dB reduction by 1986.
>
> "Assuming a fairly conservative reduction of 5 dB in surface and aircraft noise, a marked improvement is achieved in Pacifica's noise environment. Less than one percent of the 1995 population will be subject to noise greater than 65 dB, as compared to 8 percent in 1977. The proportion of the City population living in a noise environment of less than 60 dB will increase from 79 to 93 percent over the 1977-1995 period. The major noise source will continue to be the Route 1 and Skyline Boulevard corridors, but noise levels will be lower."/29/

Implementation of the SFIA Master Plan would not conflict with the Noise Element of the Pacifica General Plan.

Safety

The Safety Element of the Pacifica General Plan addresses the City's Emergency Plan:

> "The City's emergency plan is regularly updated and improved. Because of State requirements, the focus of the Emergency Plan is on preparedness for a natural disaster. Since a natural disaster is more likely to occur in Pacifica, the City has included preparedness for natural disasters, including earthquakes, unconfined fire, major flooding, tsunami, airplane accidents and landslides. The City is currently updating the emergency plan and is including more specific standard operating procedures for natural disasters. The City monitors changes in the Federal Disaster Act regulations. Public awareness and disaster planning for individual neighborhoods has been included in disaster preparedness. A Disaster Preparedness Commission has been established by the City Council."/30,31/

City of San Bruno

Community Setting and Land Use

The City of San Bruno is approximately five miles south of the San Francisco County line and is immediately west of SFIA. San Bruno was incorporated in 1914 and occupies approximately 3,760 acres (5.87 square miles). San Bruno is bordered by San Francisco International Airport on the east; the City of South San Francisco on the north, the City of Millbrae on the south; and the City of Pacifica and San Francisco Watershed lands to the west./32/

The city is a suburban residential community, predominantly single-family homes, and was approximately 96 percent built-out in 1984. The population of San Bruno was about 38,960 in 1990, with a mean household income of about $51,400./6,7/ Commercial development is concentrated along El Camino Real, San Bruno Avenue and San Mateo Avenue, and in the Tanforan Shopping Center.

The 80+ acres of SFIA land within the San Bruno sphere of influence is designated for light industrial use in the City's General Plan./32/

Land Use / Noise Compatibility

Airport noise is considered to be an environmental constraint to development. Approximately one-quarter of the housing units are subject to CNEL greater than 65 dB, primarily from airport noise in the north-easterly portion of the City. These areas include the neighborhoods of San Bruno Park, Lomita Park, Bel Air, and Tanforan./33/

The ALUC has developed height restrictions for development in areas beneath flight paths into and out of SFIA. These restrictions are incorporated into the City of San Bruno's development review process./34/ According to the Housing Element of the 1984 City of San Bruno General Plan:

> "The airport lands, also known as the eastern sphere of influence, are unincorporated and not presently served with urban services. The 11-acre site is designated for industrial use in the City's and County's General Plans. The property is subject to noise levels of up to 75 CNEL from the San Francisco Airport, and is also subject to freeway and train noise. Residential development

within 65-70 CNEL requires special noise insulation features. In areas subject to 70+ CNEL, residential development is not considered appropriate. Other constraints to development of the airport lands are flooding hazards, the presence of power lines and high pressure underground pipes crossing the site, an environmentally sensitive habitat area for the San Francisco garter snake, and poor vehicular access from collectors and arterials. Mitigation of these constraints would be costly, thus it does not seem feasible to construct affordable housing."/34/

In regard to lands surrounding the airport, the General Plan Land Use Element comments that:

"Approximately 80 acres of vacant land lie between San Bruno's eastern city limits and the freeway. This land is commonly known as the airport lands, since until recently it was under the control of the San Francisco International Airport. The land is owned by the City and County of San Francisco and is included in San Bruno's Sphere of Influence. The City of San Francisco has no definite plans for the property at this time. Alternatives considered include a regional transportation center and uses associated with the airport. The lands south of San Bruno Channel have no road access and are subject to excessive noise from the airport. Height restrictions in airplane take-off paths also limit development. The site contains habitat areas of the endangered San Francisco garter snake protected under State and Federal law. Pacific Gas and Electric power lines and underground cables bisect this property from north to south and must be relocated prior to development. This site is subject to flooding and liquefaction."/32/

Noise

The Noise Element of the 1984 City of San Bruno General Plan states:

"The northeasterly portion of San Bruno is within the 65 dB to 70 dB CNEL from San Francisco International Airport noise contours. Much of central San Bruno is within the 60 to 65 dB CNEL contours. The San Mateo County Airport Land Use Commission has published standards for airport noise/land use compatibility. These standards indicate that new residential, school, library, church, hospital, nursing home and auditorium uses should not be developed in areas greater than 70 dB and should include noise reduction features between 65 dB and 70 dB. Commercial uses should not be developed in areas above 80 dB and should include necessary noise reduction in areas between 70 dB and 80 dB. Industrial uses should not be developed in areas above 85 dB unless related to airport activities or services; noise reducing measures should be included in new development in areas between 75 dB and 85 dB. These standards are incorporated in the Noise Element as Noise/Land Use Compatibility Standards.

"The ALUC [Airport Land Use Commission] has developed height restrictions for development in areas beneath flight paths. These restrictions will be incorporated into the City's development review process.

"There are approximately 14,650 housing units in San Bruno. Approximately 96% of the houses are subject to noise levels of 60 dB or greater. Areas outside the 60 dB contour are the southwestern and western portions of San Bruno, those areas furthest from the airport. Approximately one-quarter of the total units are subject to CNEL in excess of 65 dB, primarily from airport noise. These units are located mainly in the north-westerly portion of the City. Residents in this area are also subject to highway noise levels above 60 dB. Aircraft noise is the dominant noise factor, however.

"Certain land uses are defined in the state law as 'noise sensitive.' These include schools, hospitals, and other health care facilities. San Bruno has no hospitals. Schools are shown on the noise contour map. Noise levels near these uses are based upon monitoring of airport noise or calculated using a standardized formula."

"Future Noise

"The prevailing environmental noise in San Bruno is generated by aircraft departing from San Francisco Airport. Except for noise levels generated by automotive vehicles on the Junipero Serra Freeway, almost all other highway noise is masked in terms of annual levels, by aircraft noise. Highway noise is expected to be reduced in the future, in spite of increased traffic, due to technological changes in vehicles stimulated by national and State policies. Aircraft noise is also subject to Federal regulations which mandate quieter aircraft in the future. The San Francisco Airport Land Use Commission adopted a target of reducing the number of dwelling units within the 65 CNEL contour to 7,500 by 1987. There has already been a substantial reduction in the number of units affected by noise levels of 65 CNEL from 15,400 to 8,200 units between 1980 and mid-1983, a 47% reduction. The results of constant monitoring will indicate whether or not the benefits of quieter aircraft will be offset by increased number of flights."/33/

Implementation of the SFIA Master Plan would have virtually no effect on the future noise contours in San Bruno.

Safety

The Safety Element of the 1984 City of San Bruno General Plan states:

"Industrial fire hazards are associated with the transmission of jet fuel to San Francisco International Airport. Industrial chemicals and processing contribute to fire hazards, compounded by the crowded conditions, old buildings, and narrow streets in the Fifth Addition. Structures along San Mateo Avenue, built prior to fire safety codes, without adequate separation between buildings, or good access, are also hazardous.

"Outside of these areas, San Bruno has a very good overall fire rating. The fire rating is based upon, among other things, the type and amount of fire fighting equipment, number of fire fighters, water flow and pressure. The fire department has adequate staff and equipment. The City's water system is not in optimum condition. Old or worn water lines and connections in some parts of the City need upgrading or replacement to uphold satisfactory water flow and pressure requirements.

"The City of San Bruno has an Emergency Response Plan, adopted in 1980, which identified City officials' responsibilities in case of emergency. The plan establishes contingency organizational plans and assigns responsibility among City departments for transportation, communication, food and shelter, health and other emergency needs."/35/

City of San Mateo

Community Setting and Land Use

The City of San Mateo is approximately ten miles south of the San Francisco County line. It is bordered by San Francisco Bay on the north; Foster City on the east; Belmont on the south; and Hillsborough and unincorporated County areas on the west.

Incorporated in 1894, San Mateo had a 1990 population of about 85,490./6/ The City expects full build-out by the year 2000 and a population of approximately 115,000 to 120,000./36/ The mean household income in 1990 was about $54,500./7/

Land Use / Noise Compatibility

The Noise Element of the 1990 City of San Mateo General Plan states:

"A noise measurement survey was conducted in San Mateo during October, 1987 to determine noise levels throughout the community. Noise exposure in San Mateo is dominated by traffic and the SP rail line. Aircraft operation associated with San Francisco International Airport does not significantly affect noise levels throughout San Mateo, although some neighborhoods in the northeastern portion of the City are impacted by the airport approach path."/37/

The General Plan offers the following mitigating policies:

"Adoption and enforcement of a noise control ordinance can reduce nuisance noise generated by commercial uses or from residential sources such as amplified music, parties, leaf blowers or barking dogs. Construction activities also generate substantial short-term noise impacts which can be limited to specified hours and days of the week.

"N 2.2: *Minimize Noise Impact*. Protect all "noise sensitive" land uses from adverse impacts caused by noise generated on-site by new developments. Incorporate necessary mitigation measures into development design to minimize noise impacts. Prohibit long-term exposure increases of 3 dB (L_{dn}) or above at the common property line, or new uses which generate noise levels of 60 dB (L_{dn}) or above at the property line, excluding ambient noise levels.

"Noise sensitive land uses, such as residential neighborhoods, hotels, hospitals, schools and outdoor recreation areas, must be protected from new development which causes discernible increases in noise levels as a result of on-site activities. Noise generators such as machinery or parking lots must be mitigated through physical or operational limits.

"N 2.3: *Minimize Commercial Noise*. Protect land uses other than those listed as "noise sensitive" from adverse impacts caused by on-site noise generated by new developments. Incorporate necessary mitigation measures into development design to minimize noise impacts. Prohibit new uses which generate noise levels of 65 dBA (L_{dn}) or above at the property line, excluding ambient noise levels."

"Commercial and industrial areas typically tolerate a higher noise level than residential neighborhoods. However, some control is necessary for new development within non-residential areas so that exceptionally noisy uses are restricted."/37/

Implementation of the SFIA Master Plan would not conflict with the Noise Element of the City of San Mateo General Plan.

City of South San Francisco

Community Setting and Land Use

The City of South San Francisco was incorporated in 1908 and contains approximately 5,250 acres. The city had 54,310 residents in 1990 and 100,000 employees./4,6/ The mean household income was $45,900./7/

The City is bordered by San Bruno Mountain on the north; San Francisco Bay on the east; San Bruno and SFIA on the south; and Daly City and Colma on the west.

There are more airport-related structures (cargo facilities and maintenance buildings) within South San Francisco's city limits than within the city limits of any other city adjacent to SFIA. For planning purposes, the South San Francisco portion adjacent to SFIA is designated as the South Airport Boulevard Planning Area. This planning area includes all land east of US 101 between SFIA and East Grand Avenue./38/

Land Use / Noise Compatibility

The Noise Element of the City of South San Francisco describes aircraft noise in South San Francisco as follows:

"The single major source of noise community-wide is San Francisco International Airport. Aircraft departing Runways 28 Left and 28 Right overfly South San Francisco resulting in significant noise impacts to a number of noise-sensitive land uses. Aircraft departing from Runways 1 Left and 1 Right bound for the south overfly various parts of the City. While these overflights are at somewhat higher altitudes than the aircraft departing Runways 28, they also impact various noise-sensitive land uses within the City. Aircraft departing from Oakland International Airport also overfly South San Francisco but these aircraft are usually at altitudes above 4,000 feet and, thus, have minimal impacts on the City."/39/

The overall goal of the Draft Noise Element is to "provide a safe and pleasant environment for all citizens, workers, and visitors of South San Francisco."/39/ To achieve this, the Draft Noise Element advances the following objectives and policies:

"OBJECTIVE:	To mitigate and reduce noise impacts from aircraft generated sources.
"Policy N-1	"As appropriate, the City of South San Francisco shall continue to participate in the various regional and local bodies to reduce aircraft noise impacts to the City.
"Policy N-2	The City of South San Francisco shall continue to support the concept of not shifting noise from one impacted community to another.
"Policy N-3	The City shall oppose inordinate expansion of international traffic at San Francisco International Airport and shall support the concept presented in the Regional Airport Plan that traffic of all types should be distributed between the three regional international airports and not concentrated at one facility, specifically San Francisco International Airport.
"Policy N-4	The City shall urge adoption of strong enforceable noise regulations by the San Francisco Airports Commission that eliminate nighttime departures by Stage 2 aircraft.
"Policy N-5	The City of South San Francisco shall do all within its power to ensure continued funding of the Noise Insulation/Noise Easement Program and support the concept that, even in the absence of any Federal funding, San Francisco International Airport provide matching funding for the Noise Insulation Program.
"OBJECTIVE:	To ensure adequate and correct evaluation of aircraft noise impacts by the San Mateo Airport Land Use Commission.
"Policy N-6	The City shall urge adoption by the San Mateo Airport Land Use Commission of a continually updated noise exposure map for the San Francisco International Airport environs."/39/

Implementation of the SFIA Master Plan could conflict with policies of the Noise Element of the City of South San Francisco General Plan.

The City and County of San Francisco

Land Use / Noise Compatibility

The City and County of San Francisco's Transportation Noise section within the Environmental Protection Element of its Master Plan provides a guide for development and land use in relation to noise. The objectives and policies in this section are intended for use within City of San Francisco limits only. However, they establish San Francisco's general criteria for "achieving an environment in which noise levels will not interfere with the health and welfare of people in their everyday activities." The section also states, "In San Francisco, major attention must be given to three main aspects of the problem: the sources of the noise, the path it travels, and the receiver of the noise. In general, techniques should be designed to quiet the noise at the source, to block the path over which it is transmitted, and to shield or remove the receiver from the noise."/40/

Listed objectives and policies that relate to land use and noise compatibility are as follows:

"Objective 10	Policy 1:	Promote site planning, building orientation and designing and interior layout that will lessen noise intrusion.
"Objective 11	Policy 1:	Discourage new uses in areas in which the noise level exceeds the noise compatibility guidelines for that use.
	Policy 2:	"Consider the relocation to more appropriate areas of those land uses which need more quiet and cannot be effectively insulated from noise in their present location, as well as those land uses which are noisy and are presently in noise-sensitive areas.
	Policy 3:	"Locate new noise-generating development so that the noise impact is reduced."/40/

In addition, the "Land Use Compatibility Chart for Community Noise" outlines acceptable noise levels by land use category. Under the heading "Commercial -

Wholesale and Some Retail, Industrial/Manufacturing, Transportation, Communications and Utilities", for noise levels above 83 dBA, L_{dn} (see Section III.C. Noise for the definition of dBA and L_{dn}), new construction or development should be undertaken only if a detailed analysis of the noise-reduction requirements is made and needed noise-insulation features are included in the design./40/

Implementation of the SFIA Master Plan would not conflict with policies of the Environmental Protection Element of the City and County of San Francisco.

COUNTY OF SAN MATEO

While SFIA is located on unincorporated land within San Mateo County, SFIA is owned by the City and County of San Francisco as a public utility and is, therefore, under Section 53090 of the California Government Code, not subject to the land use regulations of the County of San Mateo./41/

However, SFIA is recognized as having an influence over surrounding areas and is in the Urban Land Use Element of San Mateo County's 1986 *General Plan* and in the San Mateo County *Zoning Ordinance*. The Urban Land Use Element designates SFIA as a "Special Urban Area", Airport, under the grouping of "Institutional Areas". The primary feasible uses associated with the Airport designation are "(t)ransportation uses including air transportation and related terminal transfer, maintenance and loading area facilities." The Urban Land Use Policy for "...San Francisco International Airport (is to) maintain current uses and allow redevelopment and expansion if compatible with adjacent land uses and other General Plan policies." /Objective 8.4.b./ The element indicates a development potential of 260 industrial acres./42/

The San Mateo County *Zoning Ordinance* designates airport land as primarily zoned M-1 (Light Industrial) and C-1/S-1 (Neighborhood Commercial) and overall as an Airport Overlay District (A-O). The A-O district limits the concentration of people where hazards from aircraft are considered to be greatest. Permitted uses are not specified; however, preference is given to uses that are anticipated to attract no more than ten persons per net acre at any one time. The requirements of the A-O district are applied in addition to the requirements of the primary zoning designation./43/

In the winter of 1990, the City / County Association of Governments (CCAG) of San Mateo County was formed by a joint powers agreement between the cities of San Mateo County and the County of San Mateo. CCAG has created several committees to address various issues and to assist in preparing state-mandated plans. One of the committees created was the Airport Land Use Commission of San Mateo County.

County of San Mateo Airport Land Use Commission (ALUC)

Airport Land Use Commissions (ALUCs) are established by California state law to coordinate new development in the vicinity of public use and military airports and to make recommendations, which, by promoting the compatibility of new development with existing and planned airport operations, will protect the welfare of nearby inhabitants and the general public./44/ An ALUC does not have any authority over airport operations, but it does have the authority to conduct land use planning for areas around airports in the County. The ALUC must make a determination that general plans, zoning regulations, and any proposed new development in its planning area are in conformance with its Airport Land Use Plan. However, local governments can overturn decisions of the ALUC by a four-fifths vote. The 1981 San Mateo *Airport Land Use Plan* requires that airport "approach zones" be kept free of structures. Nonstructural uses may be permitted in approach zones if they do not cause a concentration of more than ten persons per acre on a regular basis./45/ The San Mateo ALUC was created to regulate land uses in areas that could be affected by the operation of an airport and prepared an airport land use plan in 1973. All cities affected by Half Moon Bay Airport, San Carlos Airport, and SFIA are represented. Of primary importance to the ALUC is the intensity of land uses under the flight paths, the compatibility of projects under consideration by public agencies with current and future airport operations, and the adequacy of construction material.

San Mateo *Airport Land Use Plan* regulations include the following:

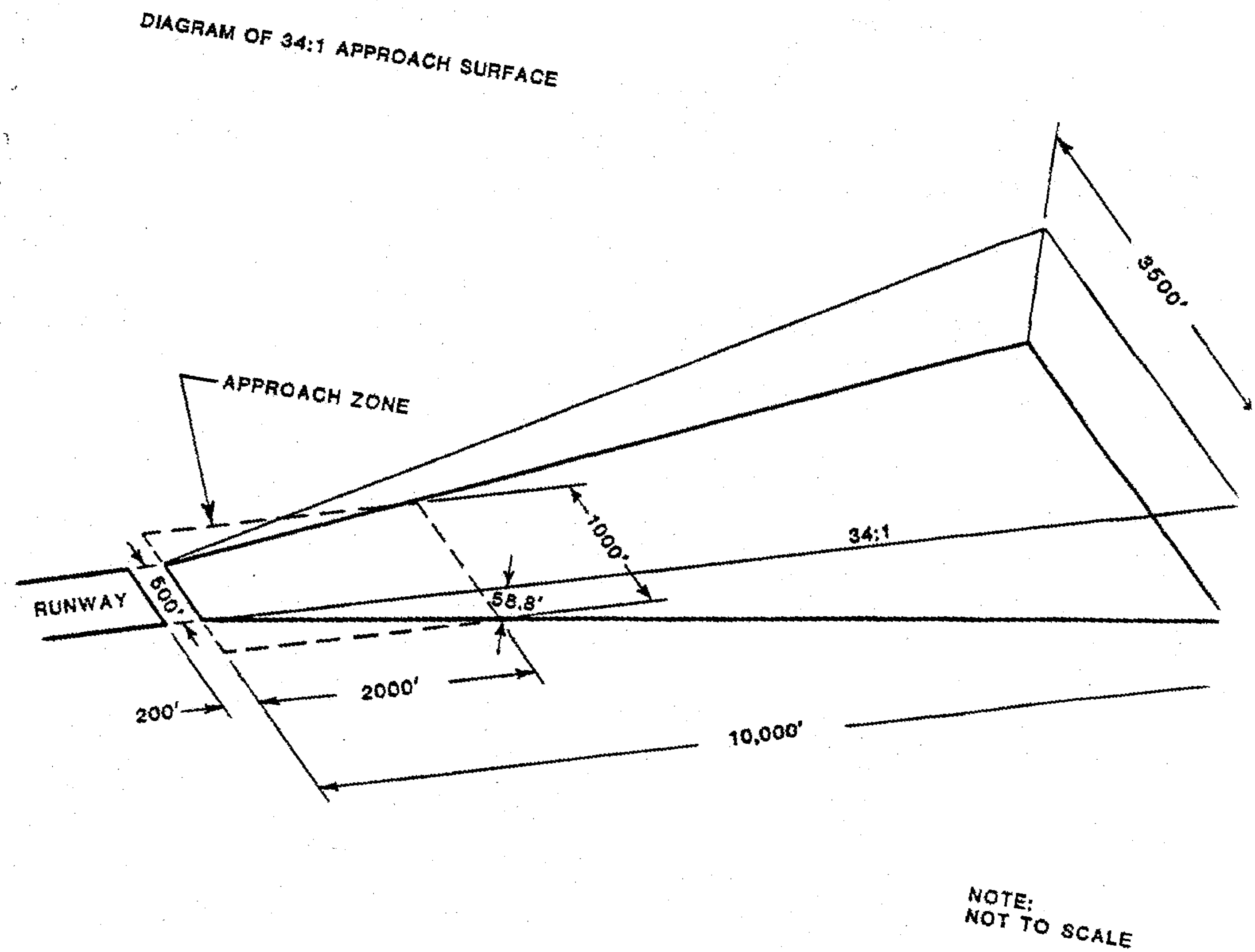
> "HEIGHT RESTRICTIONS. The ALUC Plan does not allow tall structures to be built around the three airports if such buildings would be hazardous to flight. Under these regulations, structures are prohibited above measured flat planes that slope upward and outward from a runway. These are referred to as 'approach surfaces' and should not be confused with the approach zones described in the previous section.
>
> "ALUC height restrictions are based primarily on Federal Aviation Regulations Part 77, 'Objects Affecting Navigable Airspace'. Structures which would penetrate Part 77 surfaces are prohibited. Maps defining these surfaces appear on the 'SID' (Standard Instrument Departure) and 'TERPS' (Terminal and Enroute Procedure Standards). Surfaces are subject to case-by-case review by ALUC.

> "The drawing below [Figure 12] illustrates a typical surface located in relation to an airport runway and approach zone. The illustration also demonstrates how 34:1 slope would permit a structure to be built to a maximum height of 58.8' at the end of a 2,000' approach zone."/45/

<u>Joint Powers Board, San Francisco International Airport and San Mateo County Environs Area</u>

In 1976, a Joint Powers Board was created to undertake a comprehensive effort to improve compatibility between San Francisco International Airport and the San Mateo County Environs Area. With financial support from the City and County of San Francisco, San Mateo County and the Federal Aviation Administration (FAA), the Joint Powers Board undertook a Joint Land Use Study that began in 1978 and culminated in 1980 with the publication of the *Joint Land Use Study Final Technical Report.* In addition to the Airports Commission, San Mateo County ALUC staff, local governments and consultants to the Joint Powers Board, participants in the Joint Land Use Study process included members of community groups, business, labor unions, and the aviation industry. Prior to the establishment of the Joint Powers Board, resolution of compatibility problems between SFIA and surrounding communities was undertaken on a piecemeal basis by the jurisdictions concerned: the Airports Commission, San Mateo County, the San Mateo County ALUC and cities in the vicinity of SFIA./46/ The original objectives of the Joint Land Use Study were as follows:

- "To provide for the orderly and timely growth of San Francisco International Airport, adequate to meet present and future air transportation needs, but consistent with the safety and general welfare of the inhabitants within the vicinity of the Airport and the public in general.
- "To provide governmental jurisdictions in the vicinity of the airport with tools for evaluating and implementing planning actions in a systematic fashion.
- "To inform public and private aviation interests, as well as the general public, of Airport land requirements, and to create a general awareness of the need for a systematic approach to planning the Airport and its Environs.
- "To optimize use of land and air space resources and guide community growth patterns according to comprehensive planning goals and objectives.
- "To provide for protection and enhancement of the environment through the development of land use specifications, height restrictions and/or building standards within the planning areas and through establishment of guidelines consistent with Federal and State regulations to avoid intrusion of unacceptable levels of noise and air pollution into the surrounding communities."/46/



SOURCE: Environmental Science Associates, Inc.;
San Mateo County Land Use Commission

San Francisco International Airport

Figure 12
ALUC Runway Approach Zones

During the course of the Joint Land Use Study, increasing interest in noise conditions and mitigations led to a re-ordering of Study objectives and priorities to emphasize noise issues and de-emphasize land use planning, ground access and air quality issues. Recommended Actions of the Joint Land Use Study focused on noise reduction and mitigation measures, including improvement of airport noise monitoring and mitigation programs; flight procedure changes; Airport noise limits, use restrictions and economic incentives; off-Airport voluntary noise insulation and avigation easement programs; neighborhood improvement programs; and preventive land use planning. Ground access and air quality recommendations included transit improvements and continued joint study of Airport Environs traffic; development of an aircraft emissions control program; and submission of Study recommendations to the Airports Commission for consideration in master planning studies./46/

Alternatives considered but not recommended by the Joint Land Use Study included reduction of Airport operations, construction of new or extended runways, and acquisition of noise-affected homes and schools. The Study concluded that a reduction in operations "would result in extreme economic, financial, and air service impacts," and that acquisition of noise-affected homes and schools "would result in extreme physical and social impacts to existing viable residential neighborhoods . . ." New or extended runways, the Study concluded, "would result in extreme environmental impacts to the ecosystem of San Francisco Bay if bayfill were required in sufficiently large amounts to allow construction of new or extended runways solely for noise abatement."/46/

REGIONAL CONTEXT

Association of Bay Area Governments (ABAG) and Metropolitan Transportation Commission (MTC)

The Association of Bay Area Governments (ABAG) is a voluntary regional governmental body that includes the entire nine-county Bay Area. ABAG is largely a long-range planning agency that provides cities and counties with analytical research and technical assistance. ABAG prepared and adopted a Regional Airport Plan as an element of its *Regional Plan 1970: 1990*./47/ During the 1970s, ABAG also conducted a Regional Airport Systems Study, which it adopted as a special plan element of the Regional Plan./48-51/

In 1970, the Metropolitan Transportation Commission (MTC) was established by the California State Legislature as the comprehensive transportation planning and programming agency for the nine San Francisco Bay Area counties. MTC has authority to review local projects for consistency with regional transit/transportation policies. MTC has authority to review and comment on SFIA Master Plan projects that could affect either regional ground transportation systems or regional aviation systems.

Regional Airport Plan (RAP). This Plan was prepared by MTC and ABAG to guide future aviation growth in the Bay Area, was adopted as an element of the MTC *Regional Transportation Plan* in March, 1975, and was subsequently revised as part of ● the 1980 edition of MTC's *Regional Transportation Plan.*/52,53/ Forecasts developed for the 1980 Regional Airport Plan have been periodically reviewed and revised./53a/ An update of the 1980 *Regional Airport Plan*, known as the Regional Airport System Plan (RASP) Update, is currently in progress and slated for publication by the end of 1992. An environmental impact report on the RASP Update is scheduled for completion in early 1993./53b/

● The RASP Update will include historical, current and forecast levels of aviation activity in the Bay Area; data on Bay Area aviation facilities, capacities and requirements, including ground access systems, terminals, airfields, airspace, etc.; environmental and other constraints affecting the regional airport/aviation system; and a range of alternatives for coordinating regional aviation planning, investments in capacity-increasing and other airport projects, and operations./54,55/ The RASP Update will examine airport system alternatives for 2005 and 2010./53a/

The alternative regional aviation system plans will range from no major infrastructure improvements to construction of one or more new air carrier airports, and will also include new technologies, the Master Plans of existing air carrier airports, recommendations of other agencies and studies, and various combinations of identified actions./54,55,56/

Among the assumptions likely to influence the 1992 *Regional Airport Plan* forecasts is whether growth in aviation activity between SFIA and Pacific Rim countries continues, while the other Bay Area air carrier airports increase their shares of domestic passenger traffic, particularly in the California Corridor (Southern California - Bay Area - Sacramento)./54/

The *Regional Airport Plan* is the basis of MTC consistency determinations concerning airport plans and development proposals. Provisions of the 1980 *Regional Airport Plan* include the following:

"Mitigation proposals. Regional policy calls for the development of airport ground transportation improvement, noise abatement, and air quality improvement programs by the airports prior to major expansion. One of the key recommendations concerns the establishment of a regional airport noise allocation system. This recommendation creates a noise 'budget' for each airport based on the airport's share of traffic in the RAP *[Regional Airport Plan]* and the assumption that all aircraft using the Bay Area airports will meet Federal Aviation Regulations--Part 36, Aircraft Noise Certification Requirements by 1987. Revised standards to achieve continuing reductions in the emissions from aircraft engines are also supported to minimize local airport air quality problems.

"North Bay Airport. The regional plan has identified a demand of up to one (1) million annual passengers in the North Bay who would need air service to cities in California in the 1985-1989 time frame and up to two million annual passengers in the 1994-2000 time frame. A joint policy study by regional and local governments has proposed that the need for a California Corridor Service and/or regional airport (interstate and international airline service at Travis AFB [Air Force Base] or a new airport) be reviewed around 1990. In the interim, local governments should permit only compatible land uses around Travis AFB. Also, it is recommended that responsible agencies look into management techniques at existing airports to control noise and improve capacity, and thus alleviate pressures for an airport in the North Bay.

"General Aviation. It will also be necessary to expand and improve the region's general aviation airports, particularly as general aviation becomes a more important transportation mode for business and other travelers needing to reach locations that are not served by the airlines. An efficient system of 'reliever' general aviation airports is also needed in order to divert small aircraft away from the crowded airspace in the central Bay and improve air safety. In the North Bay, Hamilton AFB and Napa County Airport have the greatest potential to relieve general aviation congestion around San Francisco and Oakland Airports. (Sonoma County and Nut Tree Airports will provide relief by serving local training demand.) In the South Bay, improvements to general aviation airports in the south county and Fremont area could substantially relieve San Jose Municipal Airport, and the possibility of joint use of Moffett Field for training purposes should also be explored . . .

"Expansion of major air carrier airports. Airline service at San Francisco International Airport, Metropolitan Oakland International Airport, and San Jose Municipal Airport should be consistent with the regional plan and with master plans prepared for these airports. The regional plan recommends that airport improvement programs and local land use decisions be guided by the assignments of air passengers shown in the following table:

●[TABLE 14]
Regional Passenger Assignments
(Millions of Annual Passengers)

Airport	1985-1989	1994-2000
San Francisco	24-27	27-31
Oakland	7-8	10-13
San Jose	6-7	8-10
Total*	37-42	45-54

* Total regional demand is projected to be 37-43 MAP [Million Annual Passengers] in 1985-1989 and 45-56 MAP [Million Annual Passengers] in 1994-2000. Some portion of the projected regional demand may remain unserved, depending on the availability of air service in the North Bay."/53/

Source: Metropolitan Transportation Commission, *Regional Transportation Plan*, 1980.

● A comparison of MTC's 1980 Region Airport Plan-recommended shares of regional passenger activity and actual 1989 shares for the five Bay Area air carrier airports is presented in the discussion of regional aviation activity and regional capacity issues, beginning on p. 118.

● Tables 14A and 14B, below, reflect the most recent MTC regional airport plan passenger forecasts (revised in 1986) and airport traffic assignments (revised in 1987). Anticipated total regional air passenger demand in the most recent forecasts is higher than in MTC's 1980 Regional Airport Plan forecasts, and the most recent forecasts are extended to 2005 (whereas the previous forecasts extended to 2000). The recommendation that SFIA's passenger share should decrease relative to shares of the airports at Oakland, San Jose and Concord as total Bay Area air passenger demand increases, is inherent in both the 1980 and the 1986-1987 Regional Airport Plan airport traffic assignments.

[TABLE 14A]

PROJECTED BAY AREA AIR PASSENGER DEMAND
(Millions of annual passengers - on & off)

Time Frame	Total Bay Area Air Passengers
1995	40.8 - 46.8
2005	48.7 - 58.7

Source: Metropolitan Transportation Commission, *Regional Transportation Plan for the Nine-County San Francisco Bay Area,* 1988.

[TABLE 14B]

AIRPORT TRAFFIC ASSIGNMENTS
(Millions of annual air passengers - on & off)

Airport	Level 1		Level 2		Level 3	
	Demand	Share	Demand	Share	Demand	Share
San Francisco	19.9	78.7%	30.0	69.3%	31.0	55.1%
Oakland	2.6	10.1	6.0	13.9	15.0	26.6
San Jose	2.8	11.2	7.0	16.2	10.0	17.8
Buchanan Field	--	--	0.3	0.6	0.3	0.5
Total	25.3	100.0%	43.3	100.0%	56.3	100.0%

Level 1 represents the 1981 traffic level and traffic distribution among the airports. Levels 2 and 3 represent shares derived from policies in the RAP and airport master plans. Air passenger assignments for intermediate levels of Bay Area demand may be determined by interpolation between the three levels of demand shown in the table.

Source: Metropolitan Transportation Commission, *Regional Transportation Plan for the Nine-County San Francisco Bay Area,* 1988.

In 1990, SFIA's actual passenger level (about 30.4 MAP) and regional share (about 70.4 percent) were relatively close to MTC's recommendations for SFIA's component of regional passenger demand Level 2, shown in Table 14B. At regional demand Level 2 (43.3 MAP for the region), MTC recommended 30 MAP and 69.3 percent of the regional passenger market for SFIA. The actual regional total in 1990 was about 43.8 MAP. Thus, SFIA's 1990 passenger level and regional market share were consistent with MTC's most recent (1987) airport traffic assignments.

- However, the passenger levels and market shares anticipated in the SFIA Master Plan are not consistent with MTC's airport traffic assignments. As shown in Table 14B, MTC assumed a 13 MAP or 30 percent increase in total passengers for the region between demand Levels 2 and 3, but recommended that SFIA's passenger total increase by only one MAP (to 31 MAP) and that its market share decline from 69.3 percent to 55.1 percent of the regional total. The SFIA Master Plan, in contrast, assumes that SFIA would serve between 70.5 and 72.8 percent of regional passenger demand at Level 3, or 56.3 MAP. (The basis of this comparison is SFIA Master Plan Table 7.1, "Total Passengers -- Regional San Francisco-Oakland-San Jose Area Passenger Forecasts" and Table 7.2, "Total Passengers--San Francisco Airport Passenger Forecasts." Forecasts in SFIA Master Plan Table 7.1 show the 56.3 MAP level being reached between 1994 and 1995; according to SFIA Master Plan Table 7.2, SFIA's "unconstrained" passenger total would be about 39.7 MAP in 1994 and about 41 MAP in 1995. Thus, the data in the two tables reflect an expected regional share under the SFIA Master Plan of 70.5 to 72.8 percent for a regional passenger level of 56.3 MAP, MTC's Level 3.)

- MTC's most recent (1986) regional air passenger demand forecasts and most recent (1987) airport traffic assignments are being revised as part of the RASP Update.

SCR 74 Peninsula Mass Transit Study. Since the late 1970s, MTC has undertaken several studies of the Peninsula Route 101 corridor between San Francisco and San Jose, one of the most congested and heavily travelled corridors in the Bay Area. In 1984, MTC was directed by the State Legislature, Senate Concurrent Resolution Number 74, to develop a mass transit plan for the San Francisco - San Jose corridor in cooperation with the California Department of Transportation (Caltrans), transit operators, and local governments. The SCR 74 Peninsula Mass Transit Study identified a range of transit system alternatives, including improvements in the commuter rail (CalTrain) service and extension of CalTrain to a downtown San Francisco station; several possible BART extensions (Colma and San Jose); a possible light-rail system between San Francisco and San Jose; a "major system transfer facility" (BART or light-rail station) at SFIA; addition of high-occupancy vehicle (HOV) lanes on US 101; and alternatives combining BART and light-rail transit, CalTrain or buses./56/

Metropolitan Oakland International Airport (Oakland Airport)

Oakland Airport, managed and operated by the Port of Oakland, has prepared a draft *Master Plan Update* (1988). The Oakland Airport draft *Master Plan Update* is currently undergoing environmental review as required by both the California Environmental Quality Act (CEQA) and the National Environmental Policy Act

(NEPA). Draft elements of the Oakland Airport *Master Plan Update* include *Chapter II: Introduction; Chapter III: Inventory; Chapter IV: Aviation Demand Forecast; Chapter V: Capacity Analysis*; and *Chapter VI: Facility Requirements*./57/

Goals of the Port of Oakland pertaining to the Oakland Airport draft *Master Plan Update* are as follows:

- "To provide comprehensive and convenient air travel services for Oakland and the East Bay Area.
- "To increase Metropolitan Oakland International Airport's share of the Bay Area passenger market.
- "To encourage Metropolitan Oakland International Airport to become a major west coast center for air cargo activity.
- "To increase Metropolitan Oakland International Airport's share of the Bay Area air cargo market."/59/

Issues identified in the Oakland Airport draft *Master Plan Update* that pertain to development of Oakland Airport include the regional role of the airport, the airport's role in the community, role of North Field and South Field (the facility is now divided), airspace capacity, airport airside capacity and facilities development, airport landside accessibility and circulation, passenger terminal development, environmental effects of airport operations and development, and compatible development of adjoining land uses.

According to the Oakland Airport draft *Master Plan Update*, "Bay Area airspace is perhaps the most complex in the nation and may be the most significant factor in determining the capacity of the Airport. Close coordination with the FAA and area airports will be required in determining airspace impacts."/57/

Fluctuations in the aviation industry, as well as potential environmental controversy and other institutional changes, caused the Port of Oakland to re-scope the Master Plan update program and scale back the plan time frame, a process which has culminated in the development of the 10-year 2002 Airport Development Program. Among the projects under consideration in the 2002 Airport Development Plan are the modification of existing terminal facilities, widening of existing airport access roads and construction of new airport access roads, construction of a ground transportation center/parking structure and remote parking lots, enhancements and additions to existing airline support and air cargo facilities, improvements to taxiway and runway facilities, and restoration of wetlands as mitigation for a previous 33-acre fill on Oakland Airport lands. The improvements to the airfield facilities are intended to enhance the current level of safe and efficient operations of aircraft and would not expand the overall capacity of the Oakland Airport airfield.

San Jose International Airport (San Jose Airport)

San Jose International Airport, owned and operated by the City of San Jose, is also updating its Master Plan, a process that began in 1988 and will likely continue for another two years (through 1994). According to demand forecasts, total annual aircraft operations at San Jose Airport are expected to increase by 90 percent between 1988 and 2010./58/ Land availability is considered a more important constraint at San Jose Airport than airspace capacity./59/

San Jose Airport staff and consultants are currently in the process of defining and scoping four Master Plan alternatives that have been identified for consideration by the San Jose City Council. An EIR will be prepared on the four alternatives, and selection of a preferred alternative will occur after completion of the EIR (expected in mid-1993). The first of the four alternatives would accommodate all of the air carrier demand projected for San Jose Airport in the Master Plan technical analysis. The second alternative, prepared by Citizens Against Airport Pollution, is an environmental-performance-based alternative that would, at most, allow limited expansion at San Jose Airport. The third, or moderate growth alternative, would fall between the first and second alternatives in terms of the amount of expansion it would allow at San Jose Airport. The fourth alternative is the No-Project alternative, defined as continuation of the existing (1980) Master Plan. Any of the four alternatives may ultimately be selected as the preferred alternative for San Jose Airport./59a/

California Department of Transportation (Caltrans)

In addition to it role in planning and operating the ground transportation systems serving SFIA (see Section III.B. Transportation, p. 125 and Section IV.B. Transportation, p. 265), Caltrans is involved in state aviation system planning and research through its Division of Aeronautics and its Office of Research and New Technology. The Division of Aeronautics recently completed the Phase I update of its *California Aviation System Plan (CASP)*, begun in 1987. Phase I of the *CASP* comprises six elements and a *Status Report and Summary.* The six Phase I *CASP* elements include *Element I: Inventory; Element II: Forecasts; Element III: Policies; Element IV: System Requirements; Element V: Financial; and Element VI: Action Plan.* The Policy element was adopted by the California Transportation Commission in November, 1990./60/ *CASP* forecasts of SFIA passenger levels and aircraft operations are presented in the previous section (Project Description).

- Phase II of the *CASP* comprised in-depth studies of issues related to air cargo, airport ground access and airspace utilization. These three Phase II *CASP* studies, and an Executive Summary, were published in August, 1991./61/

Aviation-related policies of the California Department of Transportation are identified in *CASP Element III: Policies* as follows:

"Policy 1. The Department will identify a statewide airport system to meet the State's immediate and future air transportation needs and will promote development and maintenance of the system.

"Policy 2. The Department will facilitate coordinated and comprehensive statewide aviation system planning through continuous and active participation in Federal, State, regional and local activities related to aviation.

"Policy 3. The Department will coordinate aviation system planning efforts with the Federal Aviation Administration (FAA) and the military on airspace issues to achieve efficient and safe use of airspace in California.

"Policy 4. The Department will strive for the safest possible public-use airport facilities.

"Policy 5. The Department will encourage development of an air transportation system that meets demand as identified in the *California Aviation System Plan (CASP)*.

"Policy 6. The Department will promote and assist in ensuring compatibility between airports and surrounding land uses.

"Policy 7. The Department will maintain hazard-free approach surfaces at all public-use airports, and will seek to achieve obstruction-free approach zones.

"Policy 8. The Department will promote and encourage development of adequate ground access to public-use airports.

"Policy 9. The Department will promote adequate air transportation access to the state and national air transportation systems for all the State's citizens.

"Policy 10. The Department will recommend funding in a manner that will provide the optimum benefit to the State airport system.

"Policy 11. The Department will provide aviation expertise to airports in engineering, planning, and technical areas.

"Policy 12. The Department will assist airports in becoming economically viable and self-sustaining.

"Policy 13. The Department will promote awareness of the socioeconomic benefits of aviation throughout the State and will support aviation education."/62/

In implementing the above policies, the Caltrans Division of Aeronautics prepares the *CASP* and participates in other aviation studies and programs; reviews and comments on Regional Transportation Plans, Airport Master Plans, Compatible Land Use Plans, and associated environmental documents; reviews and comments on Federal rule-making and legislation; drafts and reviews proposed State legislation related to aviation; and administers various State funding and loan programs for airports. The Division also administers State Noise Standards, issues State permits for all airports and heliports, and has permitting authority for erection or extension of structures more than 500 feet above ground or near-airport obstructions near airports declared a hazard by the FAA./62/

The Caltrans Division of Aeronautics is currently reviewing military airfields scheduled for closure to determine their potential use as civilian airports. Two Northern California facilities (Mather Air Force Base and Hamilton Air Force Base) and two Southern California facilities (Norton Air Force Base and George Air Force ● Base) were included in the first phase of this review./60/ A report on possible conversion of these four bases to civilian aviation was published by Hodges & Shutt, a consultant to the Caltrans Division of Aeronautics, in May 1991./60a/ Other Northern California military airfields that may be studied by Caltrans for potential civilian use include Alameda Naval Air Station, Moffett Naval Air Station and Fritzsche AAF (Fort Ord)./63/

The Caltrans Office of Research and New Technology, in association with the Institute of Transportation Studies at the University of California, Berkeley, is currently studying the feasibility of locating additional off-airport terminals in the Los Angeles Basin and the San Francisco Bay Area. Off-airport terminals provide regularly scheduled bus or rail service to one or more airports from remote parking facilities. Usually located about 15 to 20 miles from the airport(s), off-airport terminals may also include baggage check-in and airline ticket counters. Existing California off-airport terminals include the Van Nuys FlyAway, which provides service to Los Angeles International Airport and is operated by the Los Angeles Department of Airports, and the Marin Airporter, which provides service to SFIA from the Marin County community of Larkspur./62/

● The objective of the current study is to identify two potential sites - one in the San Francisco Bay Area and one in the Los Angeles Basin - and to develop a plan for a Caltrans-sponsored off-airport terminal demonstration program. According to the Institute of Transportation Studies and Caltrans studies, off-airport terminals can benefit users in terms of cost savings and convenience, can contribute to reductions in highway congestion and vehicle emissions by diverting airport traffic to high-occupancy vehicles, and may also contribute to a more balanced use of regional airport capacity by providing more ground transportation options in multiple-airport regions./64,65/

The California Department of Transportation also led the Los Angeles -Fresno - Bay Area / Sacramento High-Speed Rail Corridor Study, mandated by Assembly Bill AB-971, passed into law in June, 1988, and submitted to the State Legislature in June, 1990. AB-971 called for the establishment of a 30-member Study Group to "study and develop a plan for development of a high-speed rail corridor" in the Los Angeles -Fresno - Sacramento / Bay Area corridor./66/ The Study Group's Final Report to the California State Legislature stated that:

> "On the air trip between the downtown parts of Los Angeles and San Francisco, the majority of time and nearly all the stress is associated with ground access, not with the air journey itself. The airports suffer from severe capacity limits on landing slots, airplane space, fuel storage, parking and congested automobile traffic. Air travel is now less convenient, less pleasant and more costly....In its fully developed form, [the California Corridor] will comprise a high speed rail spine approximately 425 miles long and an interregional rail network with a total length of over 600 miles. Its gross population catchment of more than 20 million Californians will include more than two-thirds of all state residents. The character of this state-wide corridor makes its full and early development, and the creation of the infrastructure to support it, a California state-wide priority of the highest order."/67/

The objectives adopted by the Study Group are to:

"1. Reduce travel time and enhance speed for trips within the corridor.

"2. Provide additional passenger rail service and passenger-carrying capacity within the corridor.

"3. Extend direct rail service to Los Angeles and to Sacramento and the Bay Area.

"4. Provide San Joaquin service between Fresno, Modesto, and Stockton on the Southern Pacific Railroad on a schedule equivalent to running times achievable on the parallel Santa Fe Railway.

"5. Increase patronage potential and accessibility of rail service within the corridor.

"6. Improve the quality of passenger rail service within the corridor.

"7. Maintain capacity of freight operations.

"8. Provide cost-effective improvements that maximize benefits in the corridor relative to costs."/66/

In part of a long-term planning effort to develop rail service in the California Corridor, the Study Group identified four levels of improvement for phased implementation. Level 1 is the status quo. Level 1a would expand 79 miles per hour (mph) service and extend direct rail service to Sacramento and Los Angeles. Level 2 would include a new high-speed (185 mph potential) electrified rail line between Bakersfield and Los Angeles, 110-125 mph maximum speed service between Bakersfield and Sacramento and 79 mph maximum speed service between Stockton and Oakland. Level 3 would include new high-speed rail links (185 mph maximum speeds) between the Central Valley and the San Francisco Bay Area, with state-of-the-art equipment and dedicated passenger tracks. Level 4 would include Magnetic Levitation (Maglev) as an alternative to Level 3, built over the Level 2 alignment and having 300 mph maximum speeds./66/ According to Study Group technology analysis, travel time between San Francisco and Los Angeles (downtown to downtown) would be 3 hours, 21 minutes at 185 mph maximum speed, and 2 hours, 13 minutes at 300 mph maximum speed./65/

California Commission on Aviation and Airports

The 25-member California Commission on Aviation and Airports was established by the State Legislature in 1986 to review, monitor and evaluate issues relevant to aviation and airports in California. The Commission is composed of representatives of the aviation industry, users of the air travel system and members of the Legislature. The Commission's January, 1989 report to the Legislature stated that California is facing an aviation capacity "crisis" with potentially severe consequences for the viability and competitiveness of the State's economy. The report outlined the historic and present role of the State in aviation system planning and development, citing the State's limited control relative to Federal and local agencies and emphasizing the need for a more proactive State involvement. The report also contained recommendations for addressing the "capacity crisis," including "development of a legislative program in the State to encourage local communities, through monetary incentives, to build new public use airport facilities and heliports." The report also advocated State involvement in joint military-civilian airport uses and civilian re-use of surplus military airfields. According to the Report,

> "Recently the Federal Base Realignment and Closure Commission recommended the closure of a number of military airfields in California....It would behoove the State of California to begin preliminary discussions with the appropriate federal and local agencies as to the acquisition and operation of these bases for commercial air carrier use. The cost, while not insignificant, would be much less than the development of a brand new facility in the area."/68/

On matters related to the potential availability of surplus military airfields, the Commission report included the following recommendations:

- "Require the State to act as an interim operator of airports, including military bases, being closed until a permanent operator can be found.
- "Develop, on the state level, a plan to work with the military and the federal government on joint and/or shared use airports and on military airfields which may become surplus and closed."/68/

Bay Conservation and Development Commission (BCDC)

The state Bay Conservation and Development Commission (BCDC), created by the McAteer-Petris Act in 1965, has regulatory authority over development in two areas: 1) all areas of San Francisco Bay below the line of highest tidal action, and 2) the 100-foot shoreline band inland of the line of highest tidal action. BCDC implements the McAteer-Petris Act, the *San Francisco Bay Plan*, and the Federal Coastal Zone Management Act./70/ BCDC's *San Francisco Bay Plan* contains two fundamental objectives:

> "(1) To protect the Bay as a natural resource for the benefit of present and future generations.
>
> "(2) To develop the Bay and its shoreline to their highest potential with a minimum of bay filling."

Any fill or substantial change in use of any water, land, or structure within BCDC's jurisdictional area is subject to a permit process established in the California Government Code (Sections 66600 and following)./69/

The *San Francisco Bay Plan* findings and policies pertinent to the SFIA Master Plan include the following:

"a) The shoreline is a favored location for airports because the Bay provides an open space for takeoffs and landings away from populated areas.

"b) A regional airport system plan should be prepared with full participation of affected public agencies and should include analyses of expected air traffic, alternative sites and their alternative environmental consequences, surface transportation, and the location of the jobs and homes within the Bay Area.

"c) Airports on the Bay shoreline should include terminals, parking areas, and necessary supporting facilities, but no fill should be permitted, directly or indirectly.

"d) In order to minimize additional filling of the Bay, tall buildings and residential developments should not be permitted within BCDC's area of shoreline jurisdiction."/70/

A discussion of the Bay Area Rapid Transit District (BART) is included in Section III.B. Transportation.

A discussion of the Bay Area Air Quality Management District (BAAQMD) is included in Section III.D. Air Quality.

A discussion of the San Francisco Bay Regional Water Quality Control Board is included in Section III.J. Public Utilities.

A discussion of the FAA is included in Section III.L. Aviation Safety.

REGIONAL AVIATION ACTIVITY AND REGIONAL CAPACITY

Shares of regional passenger activity for the five Bay Area Airports recommended by the Metropolitan Transportation Commission (MTC) in its 1980 *Regional Airport Plan (RAP)* are shown in Table 15.

The 1980 *Regional Airport Plan* recommended that SFIA's relative share of passenger activity continue to decline, while the relative shares of Oakland and San Jose

TABLE 15: 1980 *RAP*-RECOMMENDED SHARES OF TOTAL REGIONAL PASSENGER ACTIVITY

Airport	1985-1989 % of Low/a/	1985-1989 % of High/b/	1994-2000 % of Low/c/	1994-2000 % of High/d/
San Francisco	64.9%	62.8%	60.0%	55.4%
Oakland	18.9%	18.6%	22.2%	23.2%
San Jose	16.2%	16.3%	17.8%	17.9%
Total	100.0%	97.7%/e/	100.0%	96.5%/e/

/a/ Low end of the three airports' assignment ranges for 1985-1989, as percent of low regional forecast for 1985-1989 (37 million annual passengers).
/b/ High end of the three airports' assignment ranges for 1985-1989, as percent of high regional forecast for 1985-1989 (43 million annual passengers).
/c/ Low end of the three airports' assignment ranges for 1994-2000, as percent of low regional forecast for 1994-2000 (45 million annual passengers).
/d/ High end of the three airports' assignment ranges for 1994-2000, as percent of high regional forecast for 1994-2000 (56 million annual passengers).
/e/ High-end percentages for the sums of the three airports' passenger shares do not total 100 percent of the high-end regional forecast because the *Regional Airport Plan* assumed that some passenger demand could remain unmet, depending on the availability of air service in the North Bay.

SOURCES: Metropolitan Transportation Commission, *Regional Transportation Plan*, 1980; Environmental Science Associates, Inc., 1991.

Airports, as well as one or more North Bay Airports, continue to increase. The 1980 *Regional Airport Plan* also recommended that, on the basis of the need to control and abate airport noise and better utilize airport and airspace capacity in the Bay Area, SFIA not exceed the level of 31 million annual passengers as a matter of policy./53/

Historical passenger totals and relative shares of regional passenger activity for the five Bay Area air carrier airports are shown in Appendix B, Tables B-3 and B-4.

The actual 1990 regional total of approximately 42,993,350 passengers was at the high end of the 1985-1989 forecast range contained in the 1980 *Regional Airport Plan* (the 1990 regional total includes all five Bay Area air carrier airports: San Francisco, Oakland, San Jose, Buchanan Field and Sonoma County). SFIA's actual passenger total in 1990 was approximately 30,387,920, or 70.7 percent of the regional total, compared to 62.8 percent recommended by the 1980 *Regional Airport Plan* for 1985-1989. Oakland Airport's 5,261,160 passengers represented about 12.2 percent of the 1990 regional total, compared to 18.6 percent recommended by the 1980 *Regional Airport Plan* for 1985-1989. San Jose Airport's 7,090,270 passengers represented about 16.5 percent of the 1990 regional total, roughly equal to the 16.3 percent recommended by the 1980 *Regional Airport Plan* for 1985-1989. Buchanan Field and Sonoma County Airport together captured about 0.6 percent of the 1990 regional total, whereas the 1980 *Regional Airport Plan* high-end forecast for 1985-1989 assumed that up to 2.3 percent of the regional passenger total would need to be served by North Bay air service./53,55/

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B. TRANSPORTATION

The San Francisco International Airport (SFIA), itself a major hub in Northern California's transportation network, can be accessed from the local, regional and interstate roadways in a variety of ways. SFIA is bounded on the west by US 101 and on the north by North Access Road. San Francisco Bay is directly east and south of SFIA. Internally, SFIA is served by local roadways entirely east of US 101. The project location relative to the surrounding roadway network is shown in Figure 1, Chapter II. Project Description, p. 21.

In addition to the highway facilities, a variety of van and bus shuttle services link SFIA with many of the Bay Area cities and counties, as well as local SamTrans bus service that operates between downtown San Francisco and points in San Mateo County, with stops at SFIA. Passenger rail service also penetrates the project impact area; the nearest CalTrain station is approximately two miles west of SFIA in Millbrae. BART service is eight miles northwest of SFIA in Daly City. BART tracks currently extend south of Daly City to Colma, the first station on the phased extension to the vicinity of SFIA.

THE ROADWAY NETWORK

Freeways

US 101 is a state-maintained, primary north-south highway that runs along the entire west coast. In the vicinity of SFIA, it is an eight-lane freeway (four lanes in each direction) with a collector-distributor system serving four interchanges that can be used to access SFIA's passenger terminals and employment areas:

- Millbrae Avenue (southernmost interchange)
- Airport (direct access to passenger terminal buildings)
- San Bruno Avenue
- Interstate 380 (I-380) / North Access Road (northernmost interchange).

Each of these interchanges connects to local roads (e.g., South Airport Boulevard, McDonnell Road or Old Bayshore Highway) that access all areas of SFIA.

South of the Millbrae Avenue interchange, US 101 has an average daily traffic volume (ADT) of 232,000 vehicles. Between the Millbrae Avenue and Airport interchanges, US 101 has an ADT of 241,000 vehicles. Between the Airport and the San Bruno Avenue interchanges, US 101 has an ADT of 256,000 vehicles. North of I-380 the ADT on US 101 drops to 214,000 vehicles./1/

Interstate 380 is an east-west freeway with six lanes that connects US 101 / North Access Road in South San Francisco with I-280 in San Bruno (a two-mile distance). The ADT is 82,000 vehicles west of State Route (SR) 82 (El Camino Real) and 71,000 vehicles east of SR 82, the segment closer to SFIA./1/ El Camino Real is the only interchange on I-380 between I-280 and US 101. Although most I-380 traffic interchanges with US 101 on the east, there are also direct ramps from I-380 to South Airport Boulevard and North Access Road.

Interstate 280, a north-south freeway with eight lanes, runs roughly parallel to US 101 approximately two miles to its west. I-280 connects San Jose and the Silicon Valley communities with San Francisco. South of the Millbrae Avenue interchange, I-280's ADT is 91,000 vehicles. Between the Millbrae Avenue and San Bruno Avenue interchanges, the ADT on I-280 is approximately 96,000 vehicles. Between San Bruno Avenue and I-380, the ADT is 87,000 vehicles, and north of the I-380 interchange the ADT is 152,000 vehicles./1/

Traffic conditions on freeways in the study area have not noticeably changed from conditions prior to the October 17, 1989 Loma Prieta Earthquake. Immediately after the earthquake, during the time when the San Francisco - Oakland Bay Bridge was closed, traffic volumes on US 101 were higher than normal. Although parts of I-280 north of the Alemany interchange on US 101 in San Francisco remain closed today, this is not affecting US 101 in the vicinity of SFIA, because the closure is over ten miles to the north./2/

Arterials

El Camino Real (SR 82) runs north-south along the Peninsula from San Jose to San Francisco, east of I-280 and west of US 101. In the vicinity of SFIA, El Camino Real is a six-lane arterial with an ADT of approximately 34,000 vehicles north of Millbrae Avenue, and 43,500 vehicles north of San Bruno Avenue./1/ El Camino Real and South Airport Boulevard provide access to SFIA for portions of the cities immediately north of SFIA (e.g., South San Francisco and Daly City).

South Airport Boulevard is a four-lane arterial running from Gateway Boulevard in South San Francisco to San Bruno Avenue / McDonnell Road (Road R-3) near SFIA. It provides access to SFIA from several developments in southeastern South San Francisco. There are ramps from South Airport Boulevard directly to I-380. The intersection at South Airport Boulevard / North Access Road / I-380 leads to the buildings and services at the north end of SFIA. At the southern end of South Airport Boulevard is the entrance to the United Airlines maintenance facility and the intersection at San Bruno Avenue.

San Bruno Avenue is a four-lane arterial running east-west from Skyline Boulevard (SR 35) in San Bruno to South Airport Boulevard. It has interchanges with I-280 and US 101. San Bruno Avenue provides access to SFIA for areas west and north of SFIA (e.g., San Bruno and Pacifica) via US 101 or McDonnell Road. It is the only continuous east-west arterial in San Bruno.

● Running east-west, Millbrae Avenue is a two-lane arterial between I-280 and El Camino Real and a six-lane arterial between El Camino Real and Old Bayshore Highway. It provides access to SFIA for areas west and south of SFIA (e.g., Millbrae) via Road R-2.

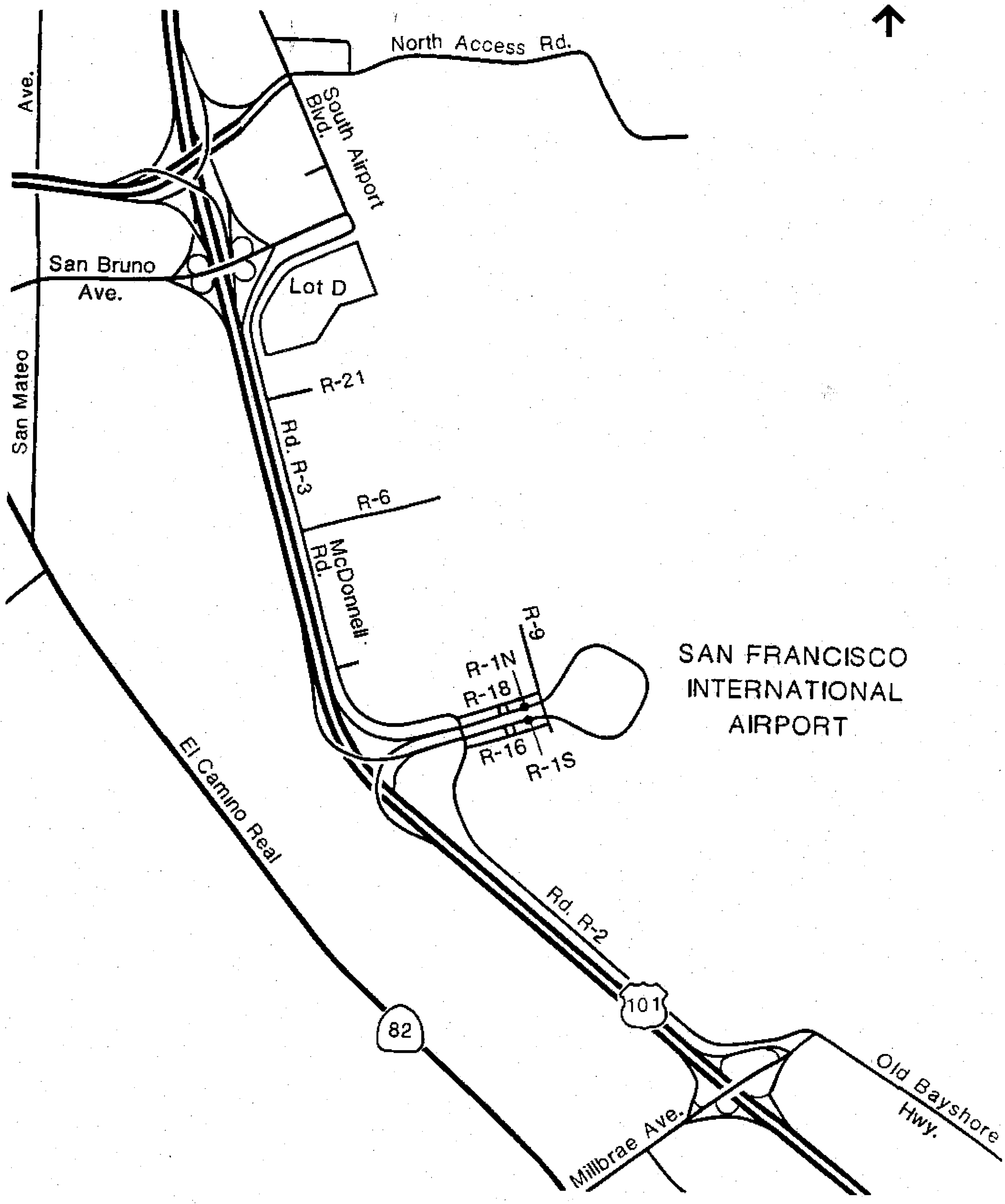
Old Bayshore Highway is a four-lane north-south arterial extending from Broadway in Burlingame to Millbrae Avenue in Millbrae. It provides access to SFIA for the areas south of SFIA and east of US 101 (e.g., northeast and east Burlingame) via Road R-2.

<u>Local Roads</u>

Primary access to the passenger terminals of SFIA is provided by direct ramps from US 101 northbound and southbound, with secondary access from Roads R-2 and R-3 (Figure 13). Figure 27, p. 271, Section IV.B. Transportation Impacts provides more detail on the internal Airport roadways. For inbound motorists, the ramps lead motorists to eastbound Road 1-S, then signage directs motorists to one of four areas:

- South of Road 1-S are the Hilton Hotel and rental car return areas. These are accessed from the far right lane of Road 1-S.

- The right lanes of Road 1-S direct traffic onto the (upper) departures roadway.



SOURCE: DKS Associates

● **Figure 13**
Local Roadways
in the Vicinity of SFIA

- The center lanes of Road 1-S direct traffic to the (lower) arrivals roadway.
- The left lanes of Road 1-S serve the entrance to the short-term parking garage and taxi staging area.

Westbound Road 1-N provides access for motorists leaving the terminal area to go to US 101, I-380, and Road R-3 (via R-20 [a crossroad between R-1S and R-1N] and R-18). It leads away from the arrival and departure decks, the parking garage, and Road R-22. It is parallel to Road 1-S, the eastbound (inbound) roadway leading to the passenger terminal and parking garage.

Road R-2 is a two-lane collector running north-south from McDonnell Road / Road 1-S (near the Airport Interchange with U.S. 101) to Millbrae Avenue in Millbrae. Road R-2 provides access to the Hilton Hotel, the TWA cargo facility and US 101 near the US 101 interchange at Millbrae Avenue. It also serves as a connecting roadway from Old Bayshore Highway and the developments in northeastern Burlingame to SFIA.

McDonnell Road (Road R-3) is a two-lane collector roadway within SFIA extending north from Road 1-N (near the Airport interchange with US 101) to South Airport Boulevard. McDonnell Road provides access to Roads R-6, R-21, the long-term parking facility (Lot D) and San Bruno Avenue.

North Access Road is a two-lane local road within SFIA, running from South Airport Boulevard and the I-380 / US 101 interchange to the Bay shoreline near the northeast corner of SFIA. It provides access to the Seaplane Harbor, the U.S. Coast Guard Air Station, the Federal Express cargo building and several other SFIA facilities.

Road R-16 is a two-lane collector south of Road 1-S, running from Road R-9 to Road R-2. It is connected to Road 1-S via one-way (cross) Roads R-24 northbound and R-26 southbound. Road R-18 is a two-lane collector north of Road 1-N, running from Road R-9 to Road R-3. It is connected to Road 1-N via one-way (cross) Roads R-20 northbound and R-22 southbound.

Average Daily Traffic (ADT) on local roads is shown in Section IV.B. Transportation Impacts, Figure 28, p. 273.

The speed limit on most local roads at or in the vicinity of SFIA is 25 mph.

EXISTING GROUND TRANSPORTATION SERVICES

Several internal transportation services are available within SFIA, and are discussed first. There are a variety of ground transportation services available both to and from SFIA. This section provides a synopsis of these services, broken down by regional service area. Services range from inexpensive public transit buses and shared-ride vans to more-expensive private limousines.

Ground Transportation Within SFIA

There are two SFIA shuttle bus routes providing service to all passenger arrival gates, outlying employment sites (e.g., United Airlines Maintenance, Federal Express Cargo), and long-term parking Lot D. Service is provided free of charge and runs approximately every five minutes.

Ground Transportation to Bay Area Cities/3/

Posted outside the baggage claim areas are color-coded ground transportation service information signs. These signs direct passengers to car rental, door-to-door van services, luxury limousines, taxis, scheduled transportation service, and bus stops. Several carriers also offer services for handicapped passengers. Fare, availability and advance notice requirements vary. Fares listed are as of January 1, 1990.

San Francisco

There are currently seven door-to-door van carriers providing service from SFIA to San Francisco. The carriers and their respective one-way fares are listed below:

• Door-to-Door Airport Express	$8.00
• Good Neighbors Airport Shuttle	$9.00
• Francisco's Adventure	$7.00
• Lorrie's Airport Shuttle	$9.00
• Shuttle Express	$8.00
• Super Shuttle	$10.00
• Yellow Airport Shuttle	$9.00

All limousine services are arranged through the Associated Limousine counter on the lower level of each terminal. Services range from shared ride to private luxury cars. To San Francisco, the cost ranges from $7.00 to $10.00 for shared ride limousines to $45 per hour for private luxury limousine service.

The SFO Airporter bus provides service to SFIA from several downtown San Francisco hotels at 20-minute intervals. Convenient transfers are available for East Bay passengers at the Embarcadero BART station. The Airporter fare is $5.00 one-way and $8.00 round trip.

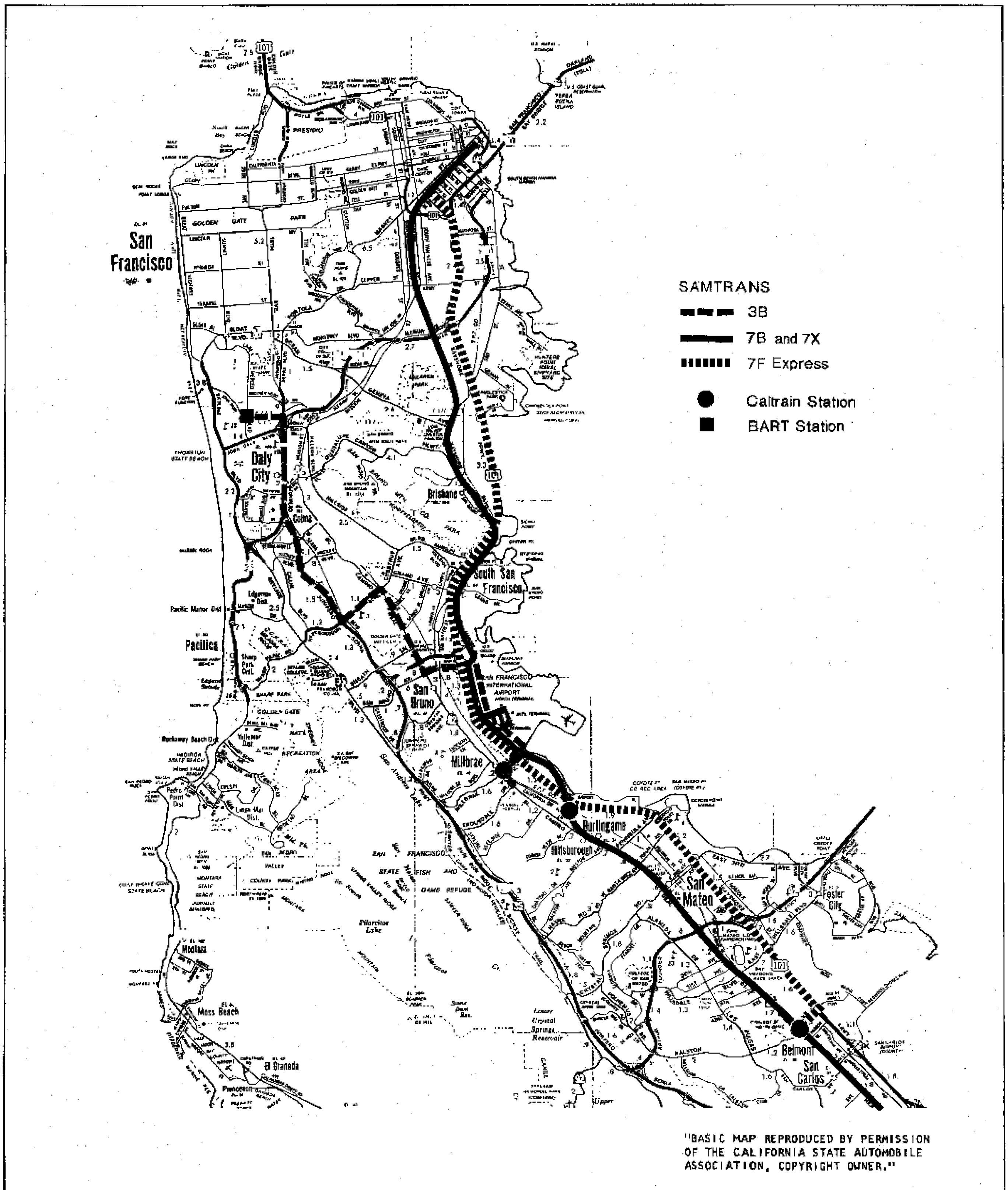
SamTrans (San Mateo County Transit District) serves SFIA with two express and two regular fixed-route bus routes, as shown in Figure 14. Route 7X (express) bus operates weekdays from the Transbay Terminal in downtown San Francisco to SFIA via US 101, for a one-way fare of $1.25. Route 7F (express) does not allow passengers to carry luggage on board. Route 7B (local) runs on local streets, providing both weekend and holiday service; the one-way fare is $1.00. Route 3B provides service from Stonestown Shopping Center in San Francisco to the Daly City BART station, continuing to SFIA. The fare for Route 3B is $0.50. SamTrans recently entered into a ● fare-coordination agreement with BART that provides free rides on some SamTrans buses (and credits on others) to passengers who present semi-monthly AC / BART Plus passes. These passes, subject to additional monthly fees, are good for free passage on MUNI routes also.

South Bay

The South Bay, which include parts of San Mateo, Santa Clara, Santa Cruz, and Monterey Counties, is served by several transportation operators.

Door-to-door van services are provided by Bayporter Express and Super Shuttle in San Mateo County, and also by South Bay Airport Shuttle and Express Shuttle in Santa Clara County. Fares vary based on the exact location served.

Limousine service is arranged through Associated Limousine Operators of San Francisco. Service is available to San Mateo and Santa Clara Counties, and costs are $24 to $51 for shared ride service or $45 per hour for private luxury limousine service.



SOURCE: DKS Associates

San Francisco International Airport ■

Figure 14
Bus Routes to SFIA

The Santa Cruz Airporter provides bus service between Watsonville and SFIA. There are four round trips per day to SFIA. The fares are $35 each way from Watsonville, $25 from Santa Cruz and $20 from San Jose.

SamTrans provides connecting bus service from the Belmont, Burlingame Broadway, and Millbrae CalTrain stations in San Mateo County throughout the day./4/ Transfer times at CalTrain are usually between three and eleven minutes. In addition, SamTrans provides service to SFIA from Palo Alto on Route 7F (Express) and from Redwood City on Route 7B (Local).

Greyhound runs regular bus service between Monterey and SFIA. The fare is $18.85 one way, and $35.80 round trip.

North Bay

There are no door-to-door van services to the North Bay. However, there are several scheduled transportation carriers (Marin Airporter, Sonoma County Airport Express, Santa Rosa Airporter) providing service from as far north as Ukiah to SFIA.

Limousine service is available through Associated Limousine and serves Marin County. The fare ranges from $66 to $160 one-way for shared ride service. Luxury limousine service is available for $45 per hour.

The Marin Airporter provides bus service between Novato and SFIA for a one-way fare of $12. The Sonoma County Airport Express provides service from Santa Rosa to SFIA. The fare is $12 one-way and $20 round trip.

The Santa Rosa Airporter bus runs from Ukiah to SFIA for $30 each way, and from Novato for $14 each way. The Sonoma Airporter provides bus service to SFIA on one route. The fare is $20 one-way from the Town of Sonoma.

East Bay / I-80 Corridor

Door-to-door van services are provided by several carriers. In Alameda County, Bayporter Express charges between $12 and $30 one-way, and East Bay Connection charges between $14 and $20. In Contra Costa County, Bayporter Express and East Bay Connection provide service in addition to Direct Shuttle. Charges for these services range from $16 to $26.

Limousine service to the East Bay is provided by Associated Limousine. For service to Alameda County the one-way fare ranges from $28 to $32 for shared rides, and $45 per hour for luxury service. In Contra Costa County the one-way fare is $24 to $51 for shared rides, and $45 per hour for luxury limousine service.

A number of scheduled transportation services are available in the East Bay / I-80 corridor for service to SFIA. Evans Airport Service runs bus service between Napa and SFIA for $15 each way. Capitol City Commuter charges $25 each way for bus service to and from Sacramento. Travis/Solano Airporter provides bus service between Travis Air Force Base and SFIA for $15 each way.

Bay Area Shuttle vans go from Claremont (an Oakland neighborhood) to SFIA for a fare of $10 one-way. Bay Area Bus Service is a shuttle service running hourly between Oakland International Airport and SFIA. The fare is $7 each way. The Fun Connection bus service travels to SFIA from Fremont for $15 each way. United Shuttle Systems provides bus service from Turlock (in the Central Valley) to SFIA for $24 one-way. San Ramon Valley Airporter Express buses run from Pleasanton to SFIA for $17 each way.

Shuttle Services for Disabled Persons

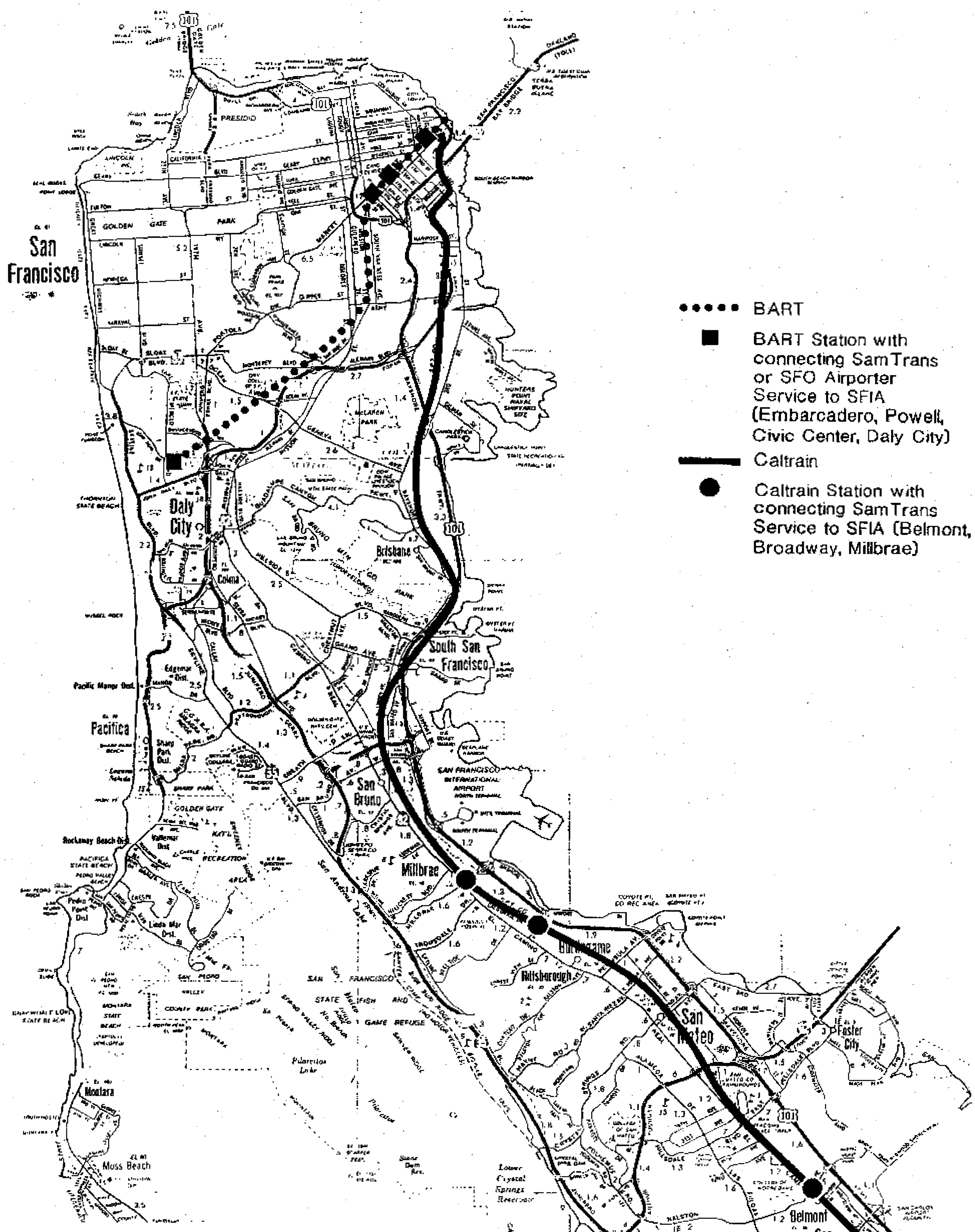
Disabled persons have several alternatives for transportation, including SamTrans route 3B (providing connecting service from Daly City BART), Yellow Airport Shuttle, Medi-Van and Super Shuttle. Except for SamTrans and BART, advance notice is required.

EXISTING RAIL TRANSPORTATION

Two commuter rail services serve one or more stations in San Mateo County, which connect with bus service to SFIA. Either rail service could provide direct or connecting service to SFIA at a later date: Bay Area Rapid Transit (BART) and CalTrain. Figure 15 shows the rail routes that serve SFIA.

<u>BART</u>

BART provides regional rail service to San Francisco, Alameda and Contra Costa counties. The Daly City BART station, approximately eight miles northwest of SFIA,



"BASIC MAP REPRODUCED BY PERMISSION OF THE CALIFORNIA STATE AUTOMOBILE ASSOCIATION, COPYRIGHT OWNER."

SOURCE: DKS Associates

Figure 15

Rail Routes to SFIA

is the current terminus of the Richmond - Daly City, Concord - Daly City and Fremont - Daly City lines, which operate from 6:00 a.m. until midnight. The three lines operate on 7½- to 20-minute headways, depending on time of day. SamTrans provides connecting service between the Daly City BART station and SFIA as described above.

CalTrain

The Peninsula Commute Service (CalTrain) provides regional rail service to San Francisco, San Mateo and Santa Clara counties, connecting San Jose with the South of Market district in San Francisco along a route adjacent to or near the US 101 Corridor. The Southern Pacific Transportation Company (SP) operates the trains under contract to the California Department of Transportation (Caltrans).

CalTrain operates on 8- to 120-minute headways (however, generally 30-minute headways during peak periods) from 5:00 a.m. to midnight, serving SFIA through SamTrans connecting service from the Belmont, Burlingame, Burlingame Broadway, and Millbrae CalTrain stations.

PEDESTRIANS

Other than for the movement of air passengers and employees between the main garage and the terminal buildings, there is little pedestrian movement among the various buildings at SFIA. Currently, some air passengers and employees cross vehicular traffic on the arrivals and departures roadways, primarily to go between the parking garage, transit/shuttle services, and the terminal buildings. Although this inhibits traffic flow, the pedestrian activity does not impair the ability of the arrival and departure roadways to serve the terminal buildings (i.e., no backups onto Road 1-S occur during peak periods or other times).

BICYCLES

None of the streets that surround SFIA are designated as bike routes. The nearest suggested routes are west of US 101 in Millbrae, San Bruno and South San Francisco. The 1983 SamTrans employee transportation survey (see following section on existing SFIA transportation characteristics for a description of the survey) did not specify cycling as a separate mode, and it is unlikely that more than 50 SFIA employees (out of 31,000) currently commute by bicycle. Travel by bicycle to and from SFIA is not convenient since the cyclist must travel through congested high-noise areas to access SFIA.

TRUCK TRAFFIC

Truck traffic is generated at SFIA primarily due to air cargo and U.S. Mail operations, as well as delivery trips associated with food and beverage service and SFIA administration. Truck activity is concentrated on McDonnell Road (Road R-3) north of the terminal and on North Access Road. Several locations at SFIA were surveyed to determine the percentage of trucks in the total a.m.- and p.m.-peak-hour traffic mix/5/:

A.M. Peak Hour

- S. Airport Boulevard / N. Access Road / Freeway on-ramps - 7.5 percent
- S. Airport Boulevard / N. Access Road / Freeway off-ramps - 4.1 percent
- N. Access Road / N. Access Road Extension - 3.9 percent
- S. Airport Boulevard / San Bruno Avenue - 8.3 percent
- Road R-2 / Road R-16 / Hilton Hotel - 6.8 percent
- Arrivals and departures decks - less than 1 percent

P.M. Peak Hour

- S. Airport Boulevard / N. Access Road / Freeway on-ramps - 6.0 percent
- S. Airport Boulevard / N. Access Road / Freeway off-ramps - 5.1 percent
- N. Access Road / N. Access Road Extension - 5.8 percent
- S. Airport Boulevard / San Bruno Avenue - 6.4 percent
- Road R-2 / Road R-16 / Hilton Hotel - 4.1 percent
- Arrivals and departures decks - less than 1 percent

EXISTING SFIA TRANSPORTATION CHARACTERISTICS

For information on the transportation and parking characteristics of air passengers and employees of San Francisco International Airport, several transportation surveys were used:

- 1983 Employee Survey conducted by SamTrans.
- 1989 Air Passenger Survey conducted by the Metropolitan Transportation Commission (MTC).
- 1989 ramp and roadway automatic machine counts (tube counts) conducted by SFIA.
- 1990 intersection turning movement counts, ramp volume counts, vehicle classification counts, vehicle occupancy counts and pedestrian counts conducted by DKS Associates for this document.

1983 SamTrans Employee Survey

SamTrans' SFO Airport Employee/Employer Survey was conducted in Fall of 1983. At that time, there were approximately 20,000 employees at SFIA, compared to 31,000 today. There has not been another comprehensive employee survey since 1983. The survey covered origin of trips for employees, location of job within SFIA, mode of travel on day of survey, commute time and parking fees for employees. In addition, there were questions regarding incentives that SamTrans could use to attract SFIA employees to take transit. The 1983 mode split for SFIA employees was as follows:

Mode	Percent
Drive Alone & Park	68
Carpool	14
Charter	8
VanPool	4
SamTrans	3
Other	2
Airporter (private shuttle)	1
SamTrans & Other	<1
SamTrans & BART	<1
SamTrans & CalTrain	<1

The percentage of employees who took transit (approximately four percent) is typical of most suburban employment sites in the Bay Area. Review of current operations and discussion with SFIA staff indicate that these percentages have not changed significantly since 1983.

SFIA Airports Commission Air Passenger Surveys

The City and County of San Francisco Airports Commission conducts a survey of air passengers in May of each year. The most recently published survey was conducted in

May, 1990. Departing passengers were asked to respond to questions covering residency, mode of arrival at SFIA, the parking facilities, problems encountered while at SFIA, and products and services that they would like to see at SFIA. Passengers were also asked to make explanatory comments at several points throughout the interview. The largest number of comments regarding ground transportation referred to a desire to see BART extended to SFIA, followed by the need for more traffic lanes on freeways leading to SFIA, congestion and confusion on "the freeway" (respondents did not distinguish among US 101, I-380 and I-280) and heavy traffic around SFIA. The survey was used for trip distribution for air passengers, as shown in Figure 29, p. 290, in Section IV.B. Transportation Impacts.

Information on person-trips was obtained from the air passenger survey. This survey also asked travelers how they arrived at the airport (mode of travel); however, it did not ask how many other passengers were in the same vehicle. Therefore, information on vehicle occupancy was obtained as part of a 1990 Mode Split Survey conducted by DKS (described below). Vehicle occupancy information is necessary in order to determine the number of vehicle trips to be used in assessing traffic impacts. (The number of vehicle trips was calculated by dividing the number of person trips by the average vehicle occupancy.)

<u>1989 Tube Count Program by SFIA Office of Landside Operations</u>

In August of each year, the SFIA Office of Landside Operations conducts a tube count program using automatic traffic counting machines. Counts are taken for a minimum of seven days at over 30 locations within and at the boundaries of SFIA. These counts are taken in the peak month of air passenger travel at SFIA, and thus represent peak traffic conditions at SFIA.

The tube counts have been used to establish SFIA air passenger trip rates. The August ramp counts were factored to May volumes based on the ratio of May to August enplanements and the number of employees at SFIA (which does not fluctuate as much as air-passenger/enplanement ratios). The counts were factored to May volumes to present a consistent analysis period (intersection turning movement counts were performed in May, 1990). The methodology used to determine the air passenger trip-generation rate is explained in the Impacts Chapter, Section V.B. Transportation. The trip generation rate for air passengers is based on total enplanements, and was calculated to be 1.98 trips/enplanement for air passengers at SFIA.

1990 Traffic Counts

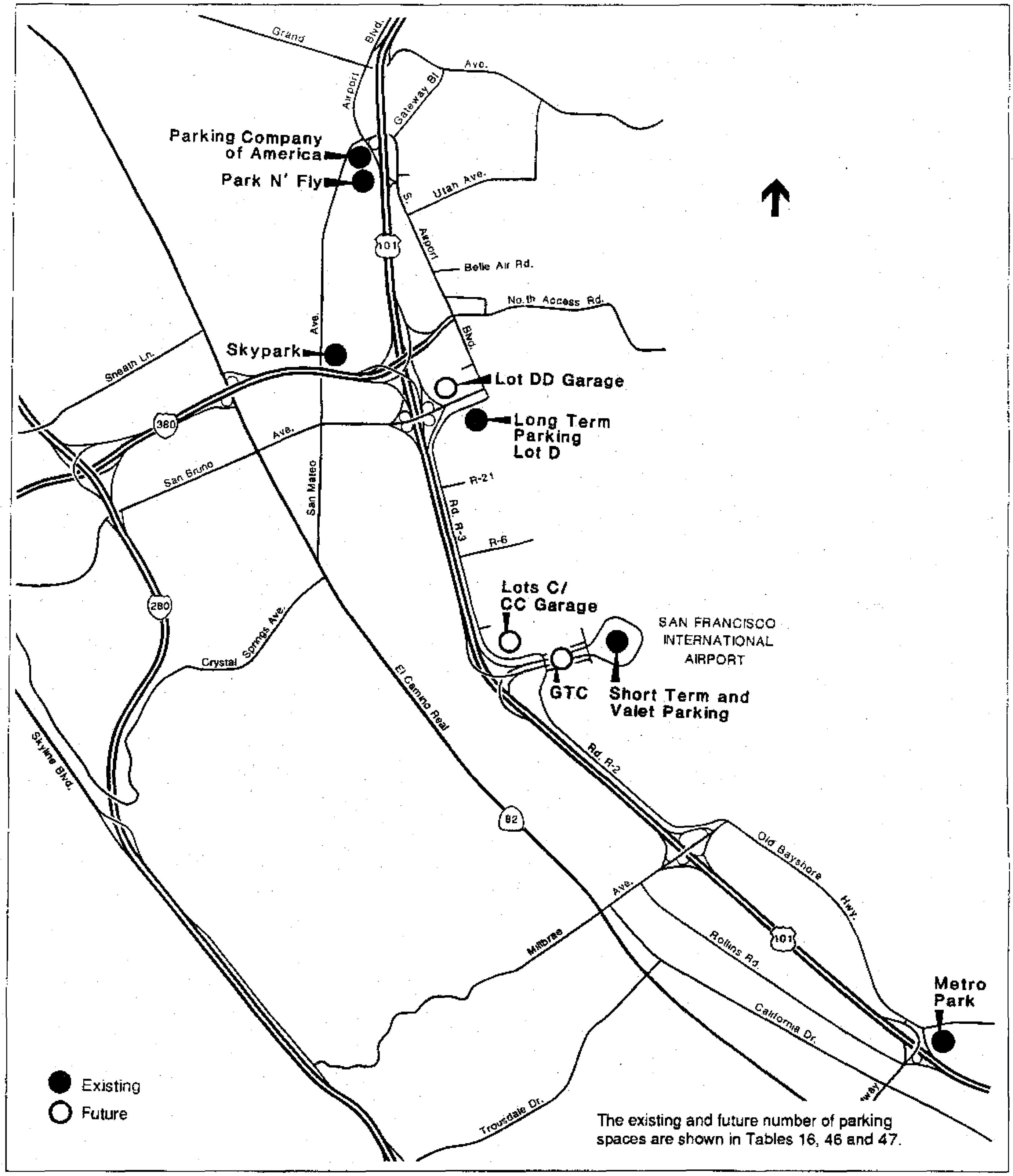
In May 1990, intersection turning movement counts were conducted at 25 intersections around SFIA./6/ These included intersections in Millbrae, San Bruno and South San Francisco. Counts were taken during the a.m. and p.m. peak periods, which for most intersections are 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. For those intersections in the vicinity of United Air Lines Maintenance, a.m. peak hour intersection counts were started at 6:00 a.m. and p.m. peak hour intersection counts were started at 3:00 p.m. In addition to intersection counts, a.m. and p.m. peak hour mainline freeway counts on US 101 at the San Bruno Avenue overcrossing were performed, as well as ramp volume counts at selected locations.

1990 Mode Split Survey

The mode split for air passengers was determined on the basis of a field survey conducted by DKS Associates in May 1990. Vehicles were surveyed on Road 1-S at a location just west of the arrivals deck, departures deck and garage entrance. The survey information was used to establish air passenger mode split and average vehicle occupancy, as shown in Tables 27-30, pp. 283-286, in Section IV.B. Transportation Impacts. The number of vehicle-trips were calculated by dividing the number of person-trips by the average vehicle occupancy.

PARKING

Both short- and long-term parking are available, convenient to the terminal buildings. In addition, there is valet parking service available and four more remote parking locations. Airport parking, which currently totals 15,515 public spaces, is shown in Figure 16.



SOURCE: DKS Associates

Figure 16
Parking Locations

Parking Access from Freeways

"Airport Parking Available" signage directs motorists on US 101 southbound to exit at either South Airport Boulevard or North Access Road, both of which are just north of the SFIA terminal area. Motorists exiting at South Airport Boulevard are directed toward the off-airport long-term parking areas (e.g., Park N' Fly, Parking Company of America, and Skypark) in South San Francisco off Produce Avenue. Motorists exiting at North Access Road are directed to the long-term Parking Lot D within SFIA.

Motorists traveling on US 101 northbound are directed to exit at the Broadway interchange in Burlingame, two exits south of the main SFIA exit. They are then directed toward the off-airport long-term parking facility (Metro Park) in Burlingame, south of Broadway and east of US 101.

Motorists traveling on I-380 eastbound are directed to exit at North Access Road for parking availability. The signs then direct them to Lot D as they do for motorists from US 101 southbound.

Although specific signage is not provided on US 101 or I-380, all motorists who desire short-term parking proceed directly to the Airport interchange from US 101 either northbound or southbound. This interchange takes motorists directly to the terminal area, the parking garage, or other areas within SFIA via Road R-1S and then Roads R-2 or R-3 (McDonnell Road).

Short-Term Parking at SFIA

Short term parking is available at the garage in the center of the SFIA terminal complex. The garage can accommodate approximately 6,800 vehicles, and in January 1986 was 60 percent occupied on average and 78 percent occupied during peak periods, which occurred on Fridays at 8:00 p.m. Discussions with SFIA staff indicate that the January 1990 occupancy level of the garage has increased from the January 1986 level. During holiday periods, occupancy levels are higher (90 percent or higher), and at least one lot or garage closure (due to full occupancy) occurs in each of seven months per year./7/ Rates vary from $1 for the first hour to a maximum of $13 for 6 to 24 hours. Generally it is suggested that the garage be used for those who wish to park five hours or less.

Long-Term Parking at SFIA

Long term parking is available at Lot D, off McDonnell Road south of San Bruno Avenue. Rates vary from $4 for the first three hours to $8 for 3 to 24 hours. The lot, which can accommodate approximately 3,500 vehicles, was, in January 1986, 70 percent occupied on average and 73 percent occupied during the peak period, which occurred on a Sunday at about 4:00 a.m. Discussions with SFIA staff indicate that the January 1990 occupancy level of long-term Parking Lot D was similar to the January 1986 level. During holidays, Lot D can be 100 percent occupied and SFIA air passengers are directed to use short-term parking and/or off-site lots. Free shuttle service to Lot D is provided from the terminal buildings every 5-7 minutes, except between midnight and 6:00 a.m., when the frequency of shuttles is every 15-20 minutes.

Off-site (Remote) Parking

There are currently four off-site (remote) parking lots, each operated by a private company. Park N' Fly, Parking Company of America, and Skypark are in the vicinity of the US 101 / I-380 interchange. Metro Park is south of SFIA in Burlingame. The rates for each company are approximately $7-8 per day, with the seventh day free, roughly comparable to rates for long-term SFIA parking. Skypark has a seven-day minimum for its $7 daily rate, and also offers indoor parking for $10 per day. Approximately 4,750 parking spaces exist (May 1990) in the remote lots, which were 70 percent occupied on average in January 1986. Recent phone conversations with operators of remote parking lots indicated that the operators were generally unwilling to divulge any information on their operations.

SFIA passengers can also park at many of the area hotels and pay for one night's lodging in exchange for 7-21 days parking privileges. Since this is an informal arrangement, no data is kept on the number of air passengers who choose this option.

Valet Parking

Valet parking is located midway along the departures roadway (on the departure deck) across from the south terminal building. Free shuttle service is provided from the valet lot to all airlines. The rate for valet parking is $25 per day and there are 223 spaces.

Parking for Disabled Persons

Handicapped parking is available at the beginning of the arrivals roadway, as well as in courtyards north and south of the International Terminal. Seventy-two hours of courtesy parking is permitted for vehicles displaying handicapped license plates. There are 51 parking spaces for the disabled, with spaces generally available during peak periods. Handicapped persons can park after making arrangements by phone with SFIA police.

Observation Area

Northwest of the Millbrae Avenue / Old Bayshore Highway intersection, there is a dirt lot that is popular for watching takeoffs and landings. About 10-15 vehicles can park off-street in the observation area.

On-Street Parking

Parking on-street is not common in the vicinity of SFIA. Many local streets are signed "No Parking" and there is no shuttle access to the airport for people who might consider this option.

PARKING DEMAND

The SFIA Master Plan and operational data from the short-term garage provided by the SFIA Office of Landside Operations were used to determine the existing SFIA employee and air passenger parking demand. The existing supply and demand are shown in Table 16. The total parking demand for air passengers and employees is about 23,900 spaces, with about 14,400 (or 60 percent) needed by air passengers and about 9,500 (or 40 percent) needed by SFIA employees. The remaining parking demand results mainly from rental car storage and taxi parking. The existing (1991) parking space demand was derived from the May 1991 parking occupancy survey. SFIA employee space demand was based on 1991 employment levels, and air passenger space demand was based on estimated enplanements on a Friday in May 1991./8/

TABLE 16: EXISTING PARKING SUPPLY AND DEMAND /a,b,c,d,e/

	Daily Enplanements	57,700 (estimated)	
	1991 Employees	31,000	
	Supply	Demand	Difference
Public Spaces			
Garage			
Public short-term	6,294	4,128	2,166
Permit/Valet	492	124	368
Lot D			
Public long-term	3,559	2,801	758
Off-Airport	5,170	6,168	- 998
Subtotal	15,515	13,221	2,294
Employee Spaces			
Garage		See Public Spaces	
Lot D	971	794	177
Other	11,963	8,685	3,278
Subtotal	12,934	9,479	3,455
Other Spaces /e/			
Rental Cars	2,011	965	1,046
Courtyard	183	186	-3
Taxi Staging (in Garage)	86	57	29
Subtotal	2,280	1,208	1,072
TOTAL	30,729	23,908	6,821

NOTES:

/a/ August enplanements are used in this table as August represents the highest month for enplanements of SFIA, and therefore the peak month for parking demand.

/b/ This table assumes a theoretical maximum lot and garage occupancy of 95 percent for passengers and 97 percent for employees.

/c/ Negative numbers represent periods where demand for parking spaces exceeds the number of available spaces based on a peak-period, peak-day, worst-case scenario. In those situations, the excess demand must find alternative parking locations.

/d/ Demand rates based on May 1991 enplanements and May 1991 parking occupancy survey: Public short-term = 0.0981 spaces/enplanement; public long-term = 0.0485 spaces/enplanement; off-site parking = 0.1069 spaces/enplanement; employee = 0.3500 spaces/employee.

/e/ Not included: Limo parking, van staging and vehicle impound lot (246 spaces)

SOURCE: SFIA Office of Landside Operations, and DKS Associates.

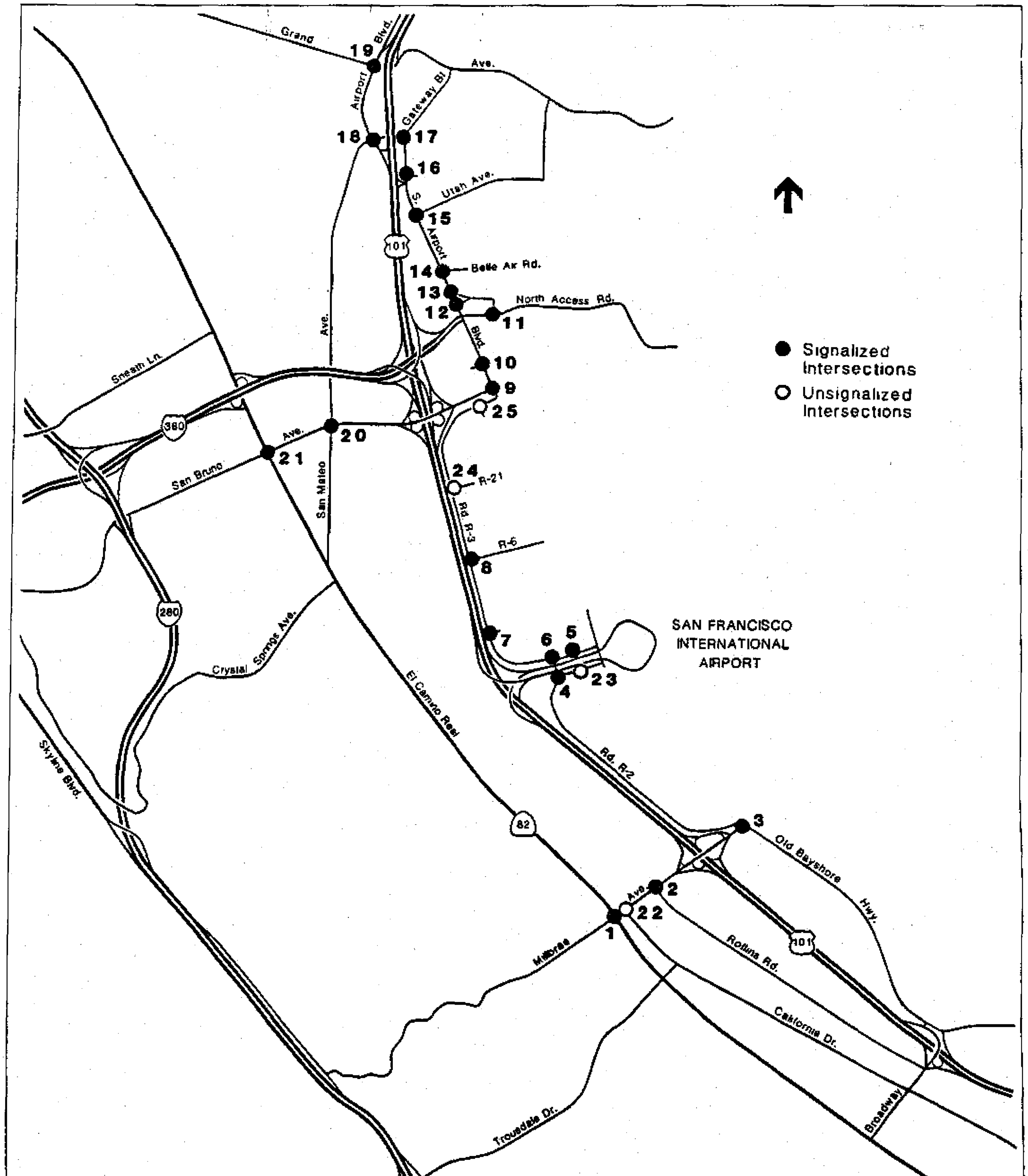
EXISTING TRAFFIC CONDITIONS

Evaluated Intersections

To help evaluate current traffic conditions, vehicle turning movement counts were conducted on a Friday in May 1990 at 21 signalized intersections in the vicinity of SFIA during both the a.m. and p.m. peak periods./6/ Counts were also taken at four unsignalized intersections. The following list of study intersections (illustrated by number in Figure 17) was developed in cooperation with the SFIA Office of Landside Operations; the cities of Burlingame, Millbrae, San Bruno and South San Francisco; the City and County of San Francisco; and Caltrans District 4 (Bay Area):

Signalized

1 El Camino Real (SR 82) / Millbrae Avenue
2 Rollins Road / Millbrae Avenue
3 Old Bayshore Highway / Millbrae Avenue
4 Road R-2 / Road R-16 / Hilton Hotel
5 Roads R-20,R-22 / Road R-18
6 Road R-3 (McDonnell Road) / Road R-18
7 Road R-3 (McDonnell Road) / UAL Cargo Facility
8 Road R-3 (McDonnell Road) / Road R-6
9 South Airport Boulevard / San Bruno Avenue
10 South Airport Boulevard / United Air Lines West Parking Lot/9/
11 North Access Road Extension / North Access Road East
12 South Airport Boulevard / North Access Road South / I-380 & US 101 off-ramp
13 South Airport Boulevard / North Access Road North / I-380 & US 101 on-ramp
14 South Airport Boulevard / Belle Air Road
15 South Airport Boulevard / Utah Avenue
16 South Airport Boulevard / Radisson Hotel / US 101 on- and off-ramps
17 South Airport Boulevard / Gateway Boulevard / Mitchell Avenue
18 Airport Boulevard / Produce Avenue / San Mateo Avenue
19 Airport Boulevard / Grand Avenue
20 San Mateo Avenue / San Bruno Avenue
21 El Camino Real (SR 82) / San Bruno Avenue



SOURCE: DKS Associates

San Francisco International Airport ■

Figure 17

Intersections Analyzed

Unsignalized

22 California Drive / Millbrae Avenue
23 Roads R-24,R-26 / Road R-16
24 Road R-3 (McDonnell Road) / Road R-21
25 Road R-3 (McDonnell Road) / Long-term Parking Lot D

<u>Signalized Intersections</u>

Traffic levels of service for the signalized intersections were analyzed using the methods outlined in Transportation Research Circular 212./10/ Level of service (LOS) is a common measure of traffic service that uses letters A through F to indicate the amount of congestion and delay. LOS A represents free-flow conditions. LOS D is typically considered acceptable for peak hour periods in urban areas. LOS E is approaching capacity and LOS F represents conditions at or above capacity. Appendix G, Table G-1, p. A.162, provides a definition of levels of service for signalized intersections. Table 34, on p. 293 in Section IV.B. Transportation Impacts, summarizes the existing level of service calculations for the a.m. and p.m. peak hours.

A.M. Peak Hour

For the purposes of this analysis, the a.m. peak hour is defined as a continuous 60-minute period in the interval from 6:00 a.m. to 9:00 a.m. where traffic volumes are highest at an intersection. For one intersection, it could be from 6:30 a.m. to 7:30 a.m. and for another intersection it could be from 8:00 a.m. to 9:00 a.m. This is done to ensure that the highest and worst-case traffic volumes are considered. Generally, the a.m. peak hour for intersections beyond the SFIA boundary, based on 1990 count data, was from 7:30 a.m. to 8:30 a.m. For the following intersections near the United Air Lines Maintenance Facility, traffic peaks earlier due to change-in-shift times:

- South Airport Boulevard / San Bruno Avenue, 6:15 a.m. to 7:15 a.m.
- North Access Road Extension / North Access Road, 6:00 a.m. to 7:00 a.m.
- McDonnell Road crosswalks at the United Air Lines West Parking Lot (pedestrian movement only), 7:00 a.m. to 8:00 a.m.

All of the intersections located on the SFIA internal roadway network /11/ currently operate at acceptable levels of service (LOS C or better) during the a.m. peak hour, when they experience their peak in traffic from 7:00 a.m. to 8:00 a.m. In the surrounding municipalities (e.g., San Bruno, Millbrae and South San Francisco), two intersections currently operate below (worse than) LOS D during the a.m. peak hour: El Camino Real (SR 82) at Millbrae Avenue, and Rollins Road at Millbrae Avenue, both LOS E.

P.M. Peak Hour

The p.m. peak hour is defined as a continuous 60-minute period in the interval 3:00 p.m. to 6:00 p.m. when traffic volumes are the highest at an individual intersection. In the vicinity of SFIA, the p.m. peak hour was generally from 4:30 p.m. to 5:30 p.m., except at the above noted United Air Lines Maintenance - related intersections, where peaking occurred from 3:00 p.m. to 4:00 p.m. During the afternoon peak hour, three intersections operate at or below (worse than) LOS D: El Camino Real at Millbrae Avenue, LOS E/F; Utah Avenue at South Airport Boulevard, LOS D/E; and El Camino Real at San Bruno Avenue, LOS E/F.

Unsignalized Intersections

Traffic levels of service for the unsignalized intersections were evaluated using the methodology outlined in the 1985 *Highway Capacity Manual*./12/ At unsignalized intersections, each traffic movement that must yield to another movement is evaluated separately and assigned a level of service. The level of service is based on the relative ability of turning traffic to find adequate gaps in conflicting traffic flows. Appendix G, Table G-3, p. A.164, provides a definition of levels of service for unsignalized intersections. Each of the four unsignalized intersections currently operates at an acceptable level of service in both the a.m. and p.m. peak hours.

Basic Freeway Sections

For the analysis of basic freeway sections, the heaviest direction of traffic was considered. For US 101 and I-280 in the vicinity of the Airport, this is northbound (toward San Francisco) in the a.m. peak hour and southbound (toward San Jose / Silicon Valley) in the p.m. peak hour. For I-380, the heaviest traffic is eastbound (toward SFIA) during the a.m. peak hour and westbound (away from SFIA) during the p.m. peak hour.

On the basis of methods outlined in the 1985 Highway Capacity Manual, the basic freeway section of US 101 currently operates at LOS F from Third Avenue in San Mateo to the I-380 interchange during both peak hours. North of the Grand Avenue interchange, US 101's operation improves to LOS D. I-380 operates at peak-hour LOS C, and I-280 operates at LOS C south of I-380 and LOS E north of I-380. Contrary to the level of service calculations based on techniques from the 1985 *Highway Capacity Manual*, field observations show traffic on US 101, I-280 and I-380 flowing well, even during the peak periods. Existing freeway segment levels of service are shown in Table 40, on p. 309 in Section IV.B. Transportation Impacts.

Truck Traffic on Freeways

On US 101 in the vicinity of SFIA, trucks make up 5.1 percent of total traffic near Third Avenue in San Mateo, 4.2 percent near Broadway in Burlingame, 3.7 percent near San Bruno Avenue, 4.2 percent near Linden Avenue in South San Francisco and 4.8 percent at Third Avenue in San Francisco. On most segments of I-280, trucks make up roughly 2.0 percent of total traffic (varying from 1.2 percent at SR 92 to 2.3 percent at San Bruno Avenue), and on I-380, trucks make up 5.4-6.2 percent of total traffic./13/

Freeway Ramps

Caltrans reports daily ramp volumes in Ramp Volumes on the California State Freeway System: District 4. There are ramps within the SFIA vicinity, but a relatively small number for which peak-hour counts are available. Ramps that were counted recently (by Caltrans, SFIA Office of Landside Operations or DKS Associates) are shown in Table 42, on p. 314 in Section III.B. Transportation Impacts. The peak hours of an average weekday for the SFIA terminal ramps off US 101 occurred between 11:00 a.m. and 12:00 noon and between 7:30 p.m. and 8:30 p.m. for the off-ramps, while the peak hour for the on-ramps occurred between 12:45 p.m. and 1:45 p.m.

Ramp level of service for two-lane ramps was analyzed by use of the *Highway Capacity Manual*, Chapter 5, "Approximate Service Flow Rates for Single-Lane Ramps," as modified for two-lane ramps according to the methods presented. (Ramp levels of service for one-lane ramps could be obtained directly from the *Highway Capacity Manual.*) Service flow rates vary from a maximum of 1,250 vehicles per lane per hour for ramps with a design speed of less than 20 miles per hour (e.g., US 101 northbound and southbound off ramps to Millbrae Avenue) to approximately 1,700 vehicles per lane per hour for ramps with design speeds greater than 50 miles per hour (e.g., SFIA Road 1-N on-ramps to US 101 northbound and southbound). While the ramp volume could indicate a relatively good level of service, mainline freeway congestion can cause lengthy queues on on-ramps.

Currently, each of the off-ramps from US 101 leading onto SFIA Road 1-S operates at LOS C during the a.m. and p.m. peak hours. The ramps from SFIA Road 1-N leading on to US 101 and I-380 viaduct operate at LOS C or better. The only ramp currently operating at LOS E is the US 101 southbound collector / distributor off to Millbrae Avenue, during the a.m. peak hour. Three other ramps currently operate at LOS F: I-380 eastbound off to US 101 southbound, and I-280 southbound off to I-380 eastbound, both during the a.m. peak hour; and I-380 westbound off to I-280 northbound during the p.m. peak hour.

NOTES - Transportation

/1/ Caltrans, *1989 Traffic Volumes on California State Highways*, 1990.

/2/ Caltrans, 1988 Traffic Volumes on California State Highways, 1989 and Caltrans traffic counts on US 101 taken November 3, 1989, provided by Jack Neville, Caltrans District 4 Office of Highway Operations.

/3/ SFIA, San Francisco International Airport Guide--Ground Transportation Services and Parking, SFIA Landside Operations, January 1, 1990.

/4/ Although the San Bruno CalTrain station is closest to the employment center of SFIA, no direct SamTrans service is provided at this time.

/5/ On the basis of traffic counts taken May 4, 11, 18, and 25, 1990, the a.m. peak hour for traffic on SFIA roadways is 7:00 - 8:00 a.m., and the p.m. peak hour is 4:00 - 5:00 p.m.

/6/ Intersection turning movement counts conducted by DKS Associates, May 4, 11, 18, and 25, 1990, 7:00 - 9:00 a.m. and 4:00 - 6:00 p.m.

/7/ Cabangis, Oscar, SFIA Office of Landside Operations, telephone conversation, February 4, 1991.

/8/ For consistency in generating parking-demand factors, May 1991 enplanement, employment and parking data were used for the parking-demand analysis (rather than the May 1990 base year assumed elsewhere in the transportation sections), partly because May 1990 air passenger data were lower than May 1989 air passenger data due to decreased air passenger travel at SFIA as a result of the October 17, 1989 Loma Prieta earthquake. Use of the May 1990 data with the May 1991 parking survey would have resulted in an artificially high air-passenger parking-demand rate, thereby resulting in an overestimate of future parking space needs.

/9/ Pedestrian volumes only were collected at this location. This intersection was therefore not evaluated for vehicular levels of service in the Impact Analysis.

/10/ Transportation Research Board, Transportation Research Circular 212, 1980.

/11/ Internal intersections are those on SFIA property, politically a part of the City and County of San Francisco.

/12/ Transportation Research Board, Special Report 209, Highway Capacity Manual, 1985.

/13/ Caltrans, 1988 Average Daily Truck Traffic on the California State Highway System, August 1989.

C. NOISE

INTRODUCTION

Noise levels are measured in decibels (dB)./1/ Each three-decibel increase or decrease in sound pressure level represents a doubling or halving, respectively, of sound intensity. Human perception of sound "loudness" does not relate directly to sound pressure level and varies among individuals. In general, a difference of three dB is perceptible and a difference of ten dB is perceived as a doubling of loudness. Some common indoor and outdoor noise levels and typical public reactions are shown in Figure 18.

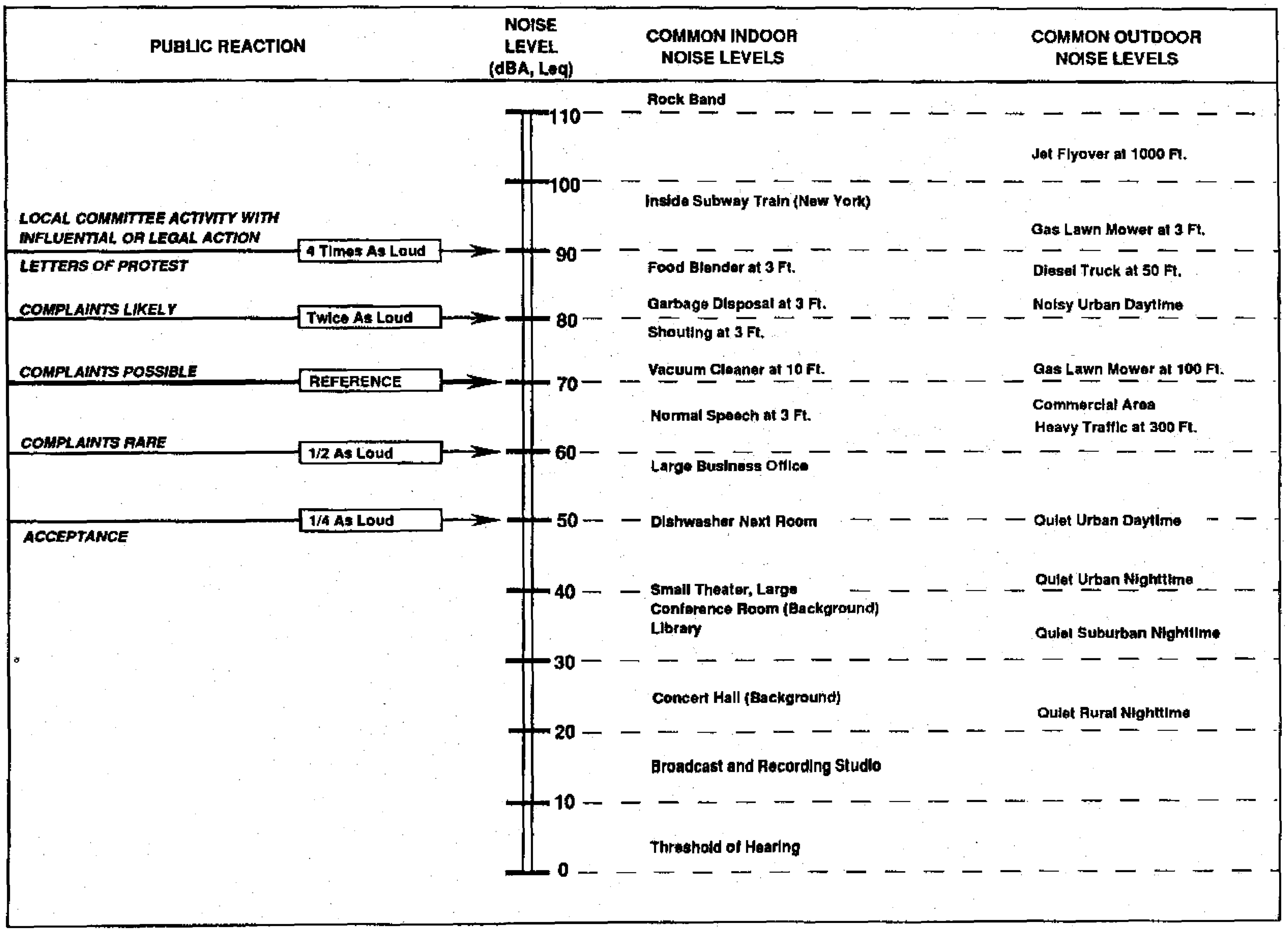
Environmental noise levels typically fluctuate over time, and different types of noise descriptors are used to account for this variability. Descriptors representing time-averaged noise levels include L_{eq}, L_{dn}, and CNEL./2,3,4/ L_{eq} represents the actual time-averaged noise level, while L_{dn} and CNEL are 24-hour noise descriptors calculated from L_{eq}. The calculation of L_{dn} and CNEL accounts for the greater sensitivity of most people to nighttime noise.

L_{dn} and CNEL are commonly used in establishing noise exposure guidelines for specific land uses. CNEL has been adopted by the California Department of Transportation, Division of Aeronautics, for the purposes of the state Noise Standards governing the operation of aircraft at California airports./5/ According to the Noise Standards, "the standard for the acceptable level of aircraft noise for persons living in the vicinity of airports is hereby established to be a community noise equivalent level of 65 decibels."

A discussion of descriptors of environmental noise is presented in Appendix C, together with a summary of the principal effects of noise on people.

EXISTING NOISE ENVIRONMENT

The existing noise environment in the vicinity of San Francisco International Airport is influenced by both surface-vehicle traffic on approach roads and adjacent roads, principally the US 101 (Bayshore Freeway) corridor, and by air traffic arriving at and departing from the Airport.



SOURCE: Caltrans Transportation Laboratory Noise Manual
Modifications by Environmental Science Associates, Inc.

Figure 18
Common Indoor and
Outdoor Noise Levels

Surface Traffic

The US 101 corridor, bounding the Airport property on its western side on a generally north-to-south alignment, is the largest source of noise from motor vehicles; at 50 feet from the centerline, peak-hour noise levels along US 101 are about 80 dBA, L_{eq}. Other principal roads in the vicinity of the Airport are San Bruno Avenue, an east-west connector north of the Airport, and Millbrae Avenue, an east west connector south of the Airport. The peak-hour noise level is about 65 dBA, L_{eq} on San Bruno Avenue and about 69 dBA, L_{eq} on Millbrae Avenue.

Air Traffic

Aircraft operations constitute the primary source of noise from the use of SFIA. The noise from aircraft operations at SFIA results primarily from air carrier aircraft powered by turbofan engines. Additional noise is experienced from operations by military, commuter and turbojet-powered General Aviation aircraft, but it is not considered further in this analysis./6/

The aircraft noise levels experienced in the vicinity of the Airport are a function of the type of operation (arrival or departure), the number of flights, the types of aircraft, the destinations of departing aircraft (which affect aircraft weight and noise levels by determining the amount of fuel required), the use of the Airport runways, the locations and relative use of flight tracks into and out of the Airport, and the time of day.

Operations by Aircraft Type and Time of Day

Table 17 shows the estimated number of aircraft operations, by type of operation, time of day, and aircraft type, for an average day of the year in 1990. (Annual data for
● 1989 were used to represent 1990 conditions.) The types of aircraft listed in Table 17 are representative, and are not meant to constitute the full range of aircraft that currently use the Airport.

TABLE 17: AVERAGE DAILY AIR CARRIER AIRCRAFT OPERATIONS BY TYPE OF OPERATION, TIME OF DAY, AND AIRCRAFT TYPE, 1990/a/

	Number of Arrivals				Number of Departures				
Type of Aircraft	Day/b/	Eve./b/	Night/b/	Total	Day/b/	Eve./b/	Night/b/	Total	Total Ops.
Stage 2/c/									
B-727 (all)	50	24	9	83	50	24	9	83	166
B-737 (-100,-200)/d/	43	11	3	57	45	6	5	56	113
B-747/e/	7	2	1	10	6	2	2	10	20
Stage 3/c/									
B-737-300	53	13	4	70	56	8	7	71	141
B-747	12	3	2	17	12	3	3	18	35
B-757 (all)	7	4	2	13	10	0/f/	3	13	26
B-767 (all)	12	10	3	25	23	0	2	25	50
DC-8-71	3	3	1	7	5	1	2	8	15
DC-10,L-1011(all)	21	15	7	43	31	3	9	43	86
MD-80 series	27	9	6	42	25	9	8	42	84
Airbus(all types)	4	1	1	6	1	1	3	5	11
BAe-146	34	6	3	43	35	6	2	43	86
Total	273	101	42	416	299	63	55	417	833

NOTES:

/a/ Average daily aircraft operations are equal to annual operations (takeoffs and landings) divided by 365 and rounded to the nearest whole number. Annual data for 1989 were used to represent 1990 conditions. Air carrier operations, as defined by SFIA, are scheduled commercial jet operations.

/b/ Day = 7:00 a.m. to 7:00 p.m.; evening = 7:00 p.m. to 10:00 p.m.; night = 10:00 p.m. to 7:00 a.m.

/c/ Classification of aircraft as "Stage 2" or "Stage 3" refers to noise standards established by Federal Aviation Regulations Part 36. Stage 3 aircraft are generally quieter than Stage 2 aircraft.

/d/ Includes operations by DC-9 aircraft.

/e/ Earlier models of the B-747 are classified as Stage 2 aircraft.

/f/ Fewer than 0.5 operations per day (183 operations per year).

SOURCES: Ken Eldred Engineering, from information provided by SFIA landing fee reports and the Metropolitan Transportation Commission; Environmental Science Associates, Inc.

- As shown in Table 17, p. 156, about 143 aircraft arrivals, or about 34%, occurred during evening or nighttime hours (7:00 p.m. to 7:00 a.m.); 118 aircraft departures, or about 28%, occurred during evening or nighttime hours. Operations by aircraft meeting Federal Aviation Regulations (FAR) Part 36 Stage 3 noise standards (newer, quieter technology aircraft) accounted for about 64% of total average daily operations./7/

The number of average daily aircraft departures by trip length is shown in Appendix C.

Runway Use

The historical average distribution of aircraft arrivals and departures on each pair of parallel runway ends is shown in Table 18. (Figure 19, p. 159, includes a diagram of the runways with the ends labeled.)

TABLE 18: HISTORICAL AIRCRAFT ARRIVALS AND DEPARTURES AT SFIA BY PAIR OF RUNWAY ENDS

	Percent Aircraft Arrivals and Departures by Pair of Runway Ends/a/							
	Arrivals				Departures			
Year	1	10	19	28	1	10	19	28
1985	0.1	0.2	2.6	97.2	75.3	5.8	0.3	18.1
1986	0.0	0.1	5.3	94.5	74.0	8.7	1.2	16.1
1987	0.5	0.6	4.5	94.4	81.9	6.0	0.7	11.5
1988	0.3	0.3	2.7	96.6	85.2	4.5	0.2	10.2
1989	0.2	0.1	3.8	95.9	87.4	4.6	0.3	7.6
Average	0.2	0.3	3.8	95.7	80.8	5.9	0.5	12.7

/a/ Each of the four pairs of runway ends listed refers to the ends of the parallel Runways 1-19 and 10-28 (e.g., "1" refers to Runways 1L and 1R). Use of the runway ends within each pair is roughly equal (except for long-distance flights by B-747 aircraft). The arrival runway ends are nearest the point where the aircraft land; the departure runway ends are where the aircraft start their takeoff roll.

SOURCE: Ken Eldred Engineering.

Runways are labelled according to their orientation relative to the North magnetic pole. Runway 1L-19R at SFIA, for example, is oriented along headings of about 10° and 190°. The two headings assigned to the runway reflect the fact that the runway can be used in two directions. When only one end of a runway is referred to, the reference is to use of that end (or direction) of the runway. Aircraft departing on Runway 1L, for example, would start their takeoff roll at the (south-southwest) end of the runway labelled 1L and would initially be travelling north-northeast (at a heading of 10°).

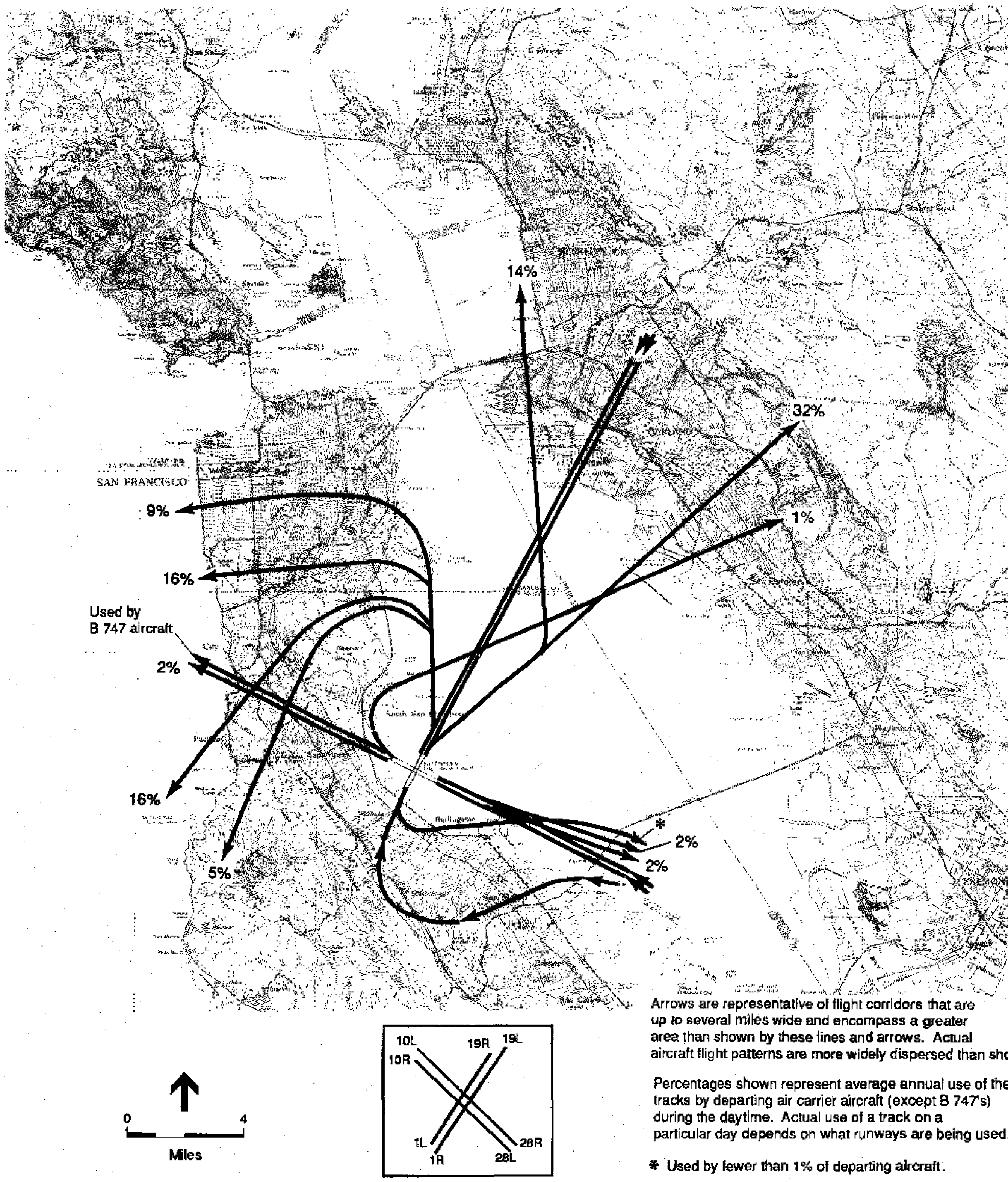
The use of Runways 1L and 1R for departures increased from about 75 percent in 1985 to about 87 percent in 1989. The use of Runways 28L and 28R for departures decreased from about 18 percent in 1985 to about 8 percent in 1989. Runway 28R is still used for most of the departures by the heaviest aircraft. Runways 28L and 28R are used by almost all arriving aircraft. Between 1:00 a.m. and 6:00 a.m., Runways 10L and 10R are used for most departures and Runways 28L and 28R for most arrivals. This nighttime traffic distribution is part of SFIA's current noise abatement program, discussed below. See Appendix C, Table C-2, p. A.46 for estimates of actual nighttime runway use.

Locations and Use of Flight Tracks

The generalized flight tracks for the main Airport flow (runway use) conditions are shown in Figure 19. The flight tracks depicted are averages; deviation from the tracks occurs because of weather conditions, pilot technique, air traffic control, and aircraft weight.

The flight tracks shown in the figure were developed through discussions with SFIA Airport Traffic Control Tower personnel; a review of Airport flight track data; and a review of standard instrument departures (SID) published by the FAA. SID are coded descriptions of aircraft routes assigned to pilots by air traffic control. A complete set of the SID used at SFIA is reproduced in Appendix C.

As shown in Figure 19, the San Francisco peninsula experiences overflights of aircraft departing from Runway 1L and Runways 28L and 28R (which together with Runway 1R accounted for 95 percent of departures in 1989). Many aircraft departing on Runway 1L for destinations south of San Francisco use the Eugen Four SID, which instructs pilots to turn left (by 150°) after climbing to 1,600 feet altitude and four



Arrows are representative of flight corridors that are up to several miles wide and encompass a greater area than shown by these lines and arrows. Actual aircraft flight patterns are more widely dispersed than shown.

Percentages shown represent average annual use of the tracks by departing air carrier aircraft (except B 747's) during the daytime. Actual use of a track on a particular day depends on what runways are being used.

* Used by fewer than 1% of departing aircraft.

SOURCE: Ken Eldred Engineering and Envirionmental Science Associates, Inc.

● Figure 19
Generalized Flight Tracks

nautical miles from the Airport. Aircraft departing on Runways 28L and 28R use one of several SID instructing pilots to continue straight out through the San Bruno gap. Aircraft departing on Runways 10L and 10R turn left as soon as practicable and climb out over the Bay.

Aircraft departing on Runway 1R tend to go northeast over Metropolitan Oakland International Airport or north up the Bay. Almost all arriving aircraft approach the Airport over the Bay and land on Runways 28L and 28R.

The use of each of the generalized flight tracks was estimated from the runway use patterns discussed above, and the relationship between departure routing and flight destinations.

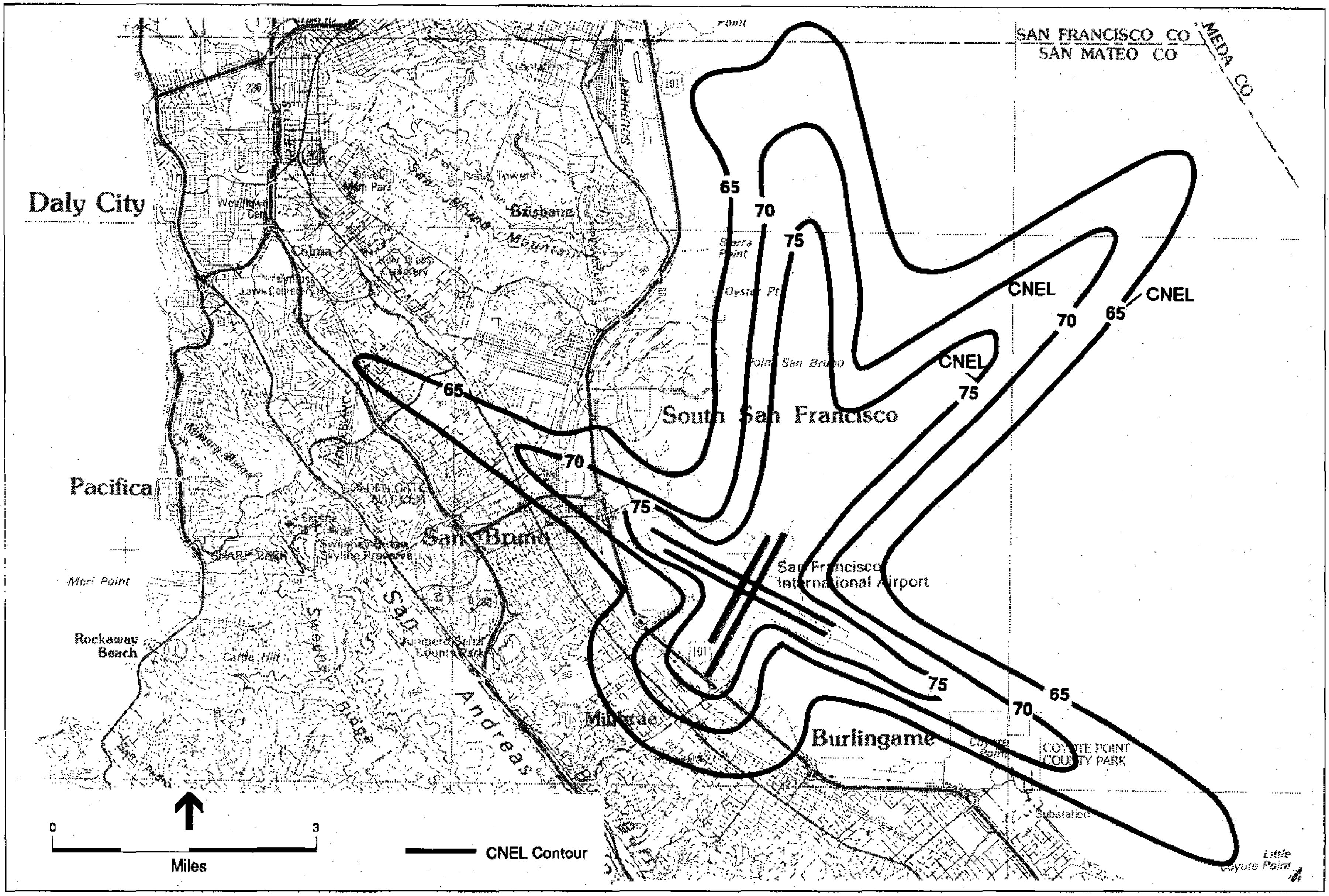
SFIA Aircraft Noise Contours -- 1990

The CNEL contours for 1990, calculated by the Integrated Noise Model (INM, a computer program developed by the FAA), are shown in Figure 20. (Annual data for 1989 were used to represent 1990 conditions.) As shown in Figure 20, most of the area within the CNEL 65 contour is over the Bay and the Airport. Residential areas in San Bruno, Millbrae, Burlingame and South San Francisco are exposed to aircraft noise of 65 dBA, CNEL and above. The noise impacts in those areas are associated primarily with aircraft departing on Runways 28L and 28R, and aircraft beginning their takeoff roll on Runways 1L and 1R.

- There are currently (in 1990) about 12,660 people, about 1,980 people, and about 340 people who live in areas of 65-70 dBA, 70-75 dBA, and 75+ dBA, CNEL, respectively.

Comparison of Calculated and Measured CNEL Values

Actual noise levels are recorded regularly at 27 remote monitoring stations in the vicinity of SFIA, and submitted to the California Department of Transportation in compliance with the state Noise Standards. The remote monitoring stations and 20 additional sites selected for this study are shown in Figure 21, p. 162.

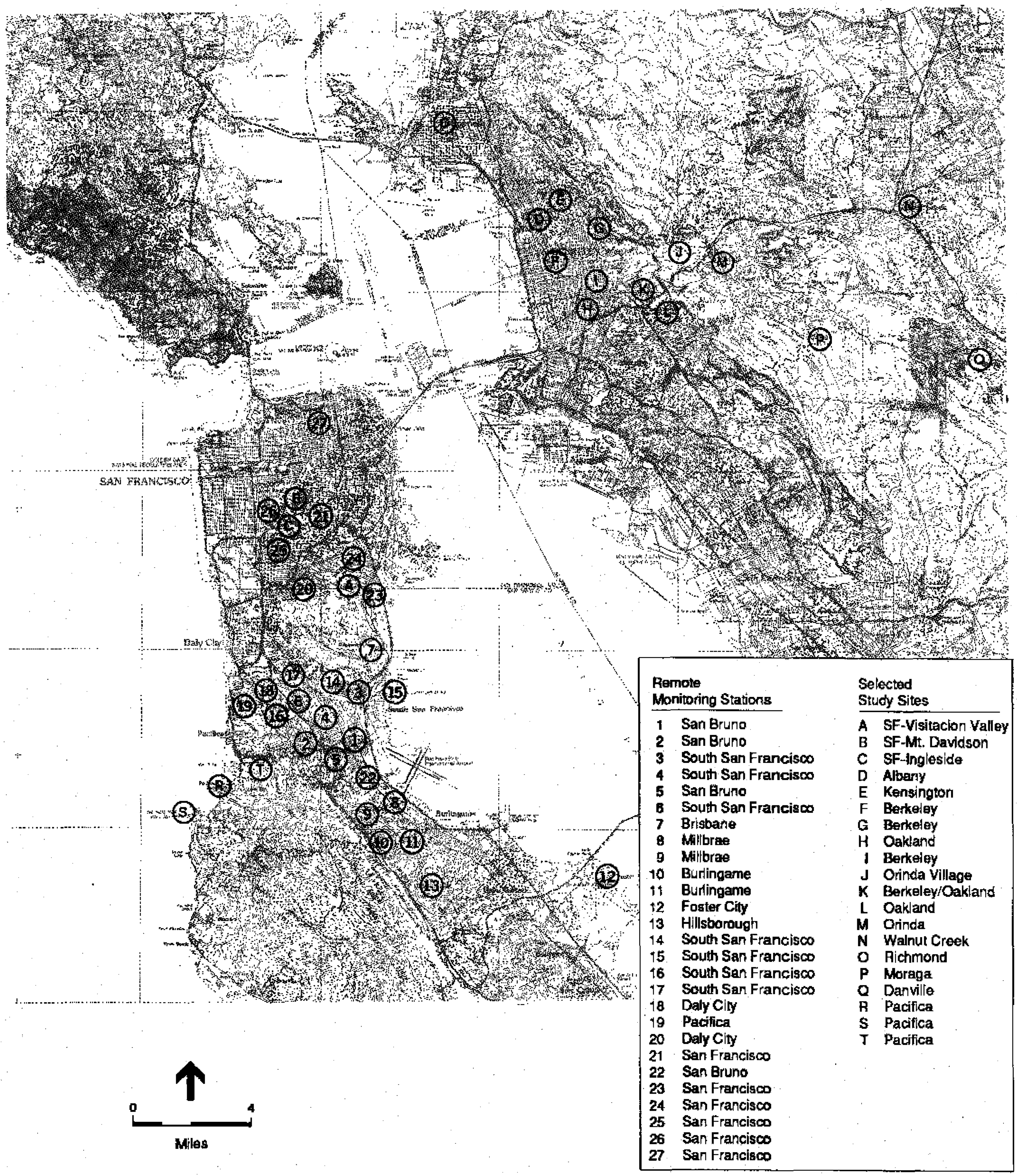


SOURCE: Ken Eldred Engineering and Environmental Science Associates, Inc.

San Francisco International Airport

Figure 20

1990 Aircraft Noise Contours



SOURCE: Ken Eldred Engineering and Envirionmental Science Associates, Inc.

San Francisco International Airport ■

Figure 21
Remote Monitoring Stations
and Selected Study Sites

Measured CNEL values at the remote monitoring stations were compared with CNEL values calculated by the Integrated Noise Model, to determine the accuracy of the model in predicting current and future noise levels near SFIA (as represented by the CNEL contours). The comparison showed that:

- At stations 1-6 and 14-19, located near the departure tracks for Runways 1L and 1R and Runways 28L and 28R, the calculated and measured CNEL values are similar.

- At stations 8-11, located in Millbrae and Burlingame, the calculated CNEL values are 0.9 dBA higher on average than the measured values. The calculated values would be substantially lower than the measured values without a modification to the Integrated Noise Model (INM)to improve its representation of the "back blast" from takeoffs on Runways 1L and 1R. (Without the modification the calculated CNEL values would be about 13 dB lower than the measured values.) The modification involved removing the excess ground attenuation in the model, which is inappropriate to this terrain, and changes to the INM computer program algorithm representing the noise during takeoff ground roll. These changes were based on data obtained by Tracor (in its investigation of low-freqency noise at SFIA) and on data on noise radiation over water in Boston./7a,7b/

- At stations 20-21 and 24-26, located in Daly City and San Francisco, the calculated CNEL values are 1.9 dBA lower on average than the measured values. Areas of the San Francisco peninsula are exposed to noise from aircraft departing from Metropolitan Oakland International Airport and turning southwest. The additional noise from those aircraft is included in the measured CNEL values (which reflect all noise recorded by the monitors), but is not included in the calculated CNEL values (which reflect estimates of the noise produced only by aircraft using SFIA).

The calculated CNEL values at the remote monitoring stations, and the corresponding CNEL contours, may differ from the comparable measurement data presented to the State on a quarterly basis as required by the State Noise Standards. The reason is that the computer program used to model the noise measurement data for the State adjusts its parameters in order to minimize differences between the model results and the noise measurements. Consequently, the program is accurate with respect to locations near the monitoring stations, but not necessarily accurate at locations far from the monitoring stations.

The Integrated Noise Model (used to calculate existing and forecast CNEL values and contours for this EIR) operates independent of the noise measurement results. The comparison of measured and calculated CNEL values above simply provides information about the accuracy of the model at the monitoring stations. As the comparison shows, the measured and calculated values at most monitoring stations were similar (for noise produced by aircraft using SFIA). Thus, the Integrated Noise Model provides a reasonable foundation for calculating noise values in future years, and for comparing existing and forecast noise levels.

The calculated and measured CNEL values at the 27 remote monitoring stations are shown in Table C-3 in Appendix C, p. A.47. The calculated CNEL values range from 40.5 dBA at Station 27 in San Francisco to 71.7 dBA at Station 1 in San Bruno. The measured CNEL values range from 53.4 dBA at Station 2 in San Bruno to 72.4 dBA at Station 1 in San Bruno. The calculated and measured CNEL values at most stations are between 55 and 65 dBA.

Contribution of SFIA Aircraft to Noise Levels in the East Bay

Some aircraft departing from SFIA fly over communities in the East Bay. CNEL values were calculated for 20 locations selected for this study on the basis of noise complaints, including 14 locations in East Bay communities. The calculated CNEL values reflect noise only from aircraft using SFIA; actual noise measurements taken in East Bay communities would also reflect aircraft using Metropolitan Oakland International Airport, and could be higher.

- Most of the calculated CNEL values for East Bay locations (except Site P in Moraga) are below 50 dBA (Table 54, which lists the values, is on p. 343). These locations are relatively far from SFIA (15-20 miles).

Single-Event Noise

As distance from the Airport increases, the effect of aircraft on average noise levels in the community (i.e., CNEL) declines. Even at great distances from the Airport, however, the single-event noise from individual planes still can annoy and disturb residents under Airport flight tracks.

- Maximum single-event noise levels for four typical aircraft departing from SFIA were estimated for the 27 remote monitoring stations and the 20 study locations (these estimates are shown in Appendix C, in Tables C-8 and C-9). (The maximum noise would be produced if the aircraft passed directly overhead. In most cases, the noise heard at the locations would be lower than the maximum level.) The stations with the highest maximum single-event noise levels are in San Bruno, Millbrae, and Burlingame, closest to the Airport (sites 1, 5, and 8-11). Maximum single-event noise levels range from 87 dBA to 120 dBA at these stations. At the more distant stations in San Francisco, maximum single-event noise levels range from 71 dBA to 95 dBA. These noise levels indicate that individual planes may be noticed by most persons under the flight paths over the peninsula and San Francisco.

- Of the locations studied in East Bay communities, those with the highest single-event noise levels are in Berkeley and Oakland (sites F, H, I, K, and L). Maximum single-event noise levels at all of the East Bay study locations range from 67 dBA to 91 dBA. The single-event calculations show that aircraft departing from SFIA can cause annoyance in East Bay communities outside the Airport's CNEL 65 contour.

- Of the four aircraft studied, the Boeing 727 (B-727) produced the highest departure noise levels; the Boeing 747-200, a Stage 2 aircraft, and Boeing 737-300 and 767, both Stage 3 aircraft, produced lower noise levels (up to 23 dBA lower). Aircraft such as the B-727 are gradually being replaced by aircraft such as the B-737-300 and B-767. The increased use of quieter aircraft at SFIA will generally result in lower single-event (and cumulative) noise levels in communities near the Airport.

A more detailed discussion of single-event noise in the vicinity of SFIA is presented in Appendix C.

Backblast noise is the noise heard by people located in an area behind an airplane during its takeoff roll. The noise is characterized by a lower frequency and an increase in perceived rumble. It may be perceived as a sequence of two noises: first, the roar at the start of takeoff which decreases in level as the airplane moves further away down the runway, and second, the noise after the airplane is airborne and above the height where the ground reduces the noise (through what is called ground attenuation). At SFIA, backblast is heard principally in the cities of Millbrae and Burlingame, which are located behind Runways 1L and 1R. Because exposed neighborhoods in Millbrae and Burlingame are located on terrain that rises above the runways, they do not benefit from ground attenuation the way that a neighborhood on flat terrain would. The magnitude of the backblast noise may be seen in the CNEL contours in Figure 20, p. 161.

SENSITIVE RECEPTORS

Certain types of land uses are considered to be more sensitive to ambient noise levels than others, due to the amount of noise exposure (in terms of both exposure time and intensity) and the types of activities typically involved with these land uses. Residences, motels and hotels, schools, libraries, churches, hospitals, convalescent and nursing homes, auditoriums, parks, and outdoor recreation areas are generally more sensitive to noise than are commercial and industrial land uses.

In order to identify acceptable noise levels for various types of land uses, cities and counties in California are required to adopt land use noise compatibility guidelines. Because the project would be located on San Francisco land, but much of the noise impact would occur in the cities of Millbrae, Burlingame, and San Bruno, the noise compatibility guidelines for all of these communities are discussed in Section III.A. Land Use and Plans, pp. 82-103. These sets of guidelines, all of which were derived from state guidelines, are similar.

Land uses within the vicinity of SFIA include residential, commercial, and industrial development. Various noise-sensitive land uses, facilities, and activities are exposed to Airport noise or to noise from surface traffic to and from the Airport. Noise-sensitive schools, hospitals, and public facilities within the CNEL 65, 70, and 75 contours for 1990 are listed in Appendix C.

NOISE REGULATIONS, PLANS, AND POLICIES

The passenger facilities expansion at SFIA would be subject to the following noise regulations.

California State Noise Standards

- The State of California Noise Standards established by the California Department of Transportation specifically prohibit an airport proprietor from operating an airport within California if the noise impact area at the airport exceeds zero, unless the airport proprietor has been granted a variance from the law (California Code of Regulations, Title 21, Division 2.5, Chapter 6). From December 31, 1980 until December 31, 1985, California law established 70 dBA CNEL as the maximum standard for areas impacted by airport noise; as of January 1, 1986 that ceiling was lowered to 65 dBA, CNEL.

- SFIA is in compliance with the State Noise Law. However, because SFIA has exceeded the maximum noise ceiling set by these standards since January 1, 1978 in areas near the Airport, it has been required to obtain successive variances from those ceilings to continue operations. The first of these variances was granted on July 8, 1982 and the second was granted on November 25, 1986. The second variance was extended on October 19, 1989 upon the request of SFIA, and further extended on September 19, 1990 at the request of the Airport/Community Roundtable. The Roundtable requested the extension because the SFIA Master Plan and this EIR, when completed, could produce information and mitigation measures that could be incorporated into a new variance.

The 1986 variance contains specific requirements that SFIA make continued progress towards the date when it will be in full compliance with the requirements of the State Noise Standards. Among the conditions of the variance are 1) the use of the goals, objectives and recommendations of the 1980 *Joint Land Use Study* as the framework for mitigation; 2) implementation of the Airport Noise Mitigation Action Plan (described on p. 167); and 3) participation in sound insulation programs and the investigation of certain noise abatement actions./7c/

Existing Airport Programs and Regulations

Existing Airport efforts to mitigate noise exposure include the SFIA Noise Abatement Program, the Airport Noise Abatement Regulation, and the approved noise compatibility program under Federal Aviation Regulations (FAR) Part 150.

Noise Abatement Program

The Airport Noise Abatement Program includes the following actions identified in the Airport Noise Mitigation Action Plan, developed in 1981:

- Noise abatement has been established as a priority function under the Director of Airports, and is administered by a full-time professional staff.
- A noise performance monitoring system has been developed and established, currently including 27 off-Airport stations. A system is currently under development to enable monitoring of flight tracks using aircraft transponder data.
- Airport rules and regulations have been expanded to include noise mitigation actions (discussed below).
- A community information program has been established, including monthly meetings of the SFIA Roundtable, a group that monitors implementation of the noise regulations and programs.
- Runways 10L and 10R have been established informally as the preferential noise abatement departure runways from 1:00 a.m. to 6:00 a.m.
- The Visual Shoreline Departure, involving right turns for aircraft departing on Runways 28L and 28R, is currently in use.
- The Quiet Bridge Approach, involving approaches to Runways 28L and 28R over the San Mateo Bridge and the Bay, is currently in use.
- Airline aircraft use noise abatement climb power reduction for departures, generally known as the "ATA departure procedure."
- Aircraft engine runups are prohibited from 10:00 p.m. to 7:00 a.m. without special permission.

SFIA also participates in an advisory capacity in the implementation of the following off-Airport actions:

- Noise insulation (SFIA provides funding for 20 percent of the cost);
- Avigation easements;

- Neighborhood improvement program; and
- Preventive land use planning.

Noise Abatement Regulation

The Airport Noise Abatement Regulation, adopted in January 1988 and amended in June 1991, contains the following provisions:

- A gradual scheduled phaseout of Stage 2 aircraft, including requirements that at least 25 percent (of each operator's aircraft operations) after January 1, 1989 must be performed using Stage 3 aircraft; at least 50 percent after January 1, 1994; at least 75 percent after January 1, 1999, and 100 percent as of January 1, 2000.
- A requirement that the percentage of Stage 2 operations at SFIA performed by a particular airline cannot increase (during a specified quarter, based on the same quarter during the previous year).
- A scheduled phaseout of Stage 2 aircraft operations during the nighttime, defined as 1:00 a.m. to 6:00 a.m. as of January 1, 1989, and extending to 11:00 p.m. to 7:00 a.m. after January 1, 1993.
- A maximum sideline noise of 103 effective perceived noise level in dB from 11:00 p.m. to 7:00 a.m., as of 1993.

According to staff of the SFIA Noise Abatement Office, to date, all of the requirements of the Regulation have been met by the operators at SFIA./8/

FAR Part 150 Program

In the late 1970s and early 1980s, SFIA was involved in the preparation of a study under the federal Airport Noise Control and Land Use Compatibility Program. The Airport noise exposure map was accepted by the FAA under FAR Part 150, "Airport Noise Compatibility Planning." Subsequently, the SFIA noise compatibility program was accepted by the FAA under FAR Part 150, with the majority of the proposed actions approved. (Most of the actions not approved or determined to require more study involved FAA actions or noise limits.)

Airport Land Use Plan

The environs of SFIA are subject to noise control policies contained in the *Airport Land Use Plan* (San Mateo County Airport Land Use Commission, 1981). The Airport Land Use Commission (ALUC) has adopted noise compatibility standards to evaluate proposed land uses in the Airport noise-affected area. For SFIA, ALUC policy allows residential development without noise insulation in areas up to 65 dBA, CNEL. In areas where noise levels from air traffic at the Airport are between 65 dBA and 70 dBA, CNEL, residential uses are allowed with special noise insulation. These guidelines are similar to the noise compatibility standards adopted by San Francisco and the cities adjacent to the Airport (see discussion of Noise Elements of Master Plans in Section III.A. Land Use and Plans, pp. 82-104).

The ALUC has limited authority to implement its policies and guidelines within the Plan area. The ALUC works with local jurisdictions to achieve consistency between its *Airport Land Use Plan* and the plans and policies of these jurisdictions. The ALUC may review zoning or plan changes within ALUC boundaries, and make advisory recommendations to the local jurisdiction. The ALUC also has review power over any substantive change in development plans made by a public agency owning an airport within its planning boundaries, such as the San Francisco Airports Commission. The ALUC has no authority over actual Airport operations.

<u>Noise Ordinances</u>

San Francisco Noise Ordinance

During construction, powered construction equipment other than impact tools would be required to comply with the San Francisco Noise Ordinance (Article 20 of the City Police Code, Section 2907b), which limits construction noise to 80 dBA at 100 feet. The Noise Ordinance (Section 2908) also prohibits construction work at night from 8:00 p.m. until 7:00 a.m., if noise from such work would exceed the ambient noise level by five decibels at the property line, unless a special permit is authorized by the San Francisco Department of Public Works.

Noise policies for other local agencies are included in Section III.A. Land Use and Plans.

NOTES - Noise

/1/ A decibel (dB) is a logarithmic unit of sound energy intensity. Sound waves, traveling outward from a source, exert a sound pressure level (commonly called "sound level") measured in decibels. A dBA is a decibel corrected for the variation in frequency response of the typical human ear at commonly encountered noise levels.

/2/ L_{eq} is the equivalent steady-state sound level that, in a stated period, would contain the same acoustical energy as the actual time-varying sound level measured during that period.

/3/ L_{dn}, the day-night average sound level, is based on human reaction to cumulative noise exposure over a 24-hour period, and takes into account the greater annoyance of nighttime noise. Noise occurring between 10:00 p.m. and 7:00 a.m. is weighted 10 dBA higher than noise occurring during the daytime.

/4/ CNEL, the community noise equivalent level, is similar to L_{dn}, but incorporates an additional five-decibel penalty (beyond the L_{dn}) for noise occurring between 7:00 p.m. and 10:00 p.m. CNEL and L_{dn} are generally considered to be equivalent for most purposes.

/5/ California Administrative Code, Title 21, Section 5000, et seq., as amended.

/6/ The primary component of cumulative noise levels near SFIA is noise produced by air carrier aircraft. The noise produced by military, commuter, and General Aviation aircraft is a relatively small portion of total cumulative noise levels.

/7/ Aircraft noise characteristics are classified according to federal noise standards specified in FAR Part 36, "Noise Standards: Aircraft Type and Air Worthiness Certification," December 1969, as amended. Stage 2 aircraft include the early B-747s, B-727s, B-737-100s and -200s, and DC-9s. Stage 3 aircraft include later model B-747s, B-757s and B-767s, B-737-300s,-400s and -500s, MD-80s and -90s, DC-10s, MD-11s, and all Airbus aircraft.

● /7a/ Connor, T., *Investigation of Aircraft Departure Noise in Community Areas Behind Runways 1L and 1R at San Francisco International Airport,* Tracor Doc. T86-01-952IU, October 1986.

● /7b/ Kestennor, et al., *Investigation of Low Frequency Noise From Departures on Runways 1L and 1R at San Francisco International Airport,* Tracor Project 076-439 (-01), February 1987.

● /7c/ Noise Variance for San Francisco International Airport, granted by California Department of Transportation, November 25, 1986.

/8/ Ellis, Marvin, Assistant Noise Officer, SFIA Noise Abatement Office, telephone conversation, June 14, 1991.

D. AIR QUALITY

CLIMATE AND METEOROLOGY

The primary factors determining air quality are the locations of air pollutant sources and the amounts of pollutants emitted. Meteorological and topographical conditions, however, are also important. Atmospheric conditions such as wind speed, wind direction, and air temperature gradients interact with the physical features of the landscape to determine the movement and dispersal of air pollutants. The topographical and atmospheric characteristics of San Mateo County tend to promote dispersal of air pollutants generated in the project area to locations downwind. The temperature profile in the atmosphere, and the amount of humidity and sunlight, also affect the resulting concentrations of air pollutants defining the air quality on a given day.

The Bay Area climate is Mediterranean in character, with mild, rainy winter weather from November through March, and warm, dry weather from June through October. There is a relatively high percentage of sunshine away from the immediate coast, particularly in summer. The movements of marine air establish the temperature, humidity, wind, and precipitation throughout the year, which in turn depend upon the location and strength of the dominant Pacific high-pressure system and the coastal temperature gradient. Average temperature increases as distance from the coast increases.

In summer, the Pacific high-pressure system typically remains near the coast of California, diverting storms to the north through the northern tier states and Canada. Subsidence of warm air aloft is associated with the Pacific High; this subsidence creates frequent summer atmospheric temperature inversions and stagnant atmospheric conditions. Subsidence inversions may be several hundred to several thousand feet deep, effectively trapping pollutants in a small volume of air near the ground. Except for late afternoon onshore winds caused by differential heating between the cool ocean and warm land mass, summer wind speeds generally are low and ventilation is relatively poor. The maximum monthly mean temperature during the summer is about 65°F in the project area.

In winter, the Pacific high-pressure system moves southward, allowing ocean-formed storms to move through the region. The frequent storms and infrequent periods of sustained sunny weather are not conducive to smog formation. Radiational cooling during the evening, however, at times creates thin inversions and concentrates carbon monoxide emissions near the ground. The maximum winter monthly mean temperature in the project area is about 49°F.

AIR QUALITY REGULATIONS, PLANS, AND POLICIES

Air quality is controlled through the regulation of ambient standards and enforcement of emission limits for individual sources. The federal Clean Air Act required the U.S. Environmental Protection Agency (EPA) to identify National Ambient Air Quality Standards (NAAQS) for the protection of public health and welfare. NAAQS have been established for ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), inhalable particulate matter (PM_{10}), and lead (Pb). The Clean Air Act Amendments of 1977 further required the states to identify areas that were in nonattainment of the NAAQS and to develop State Implementation Plans (SIPs) that demonstrated how the nonattainment area would be brought into compliance by 1982. Extensions for attainment were granted to 1987 upon EPA approval.

The current NAAQS for particulate matter applies to inhalable particulates (PM_{10}) while the NAAQS it replaced applied to total suspended particulate (TSP). San Mateo County has been designated "Group III," which corresponds to less than a 20 percent chance of being designated nonattainment when more PM_{10} data has been collected./2/

The project lies in San Mateo County, which is in the San Francisco Bay Area Air Basin, an area which has been designated nonattainment for O_3 and CO./2/ Attainment status has been designated for the Basin, however, for NO_2, lead, and ● SO_2./2/ An *Air Quality Plan* for the Basin was prepared in 1991 and is being incorporated into the current California SIP./3/

● The *Bay Area '91 Clean Air Plan* describes the air pollution control strategies necessary to bring the Bay Area into attainment for all of the NAAQS. Strategies were developed on the basis of detailed subregional emission inventories and projections, and mathematical models of pollutant behavior, and consist of stationary and mobile source emissions controls and transportation improvements. The Bay Area Air Quality Management District (BAAQMD), Metropolitan Transportation Commission (MTC), and California Bureau of Automotive Repair (a State agency) have primary responsibility for implementation of these strategies.

California has adopted more stringent ambient standards for the above pollutants, called "criteria" pollutants because the standards satisfy criteria specified in the Clean Air Act. In 1988 California passed the California Clean Air Act, also known as the Sher Bill. This Act calls for the establishment of a program to secure air quality data for each air basin and to inventory and monitor air pollutants. The BAAQMD is the local agency empowered to regulate air pollutant emissions. The BAAQMD regulates air quality through its permit authority over most types of stationary emission sources and through its planning and review activities. The *Bay Area '91 Clean Air Plan* (CAP) describes the Bay Area's current plans for meeting State clean air laws./3/ The goal of the CAP is to improve air quality through the 1990's through tighter industry controls, cleaner cars and trucks, cleaner fuels, and increased commute alternatives. The CAP encourages cities and counties to adopt measures in support of this goal. Identified measures include: developing rules to reduce vehicle trips to major residential developments, shopping centers, and other indirect sources; encouraging cities and counties to plan for high-density development; and clustering development with mixed uses in the vicinity of mass transit stations. These measures would serve to reduce total vehicle miles travelled, thereby improving regional air quality.

Provisions in the CAP will likely affect the Airport in two ways. First, the BAAQMD is considering an indirect source control program, to be adopted in 1994, that would require facilities to implement an indirect source emissions reduction program. Such a program would include measures to reduce the total vehicle miles traveled. Second, the BAAQMD is developing an employee-based trip reduction rule, scheduled for adoption by mid-1992, that would mandate large employers to achieve a specified average vehicle ridership for their employees. Both of these measures would likely be phased in for new and existing developments. SFIA will be required to work with BAAQMD in implementing future rules and regulations governing total vehicle miles travelled, including the indirect source control program and the employee-based trip reduction rule. As discussed on pp. 130-137, SFIA currently seeks to reduce total vehicle trips by offering shuttle services, public transit facilities, and transit subsidies and incentives to employees.

EXISTING AIR QUALITY

The BAAQMD operates a regional air quality monitoring network that provides information on average concentrations of those pollutants for which State or federal agencies have established ambient air quality standards. Table D-1, Appendix D, p. A.137 is a three-year summary of monitoring data for these major pollutants, collected at the BAAQMD's closest monitoring station, which is in San Francisco./4/ Pollutant concentrations are compared with the corresponding State ambient air quality standards, which are more stringent than the corresponding federal standards. Comparisons of these data with those from other BAAQMD monitoring stations reveal that air quality in the vicinity of SFIA is among the best of all the developed portions of the Bay area. Two of the three prevailing winds, westerly and northwesterly, blow off the Pacific Ocean and reduce the potential for San Mateo County to receive pollutants from elsewhere in the region. San Mateo County's air quality problems (primarily CO and PM_{10}) are due largely to pollutant emissions from within the County, which also contribute to air quality problems (primarily ozone) in other parts of the Bay Area.

Ozone (O_3)

The most severe air quality problem in the Bay area is high concentrations of O_3. High levels of O_3 cause eye irritation and can impair respiratory functions. O_3 is not emitted directly into the atmosphere, but is a secondary pollutant produced through photochemical reactions involving hydrocarbons (HC) and nitrogen oxides (NO_x).

Significant O_3 generation requires about one to three hours in a stable atmosphere with strong sunlight. For this reason, the months of April to October are the "ozone season." O_3 is a regional pollutant because O_3 precursors are transported and diffused by wind concurrently with the reaction process. Numerous relatively small sources emitting most of the HC and NO_x are spread throughout the region. Table D-1, Appendix D, p. A.137, shows that no violations have been recorded at the San Francisco monitoring station since 1987.

Carbon Monoxide (CO)

About 87 percent of the CO emitted in the Bay area comes from motor vehicles./5/ Ambient CO levels normally correspond closely to the spatial and temporal distributions of vehicular traffic. CO levels are also influenced by wind speed and atmospheric mixing. Under inversion conditions, CO levels may be more uniformly distributed over an area out to some distance from vehicular sources. Relatively high levels of CO generally found in enclosed areas such as tunnels can impair the transport of oxygen in the bloodstream and thereby aggravate cardiovascular disease and cause fatigue, headaches, and dizziness. The eight-hour CO standard was violated in 1987 and 1988 (see Table D-1, Appendix D, p. A.137). Although no violations of the State one-hour or eight-hour CO standards were recorded in 1989 at the San Francisco monitoring station, relatively high levels would be expected along heavily-traveled roads and near busy intersections. Calculations of CO concentrations near US 101 and busy intersections are presented in Section IV.D, Air Quality.

Inhalable Particulate Matter (PM_{10})

Both State and federal particulate standards now apply to smaller-diameter particulates rather than to total suspended particulates (TSP). TSP refers to dust particles with a diameter of 30 microns or less, while PM_{10} refers to that fraction of TSP with diameters of 10 microns or less. Recent studies have shown that the smaller-diameter particulates represent the health hazard posed by suspended particulate matter.

The largest sources of PM_{10} in San Mateo County include demolition and construction activity, industrial emissions, and vehicular traffic. Table D-1, in Appendix D, p. A.137 shows several violations of both the previous State TSP standard and the current PM_{10} standard over the past three years at the San Francisco monitoring station. A strategy to bring the Bay Area Air Basin into attainment is being drafted and is due for release in June 1991 as part of the "Clean Air Plan."

Nitrogen Dioxide (NO_2)

NO_2 is the brown colored gas readily visible during periods of heavy air pollution. The major sources of NO_2 are vehicular, residential, and industrial combustion. The standards for NO_2 are being met in the Bay area, and the BAAQMD does not expect these standards to be violated in the future.

Sulfur Dioxide (SO_2)

The major source of SO_2 in the Air Basin is combustion of high-sulfur fuels. Ambient standards for SO_2 are being met throughout the Bay area, and the BAAQMD does not expect these standards to be violated in the future.

Lead (Pb)

Ambient Pb levels have dropped dramatically with the increase in the percentage of motor vehicles that run exclusively on unleaded fuel. Ambient levels in San Mateo County are below the ambient standard and are expected to continue to decline.

SENSITIVE RECEPTORS

Land uses such as schools, hospitals, and convalescent homes are considered to be relatively sensitive to poor air quality because the young, the old, and the infirm are more susceptible to respiratory infections and other air quality related health problems than the general public. Agricultural crops, especially broad-leaved produce crops and cultivated flowers, are also sensitive to air pollutants such as O_3, NO_x, and SO_2.

Because people in residential districts are often at home for extended periods, the exposure times to air pollutants are relatively long. Industrial and commercial districts are less sensitive to poor air quality because exposure periods are shorter and workers in these districts are, in general, the healthiest segment of the public. Recreational land uses are moderately sensitive to air pollution. Although exposure periods are generally short in such places, vigorous exercise associated with recreation places a high demand on the human respiratory functions, which air pollution can impair. Noticeable air pollution also detracts from the recreational experience. There are sensitive receptors in the project area. See Appendix D, Table D-2, p. A.137 for a list of sensitive receptor land uses.

NOTES - Air Quality

/1/ Murphy, Michael, BAAQMD, telephone conversation, February 11, 1991.

/2/ California Air Resources Board, "Area Designations for State and National Ambient Air Quality Standards," November 1989.

● /3/ Bay Area Air Quality Management District, Association of Bay Area Governments, and Metropolitan Transportation Commission, *Bay Area '91 Clean Air Plan*, 1991.

/4/ The closest BAAQMD monitoring station is the Arkansas Street station, located in San Francisco approximately ten miles from SFIA. The next-closest monitoring station is in Redwood City, San Mateo County, about 14 miles from SFIA.

/5/ Bay Area Air Quality Management District, *Emissions Inventory Summary Report*, August 1987.

E. ENERGY

TRANSPORTATION ENERGY

Surface Transportation

Existing airport operations generate approximately 31 million passenger and employee vehicle trips per year, including private automobiles, taxis, shuttle buses, and delivery trucks. On the assumption of an average trip length of 20 miles, these trips resulted in about 620 million vehicle miles traveled in 1990./1/ In addition, aircraft servicing and maintenance generate an unknown number of vehicle miles of travel. On the assumptions of a fuel economy in 1990 for the average vehicle fleet in California of about 26 miles per gallon and a 90%/10% distribution between gasoline- and diesel-fuel-powered vehicles, surface traffic for existing Airport operations (not including ground maintenance) consumes about 3.4 trillion British thermal units (Btu) of energy per year, or the equivalent of about 586,000 barrels of oil.

Air Traffic/2,3/

Chevron, PST, and Shell Oil companies distribute aviation fuel at San Francisco International Airport. The fuel is continuously pumped to the Airport by a Southern Pacific line which runs from Richmond to Brisbane and then along the North Access Road to the aviation fuel farm. The aviation fuel farm is in the north field area, east of the Flying Tigers and Japan Air Lines airfreight facility. From there, most of the fuel is distributed throughout SFIA via pipelines to fuel hydrants in the passenger terminal areas. The remaining fuel is distributed by tanker trucks, which service General Aviation operations as well as some commuter airlines.

The capacity of the aircraft fuel distribution system is approximately 150,000 barrels a day. Since fuel demand averages about 50,000 barrels a day over the course of a year, the fuel distribution system has about a three-day capacity.

Chevron supplies all of the airlines, with the exception of TWA, with aviation fuel via a 24-inch main distribution line running from the fuel farm directly to the terminal area. (Union Oil Company of California and PST contract with Chevron to distribute fuel). Chevron supplies a total of about 47,000 barrels a day of aviation fuel with peak demand of approximately 51,000 barrels of aircraft fuel per day in July and August.

Shell Oil Company supplies aircraft fuel to TWA through three four-inch branch lines running from the bulk tank farm to the satellite tank farm and then to the TWA terminals. Shell provides TWA with approximately 3,000 barrels of aircraft fuel per day. The satellite tank facilities (day-storage) are under the clear zone of runway 1L-19R, adjacent to the R-2 service road. These facilities will be deactivated in the near future and will require a new main line sized to distribute fuel directly from the Shell bulk storage tank.

Bulk storage tanks also supply tanker trucks which are utilized by General Aviation and selected commuter airlines. All facilities and rolling stock are owned and operated by oil companies.

BUILDING AND FACILITIES ENERGY

Natural Gas

Currently, SFIA purchases natural gas from third-party suppliers and pays a fee to PG&E to transport the natural gas to its facilities./4/ Two high-pressure mains provide primary service to the site. A 20-inch main connects to one of the high-pressure mains adjacent to the San Bruno Avenue interchange with US 101 (Bayshore Freeway). A 16-inch main connects to another high-pressure main west of the terminal freeway interchange. The terminal area and south field area are serviced by a six-inch line originating from the terminal interchange connection. The north field and east field areas are serviced by an eight-inch line from the San Bruno Avenue connection./5/

The terminals, maintenance and cargo facilities are gas-heated. Total natural gas use at SFIA in 1990 was approximately 2,053,908 therms./6/ The most recent peak maximum monthly consumption was 271,000 therms in February, 1990./4/

Electricity

SFIA is served by Hetch Hetchy Water and Power, a San Francisco City Department. Hetch Hetchy pays a transmission fee to Pacific Gas & Electric (PG&E) to transmit power over PG&E lines from hydroelectric and thermal-electric generation facilities.

PG&E transmits Hetch Hetchy power to the Airport via a high-voltage aerial transmission line along a 100-foot easement running west of and parallel to US 101.

Electricity is distributed to the United Airlines Maintenance Center though PG&E's South San Francisco East Grand Substation, and to the rest of SFIA via PG&E's Millbrae substation and SFIA's substation. Feeders from both substations have a capacity of about 64 MW of electrical power. These substations, which have no other load than SFIA, are connected to SFIA by three 12 kilovolt (kV) feeder lines, which transmit the electricity to other, smaller substations and load centers throughout SFIA via underground conduits. UAL is supplied a separate source of electricity through a 12 kV overhead transmission line in the right-of-way of South Airport Boulevard from the South San Francisco East Grand Substation./7/

The PG&E transformer serving SFIA has a maximum capacity of 46.3 MW./8/ The existing overall peak demand (15-minute period) is about 37.5 MW. On average, SFIA uses about 28.9 MW. SFIA has an arrangement with United Airlines to tap electricity from the airline's cogeneration unit in the event of a PG&E power failure. The connections to the plant are scheduled to be completed in 1991.

A north field substation supplies the north airfield lighting, drainage pump systems, bulk fuel tank farms and other airport related services with 7 MW of capacity./9/ Feeders to this substation operate independently of the feeders that deliver most of the electricity to SFIA, and therefore do not figure into the calculation of the capacity constraint of 64 MW. SFIA is currently connecting and looping this feeder to provide a dual supply with the south field lines.

Each building has emergency lights and power for public evacuation. Two field lighting stations which operate independently of PG&E can supply emergency electricity to the airfield if necessary.

The SFIA Master Plan estimated current annual consumption of electricity at the airport to be 226.4 million kwh. Most of this electricity is used for lighting, air conditioning, and operation of machinery. According to the SFIA Master Plan, over a period of 12 years (1974-1986) electricity consumption grew by about 19 percent./7/

ENERGY PLANS, POLICIES, AND REGULATIONS

Transportation-related energy consumption is not subject to specific controls, although the federal government has mandated fuel economy standards for domestic passenger automobiles.

Building energy consumption is regulated in California under the state Title 24 Building Energy Efficiency Standards. The efficiency standards apply to new construction of both residential and non-residential buildings, and regulate energy consumed for heating, cooling, ventilation, water heating, and lighting. The building energy efficiency standards are enforced through the local building permit process.

Compliance with Title 24 can be achieved through either a "performance" or a "prescriptive" approach. Under the performance compliance approach, a building must be designed to consume no more energy than specified in the appropriate energy "budget." The energy budget is based on the building occupancy and the climatic zone in which the building is located. Under the prescriptive approach, a building design must include specific features that have been determined to achieve an acceptable level of energy efficiency; these specified features include minimum insulation values for walls, floors, and ceilings; energy-efficient HVAC systems, lighting systems, and hot water supply; maximum percentages of glazing (window) areas; weatherstripping of doors and windows; and similar measures. Under the prescriptive approach, a builder can choose from a variety of alternative component packages that achieve the same general level of energy efficiency. There are a few design features that are required under either the performance or the prescriptive approach.

NOTES - Energy

/1/ Twenty miles per trip is the recommended trip length for regional airports contained in the Bay Area Air Quality Management District's *Guidelines for Assessing the Impacts of Projects and Plans*, updated April 1988.

/2/ Corrado, Celeste, Urban Planner, DMJM, telephone conversation with Vance Hendry, SFIA, March 22, 1989.

/3/ Corrado, Celeste, Urban Planner, DMJM, memorandum to Ray Landy, DMJM, July 18, 1989.

/4/ Yazdi, Mohammed, Major Account Representative, Pacific Gas and Electric, telephone conversations, August 15, 21, 22 and 27, 1990.

/5/ SFIA, *Final Draft Master Plan*, Chapter 4.0., November, 1989.

/6/ A therm is equal to 100,000 British thermal units. 1989 annual figures are used as approximations of 1990 figures.

/7/ SFIA, *Final Draft Master Plan*, Chapter 6.0., November, 1989.

/8/ Costas, John, Assistant Administrator, San Francisco International Airport, written communication, June 12, 1990.

/9/ Jacobberger, Donald, Electrical Engineer, SFIA Bureau of Planning and Construction, telephone conversations, August 15, 22, 27, 1990.

F. CULTURAL RESOURCES/1/

PREHISTORY

Past Environment

The San Francisco Bay region has been subject to environmental changes during the past 15,000 years, the most relevant of which have resulted from the worldwide rise of sea levels following the Wisconsin Glacial period./2/ The changes which most affected prehistoric cultural activity in the Bay Area were the alteration of the coastline and the formation of estuaries and marshes./3/

These marshes were important to the prehistoric populations in the area, as they provided a rich and vast range of subsistence resources in the form of fish, shellfish, birds, land and sea mammals, and marsh plants. At the time of European contact, marshlands in the general vicinity of the project area were situated in the San Bruno, Crystal Springs, Mills and Colma Creeks locales. Many of these marshlands have disappeared under fill as a result of nineteenth- and twentieth-century reclamation projects.

Prehistoric Period, 3500 B.C. to 850 A.D.

Evidence of prehistoric populations on the San Francisco Peninsula date to ca. 3500 B.C., with evidence of a pre-Costanoan presence (see Ethnography, following on next page) as late as ca. A.D. 850. Archaeological evidence indicates that the West Bay region was used intensively during prehistoric times; the area was an environmentally favorable locale with a variety of exploitable resources from San Francisco Bay and the nearby foothills. Perennial and intermittent drainages provided potable water and riparian resources Also, north/south travel and trade was accomplished easily, and several passes provided access to the interior San Andreas rift valleys. Hunting and gathering systems were the basis of the native populations' subsistence practices. Parties went out from the main villages to temporary camps within their territory to exploit the various seasonally available resources. Research indicates that intensive use of plant foods (hazelnuts, acorns, tubers and grasses) as well as the exploitation of marine and land animal resources were the basis for native diets.

Little of the prehistoric social and religious organization and structure is known from the West Bay archaeological record. Ethnographic information suggests that clusters of extended families lived habitually in the same area under a "chief" or headman.

While prehistoric archaeological sites are located west of the Bayshore Freeway (US 101), particularly in the vicinity of San Bruno, Crystal Springs and Mills Creeks and on San Bruno Mountain, no archaeological resources are documented within the project area. Moreover, none of the bay-oriented prehistoric shellmound sites recorded by N. Nelson in 1909 or mound sites recorded by amateur archaeologist Jerome Hamilton, who documented shellmounds of San Mateo from 1896 to 1936, lie within the SFIA project area.

Ethnography (850-1769)

The California Indians who occupied the San Francisco Peninsula at the time of European contact are known as the Costanoan. The term Costanoan is derived from the Spanish word "Costanos" meaning coast people. No native name for the Costanoan people as a whole is known to have existed in precontact times. The Costanoans were probably neither a single ethnic group nor a political entity./4/ The term Costanoan also designates a language family consisting of eight languages.

Informational sources for Costanoan ethnographic data are limited primarily to accounts by Europeans during their visits to the coast and by ethnographic accounts collected by anthropologists after the turn of this century.

HISTORY

Spanish Period (1769-1822)

The first Spanish expedition to enter present-day San Mateo County did so in 1769, under the leadership of Gaspar de Portola. According to the records of Fray Juan Crespi, Portola's chronicler, the band of explorers ventured up the seacoast of the Peninsula before crossing Sweeney Ridge and dropping down the eastern slopes of the Coastal Range. After camping below present-day San Andreas Lake, approximately two miles southwest of the project area, Portola and his men traveled as far south as present-day Menlo Park before retracing their steps over the mountain and back along the Pacific shore/5,6,7/.

In November of 1774, Fernando Rivera and Fray Francisco Palou led a second expedition into San Mateo County. In a search for a suitable mission site, Rivera followed an inland route up the Peninsula before intersecting with Portola's earlier trail. Rivera ventured as far as the Golden Gate. The following year, Father Palou made a similar trek with Bruno de Heceta./5,6,7/ Two years later, Juan Bautista de Anza and his chronicler, Fray Pedro Font, led a third expedition up the Peninsula, passing within less than a quarter mile of the project area.

By the early 1790s, outposts loosely supervised by the missions were established throughout the Peninsula. The outposts situated near El Camino Real served as stopovers for visiting padres and travelers, and the route was a trail which transected the open terrain of California./8/

Mexican Period (1822-1848)

During the Mexican period, large tracts of land were placed in the hands of individuals who, to a great extent, engaged in cattle ranching as well as in the hide and tallow trade. Land grants were issued throughout the Peninsula, one of the largest being the 14,639-acre Rancho Buri Buri, which surrounded the project area. The rancho's boundaries ran from South San Francisco's northern border to the middle of Burlingame and from the salt marshes of the Bay to the top of Sweeney Ridge./6,9/

The land of Buri Buri had a long ranching history. For years the mission fathers and the comandantes at the Presidio fought over the land and the right to graze their cattle there. In 1835 Governor Jose Castro officially granted Rancho Buri Buri to Jose Sanchez. The Sanchez family grew wheat, corn and garden vegetables in addition to grazing herds of cattle, horses and sheep. The Sanchez family constructed two adobe houses on its property, just east of present-day El Camino Real on the Burlingame-Millbrae border. Sanchez also built a grist mill near his adobe and a boat landing on a nearby slough. The mill fell into disuse and eventually disappeared; one of its millstones was later found on the Mills Estate in Millbrae. The Sanchez levee and wharf were southeast of present-day Millbrae Avenue, just outside the southern land boundary of SFIA property. The area is currently part of a bayside park.

No roadways, mission outposts or adobe structures from the Spanish or Mission Periods are known to have existed within the project area. However, the Jose Sanchez family constructed a levee and wharf southeast of present-day Millbrae Avenue, just outside the southern land boundary of SFIA property.

Early American Period (1848-1927)

After the signing of the Treaty of Guadalupe-Hidalgo in 1848, California became part of the United States and under the 1851 Gwin Act a commission was established to settle disputes arising over the validity of Mexican land grants. Because many claims were poorly recorded and because of pressure from landless American squatters, the court heard over 800 cases involving 500 land grants and rejected claims totaling 2,500,000 acres. Although the United States government confirmed Sanchez family ownership of Buri Buri, less than 5,000 acres of the original 15,000-acre land grant remained in the family.

By the end of the century, most of that land came into ownership of other parties. In San Mateo County, these other parties consisted of American Easterners such as Charles Lux, Ansel L. Easton and Darius O. Mills who, by 1870, had purchased thousands of acres of Buri Buri. Nevertheless, although Mills owned most of the property within the project area by 1927, the bayside real estate remained largely undeveloped./7,8,10/

The land that was developed within the former Buri Buri rancho boundaries lay near El Camino Real. Throughout the second half of the 1800s, transportation improved around the Peninsula; by the 1850s, El Camino Real had grown into a highway over which wagons and stages traveled. As a result, roadhouses or inns developed along the highway. Two such stagehouses were less than half-a-mile west of the project area: the 14 Mile House at present-day El Camino Real and San Mateo Avenue in San Bruno and the 17 Mile House at present-day El Camino Real and Millbrae Avenue in Millbrae. By 1864, the San Francisco and San Jose Railroad (later Southern Pacific) was steaming down the Peninsula on tracks that at times paralleled the project area and stopping at stations slightly east of El Camino Real and the former roadhouses.

Two years after the railroad arrived, Darius Mills began constructing his Peninsula estate. The Mills estate, which lay three-quarter miles southwest of the project area, was ruined eventually by termite damage and age and was bulldozed to make way for apartments and a shopping center.

The growth of the San Mateo County fishing industry also coincided with the completion of the railroad. The unemployed railroad workers, mostly Chinese, returned to the occupation they had pursued in China - that of shrimp harvesters.

The largest shrimp camp was a few miles to the south of the San Francisco County line on San Bruno Point at the mouth of Colma Creek Slough. Because Colma Creek Slough lies less than half-a-mile north of SFIA it is assumed that when the San Mateo County shrimp industry reached its peak in 1892, producing one quarter of the entire West Coast's output, camps existed in the project area.

Other major shrimp camps below Colma Creek Slough were south of the project area.

> One of the earliest camps settled in the state was situated on the southwest side of Corkscrew Creek at Redwood Slough, close to Redwood City. Evidence reveals it dates back to 1869 . . . Other shrimp camps along the San Mateo County bayshore included one at Broadway Street and the bay off Burlingame and one off little Coyote Point./11/

However, pollution in the Bay, over-harvesting as well as anti-Chinese sentiments, which were reflected in the banning of nets and fishing gear that the "all too successful" shrimpers used, led to a decline in the industry. By 1910 the camps and Chinese fishermen had all but disappeared from the Bay./8/

Oyster harvesting off the salt flats of the project area began as early as 1877. Between 1888 and 1912, the Bay waters off San Mateo County were the "only sources of commercial oysters in California." By the turn of the century, the oyster business also began to collapse as organic and chemical waste polluted the Bay and reduced the oxygen concentrations in the water. As a result, in 1923, the Morgan Oyster Company, an oyster harvesting concern on the County baylands, began selling its holdings to Pacific Portland Cement Company./8/

Clams and other mollusks had for centuries deposited their shells on the undisturbed Bay floor; by the 1930s, dredges were scooping tons of shells from the Bay and converting them into lime powder at the nearby cement factories. However, during the 1960s, rising production costs, aging facilities, higher taxes, tougher environmental controls, and rising tideland values led to a shutdown of this industry./8/

No evidence of Chinese shrimp camps, oyster industry structures or cement company dredging equipment is known to exist near or within the project area.

San Francisco Airport (1927-present)

As the Peninsula's fishing industry was ending, San Francisco's aviation industry was begining. With Crissy Field and Ingleside district sand dunes functioning as sites for takeoffs and landings, the citizens of San Francisco realized that public safety demanded that a permanent airfield be developed outside the city limits. In March of 1927, San Francisco supervisors opted to lease 150 acres belonging to the descendants of Darius Mills for the site of the City's future airport./12,13/

The Mills estate was above the Bay tides, offered hundreds of acres of submerged land which airport engineers could later reclaim and, most important, the site was available immediately. On May 7, 1927, Mayor James Rolph dedicated the Mills Field Municipal Airport of San Francisco.

The airport opened in June of 1927 and for the next ten years it conducted business from a terminal building that "was little more than a two-room wooden shack."/14/ This building was east of US 101, northwest of the present-day Bank of America Building, on a present-day parking lot (see building Number 44 on Figure 2, Chapter II. Project Description, p. 34). When Charles Lindbergh made the second of his two visits to Mills Field airport, a catastrophe occurred. His 32-passenger Boeing aircraft got stuck in the Peninsula mud. Henceforth, the fledgling airport was considered, "a mud hole, just a mud hole."/15/

The Lindbergh incident produced criticism on a local and national level. By 1930, San Francisco supervisors had purchased 1,112 acres of property from the Mills estate and the next year the airfield became known as the San Francisco Municipal Airport.

Between 1934 and 1935, the Works Progress Administration (WPA) put 2,000 people into work-relief programs to lengthen and widen the runways. Hundreds of tons of dirt and rocks were carved from the nearby San Mateo hills. In all, 319 acres of marsh and tidelands were filled.

On the eve of the 1940s, the City and its Public Utilities Commission (designated to regulate citizen-owned utilities) looked forward to the construction of a Coast Guard Air Station and the completion of the Seaplane Harbor at the airport. Then came Pearl Harbor, and the Navy assumed control of the airport and began the fill of another 100 acres. "Airport facilities in general were modified to meet military requirements . . . apron areas were enlarged and strengthened to accommodate multi-engine military aircraft."/13/

While none of the original Mill's Field buildings remain at SFIA, older structures are situated in the vicinity of the Seaplane Harbor. During World War II, the Airport saw the establishment of the Coast Guard Station and the transfer of Pan Am and United Airlines to its property. All three organizations constructed buildings in the early 1940s.

Pan Am's Flying Tiger hangar, built in 1943 is near the Seaplane Harbor.

By the end of the war, "the airport had 700 acres in use, another 2,000 under development, and several 16,000-foot runways."/8/ San Francisco Municipal Airport soon became one of the world's busiest airports. As a result, by the end of the '40s, the Old Bayshore Highway, which ran through the Airport lands, was abandoned and a new Bayshore Freeway (US 101) was constructed further to the west./8,12,15/

During the 1950s and 1960s, the marshlands between the (old) Bayshore Highway and the Bayshore Freeway were developed, complete with hangars, buildings, airport shops and taxiways.

In 1954, after landfill activities, the Central Terminal was erected at the airport. By 1963, the South Terminal was also built. In the spring of 1966, the San Mateo County Historical Association and the public gathered at the airport to bid farewell to the classic California-style terminal, built in 1937, as well as Mills Field's first big hangar, built in 1927. In order for additional runways to be built, both structures were razed that summer./12,14,16-20/

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G. GEOLOGY AND SEISMICITY

GEOLOGY

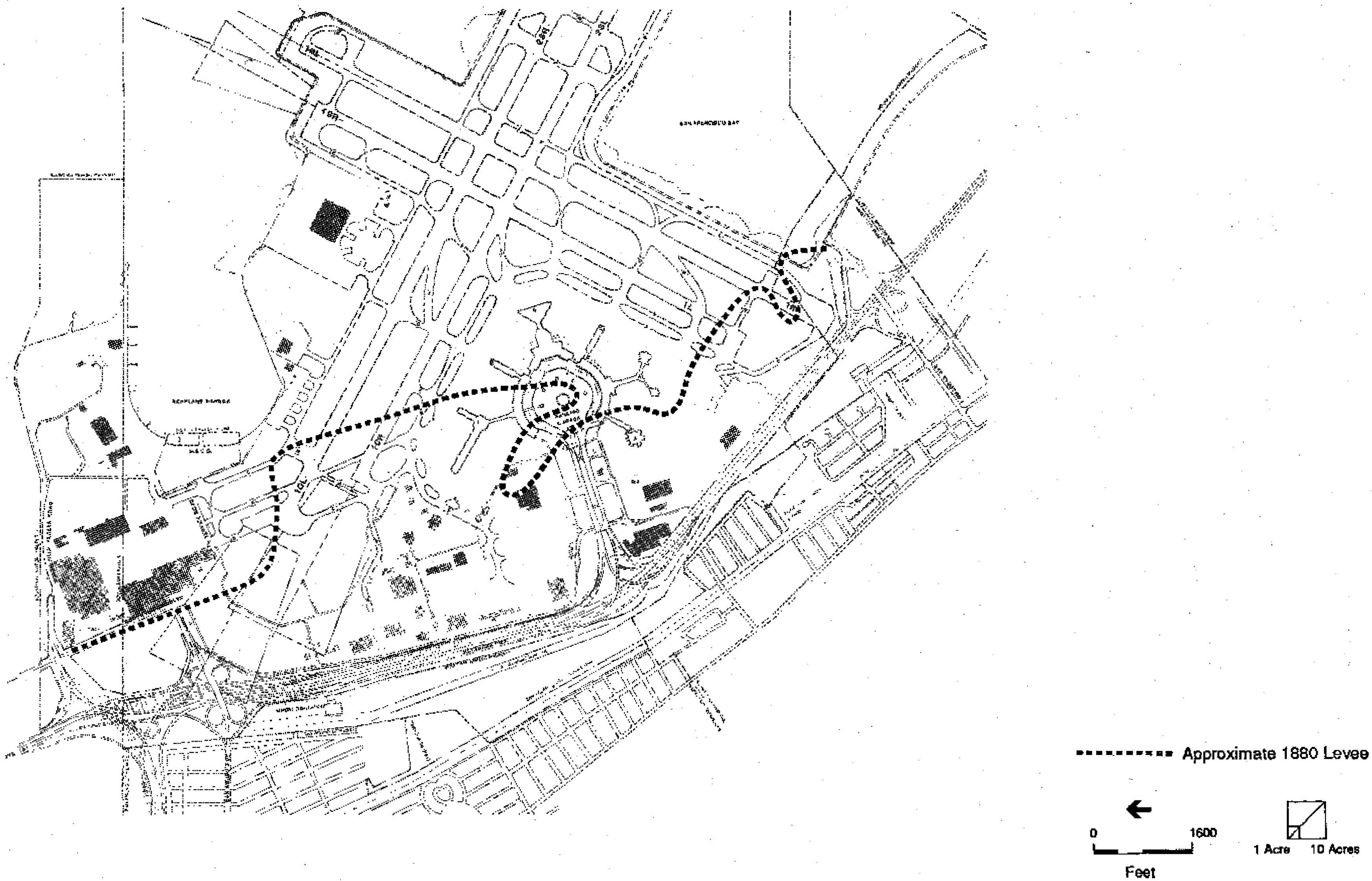
The San Francisco International Airport (SFIA) is located along the western shore of San Francisco Bay. The 2,700-acre area is composed of bay land that was filled and drained to create a relatively broad, flat area that is just above sea level. Groundwater is relatively shallow, generally less than five feet below the ground surface./1/

The area surrounding San Francisco Bay is composed of three types of sedimentary deposits: the most recent (upper) layer is composed of bay mud; under the bay mud are relatively dense silty sands; the lower deposits are older bay muds./2/ Older bay muds are relatively stiff firm clays that contain various amounts of silt, and lenses of sand and gravel. This unit is preconsolidated and is generally suitable for foundation support./1/ Dense silty sand overlies portions of the older bay mud and is generally thicker towards the Bay's margin, and thinner towards the center of the Bay.

Soft bay mud is the uppermost unit, and is generally 30 to 60 feet thick in the project area./1,3,4/ The upper bay mud unit is described by the U.S. Geological Survey as "unconsolidated, water-saturated, dark, plastic, carbonaceous clay and silty clay"/2/. All deposits are Quaternary in age, probably less than 120,000 years old./2/ Bedrock, Cretaceous sedimentary rocks of the Franciscan Complex, probably occurs about 100 feet below the ground surface./1/

Filling at SFIA began as early as 1880 with the construction of a levee, drying and filling in the western one-third of the property. The technique of placing fill on dried land has resulted in low to moderate rates of settlement. The approximate location of the pre-1927 shoreline, indicated in Figure 22, delineates the area that was filled in this manner. The remaining eastern portion of the site was filled by placing material directly over submerged lands, on top of soft bay mud. This fill technique, in combination with the presence of thicker bay mud deposits, created an environment prone to differential settlement./1/

Settlement on the order of feet has occurred since unengineered fill was placed on the site beginning in the last century and settlement will continue, although at a decreasing rate. Settlement has caused ground surface deformation, separation of pavement from



SOURCE: Aerial photograph from San Francisco Public Utilities Commission;
and Environmetal Science Associates, Inc.

Figure 22
Location of Pre-1927 Shoreline

buildings and movement of underground pipelines. Future settlement is expected to be most severe in the eastern part of the project area, where bay mud is thickest.

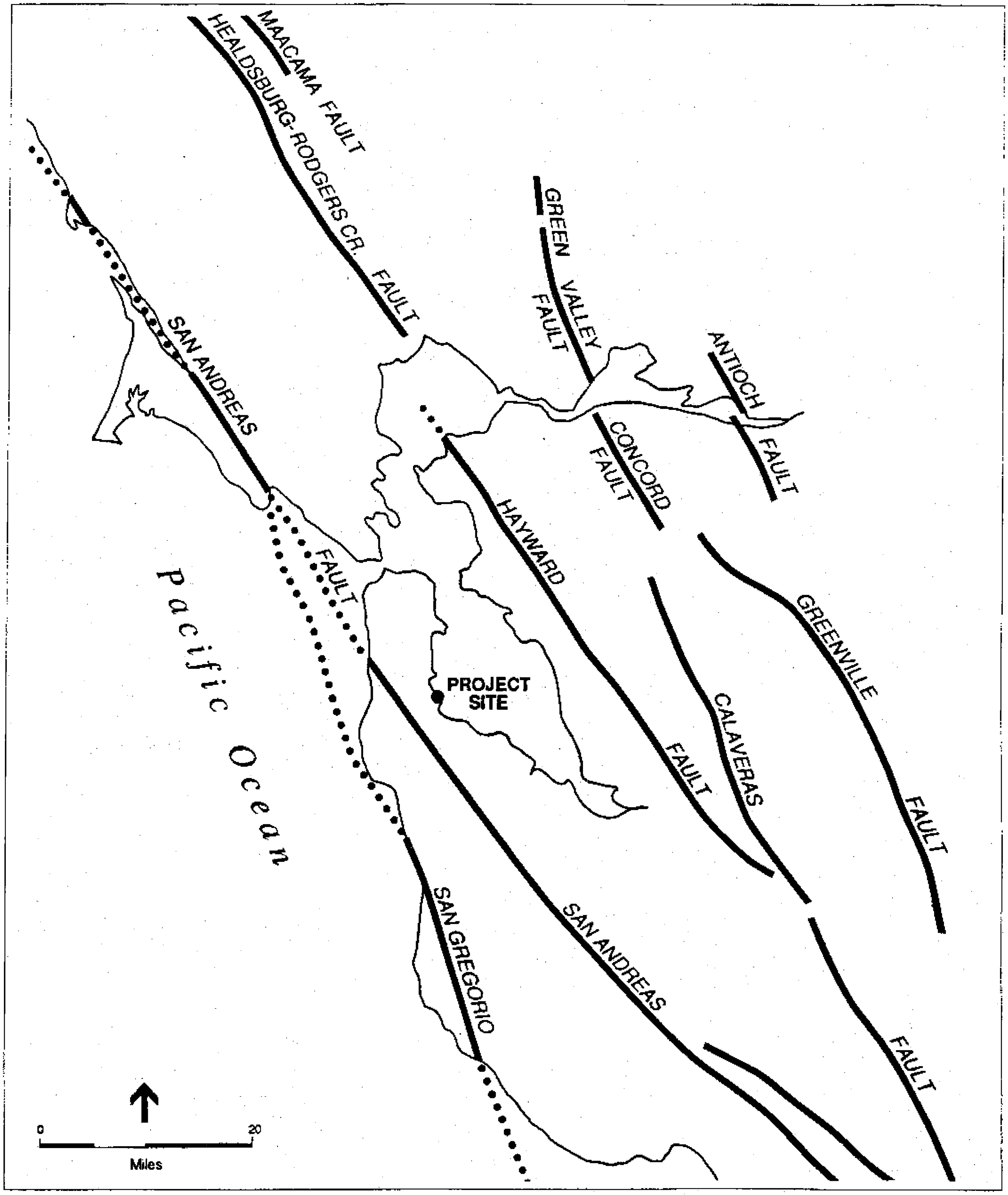
The project area is classified by the U.S. Geological Survey as having "Unstable" slope conditions, as are most areas along the margins of the Bay./5/ Although slopes are less than five percent, the tidelands and marshlands underlain by moist unconsolidated mud are susceptible to lateral spreading, a type of ground movement in which material slides along a relatively flat surface. These soils are also susceptible to seismically induced ground failure.

SEISMICITY

The San Francisco Bay Area is a region of relatively high seismic activity. The area is in Zone 4 (the most hazardous) on the Uniform Building Code's Seismic Zone Map of the United States. According to San Mateo County's Geotechnical Hazards map the potentially active Serra fault is located 2.3 miles west of the site./6/ The main trace of the active San Andreas fault is about three miles west of the Bayshore Freeway, which forms the western boundary of the project area./7/ Other nearby active faults include the Seal Cove - San Gregorio (about ten miles west of the project area), the Hayward (15 miles to the east) and the Calaveras (22 miles to the east) faults./7/ Figure 23 shows the regional faults that are most likely to cause earthquakes that could affect the project area. Table 19, p. 196 lists their maximum credible earthquakes.

Potential seismic hazards in the project area may arise from three sources: fault rupture, liquefaction and strong ground shaking. Since no mapped faults are known to pass through the project area, the potential risk from fault rupture is considered negligible./3/ The site is not within an Alquist Priolo Special Study Zone for fault rupture hazards, as designated by the state./8/ However, the project could be affected by strong ground shaking caused by a major earthquake during the life of the project.

The project area is within a zone of high ground-failure potential as designated by the California Division of Mines and Geology./9/ Earthquakes may trigger ground failure such as liquefaction, lateral spreads and flow failures at the site. Soil liquefaction is the relatively rapid loss of soil shear strength during strong earthquake shaking, which



SOURCE: Environmental Science Associates, Inc.

San Francisco International Airport ■

Figure 23
Regional Fault Map

TABLE 19: SUMMARY OF MAXIMUM CREDIBLE EARTHQUAKE MAGNITUDES FOR KNOWN ACTIVE FAULTS IN THE SAN FRANCISCO BAY AREA

Fault	Maximum Credible Earthquake Magnitude (Richter Magnitude)
San Andreas	8.5
Seal Cove - San Gregorio	N/A*
Hayward	7.3
Calaveras	7.3

*N/A = Not Available

SOURCE: Contra Costa County General Plan, 1991.

results in the temporary fluid-like behavior of the soil. Soil liquefaction causes ground failure that can damage roads, runways, pipelines, underground cables and buildings with shallow foundations.

Soils that are most susceptible to liquefaction are loose, clean, fine sands, and silts that are free of clay. In addition, these materials must be below the water table (saturated) for liquefaction to occur. Previous geotechnical investigations at the airport have not identified these conditions at selected sites./1,3/ However, San Mateo County has mapped the area as bay mud with "Variable" liquefaction potential. This unit contains, or in places is underlain by, sand lenses that are saturated and may have relatively high liquefaction potential.

Records of historic ground failure patterns indicate that earthquake-induced ground settlement and lateral spreading have occurred in the area south of San Bruno Avenue just west of the Bayshore Freeway, in the project vicinity./10/ Settlement of up to four inches was reported at the airport's wastewater treatment plant after the October 1989 Loma Prieta earthquake./11/ However, no damaging earthquake-induced ground failure was reported at SFIA following this event./12,13/

The northwestern portion of SFIA, the "airside area", is within a tsunami inundation zone, as defined by the San Mateo County Geotechnical Hazards Synthesis Maps./6/ The estimated tsunami run-up at the airport is about four feet for the 100-year event and about six feet for the 500-year event./14/

Historic earthquakes have caused strong ground shaking and damage in the project area and vicinity. The maximum expected ground shaking intensity is Mercalli VIII./15/ This intensity of ground shaking is described as:

> "Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, . . . walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water . . ."/16/

The Loma Prieta earthquake was the most damaging earthquake to strike the airport since its creation in 1927. This earthquake measured 7.1 on the Richter scale and caused strong ground shaking for about 20 seconds. Although the epicenter was located about 45 miles south of the project area, the airport experienced strong ground shaking equivalent to intensity VII on the Mercalli scale. Mercalli VII is described as:

> ". . . Damage negligible in buildings of good design and construction; slight to moderate in well built ordinary structures; considerable in . . . badly designed structures; some chimneys broken . . ."/16/

The effects of the Loma Prieta earthquake at the airport are reported in *The Earthquake of 1989, a Report on San Francisco International Airport* /12/, contained in Appendix E. The airport claimed more than $25 million in damages. One reinforced concrete building (the Airborne Cargo Building, built in the mid 1960's) was damaged and later demolished. Most buildings, however, remained intact and suffered varying degrees of non-structural damage. Typical damage included toppled furniture, overturned shelving, broken glass, and falling plaster, ceiling tiles and light fixtures. Many overhead water lines burst, flooding waiting areas and public lobbies. Although no deaths were reported, several people were injured during the earthquake, one seriously.

No runway damage or fuel leaks or spills were reported. However, the Airport Fire Department responded to reports of natural gas leaks and chemical spills at the United Airlines Maintenance Center.

The airport shut down immediately following the earthquake. Limited service resumed 13 hours after the main earthquake shock. Full service was restored within three and a half days. Airport facilities had visible cosmetic damage for months following the earthquake, as restoration took place while the airport remained fully functional./12/

Policies

The following policy concerning geohazards is contained in the San Francisco Master Plan, Community Safety Element (1974):

> "Apply a minimum level of acceptable risk to structures and uses of land based upon the nature of use, importance of the use to public safety and welfare, and density of occupancy."/17/

The airport would fall into risk level 3, because it would likely serve as a critical "emergency operations facility" following an earthquake. The Master Plan calls for the following safety standards for structures of this type:

- No structural or mechanical failure.
- Little or no damage to interior furnishings and equipment.
- Must be fully operational immediately following a major earthquake.

BUILDING CODES

California state law (Health and Safety Code, Section 18941.5) requires local jurisdictions to implement, as a minimum, building standards of the 1988 edition of the Uniform Building Code for all new construction and for substantial alterations.

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H. HAZARDOUS MATERIALS

Various types of hazardous materials are used at San Francisco International Airport for the maintenance and operation of the airplanes, the airport property and the supporting facilities. The use, storage and disposal of hazardous materials can create a public health hazard if handled incorrectly. Improperly stored chemicals lead to fire, explosion or contamination of soil or groundwater. Development in certain areas of the Airport could result in human exposure to contaminated soil or groundwater.

DEFINITIONS

A substance may be considered hazardous due to a number of criteria, including toxicity, ignitability, corrosivity, or reactivity. A **hazardous material** is defined as "a substance or combination of substances which, because of its quantity, concentration, or physical, chemical or infectious characteristics, may either (1) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (2) pose a substantial present or potential hazard to human health or environment when improperly treated, stored, transported or disposed of or otherwise managed" (Title 22, California Code of Regulations, Section 66084).

Once a hazardous material is ready for discard, it becomes a **hazardous waste**. A "hazardous waste", for the purpose of this report, is any hazardous material that is abandoned, discarded, or (planned to be) recycled (California Health and Safety Code, Section 25124). In addition, hazardous wastes may occasionally be generated by actions that change the composition of previously non-hazardous materials. The same criteria that render a material hazardous make a waste hazardous: toxicity, ignitability, corrosivity, or reactivity.

Toxic, ignitable, corrosive and reactive materials are all subsets of hazardous materials and wastes. For example, if a material is toxic, it is hazardous, but not all hazardous materials are toxic. Specific tests for toxicity, ignitability, corrosivity and reactivity are set forth in Title 22, California Code of Regulations, Sections 66693 - 66708. Each type of hazardous material is defined below.

Toxic substances may cause short-term or long-lasting health effects, ranging from temporary effects to permanent disability, or even death. For example, such substances can cause disorientation, acute allergic reactions, asphyxiation, skin irritation or other adverse health effects if human exposure exceeds certain levels (the level depends on the substance involved). Carcinogens (substances known to cause cancer) are a class of toxic substances. Examples of toxic substances include benzene, which is a component of gasoline and a suspected carcinogen, and methylene chloride, a paint stripper.

Ignitable substances are hazardous because of their ability to burn. Gasoline, hexane and natural gas are examples of ignitable substances.

Corrosive materials can cause severe burns or damage materials; these include strong acids and bases, such as lye or sulfuric (battery) acid.

Reactive materials may cause explosions or generate toxic gases. Explosives, pure sodium or potassium metal (which react violently with water), and cyanides (which react with acids to produce toxic hydrogen cyanide) are examples of reactive materials.

Contamination and contaminants are not necessarily hazardous materials or waste. Soil or water is considered to be contaminated if it contains elevated (above background) levels of a chemical substance, and if the resulting soil or water has the potential to cause human health effects or adversely affect the natural environment.

Even if soil or groundwater at a contaminated site does not have the characteristics of a hazardous material, remediation (clean-up) of the site may be required by the regulatory agencies. Several regulatory agencies usually become involved in overseeing site remediation activities. Clean-up requirements are determined on a case-by-case basis.

REGULATORY FRAMEWORK

Numerous laws and regulations govern the management of hazardous materials and wastes at the federal, state, and local levels. The major laws and regulations that relate directly to conditions in the project area are discussed below; a more complete discussion is provided in Appendix F, pp. A.147-157.

U.S. Environmental Protection Agency

The Environmental Protection Agency (EPA) is responsible for enforcing regulations at the federal level pertaining to hazardous materials and wastes. The primary federal hazardous materials and waste laws are contained in the Resource Conservation and Recovery Act of 1976 (RCRA), and in the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). These laws require that responsible parties report any known hazardous waste contamination of soil or groundwater to the EPA. For the San Francisco International Airport, reporting must be to the California Department of Health Services, the San Francisco Bay Regional Water Quality Control Board, or the San Mateo County Office of Environmental Health, depending on specific circumstances. Any contamination that threatens public health or the environment must be cleaned up (remediated) by the responsible party according to certain standards set by the EPA.

The federal statutes pertaining to hazardous materials and wastes are contained in the Code of Federal Regulations (40 CFR). The regulations contain specific guidelines for determining whether a waste is hazardous, based on either the source of generation or the properties of the waste. Determination of standards for remediation of soil and groundwater contamination is performed on a case-by-case basis. However, extensive federal guidance exists for determining acceptable levels of residual contaminants in soil and groundwater.

California Department of Health Services, Toxic Substances Control Division

The EPA has delegated much of its regulatory authority to individual states whenever adequate state regulatory programs exist. The Toxic Substance Control Division of the California Department of Health Services is the agency empowered to enforce federal hazardous materials and waste regulations in California, in conjunction with the EPA.

California hazardous materials and waste laws incorporate federal standards, but are more strict in many respects. For example, the California Hazardous Waste Control Law, the state equivalent of RCRA, contains a broader definition of hazardous materials and waste than the federal definition. Some substances not considered hazardous under federal law are considered hazardous under state law. The California Hazardous Substance Account Act, essentially the equivalent of CERCLA, contains a provision for designation of state funds to clean up sites where private funding is unobtainable. State hazardous materials and waste laws are contained in the California Code of Regulations (CCR), Title 26.

The Department of Health Services acts as the lead state agency in some site investigations and remediation projects. The state determines the level and extent of required clean-up, based on the specific site conditions and surrounding land uses. State clean-up standards can be more restrictive than federal standards; both state and federal standards are used to determine clean-up levels.

California Regional Water Quality Control Board, San Francisco Bay Region

The Project Area is located within the jurisdiction of the San Francisco Bay Regional Water Quality Control Board (RWQCB). The RWQCB is authorized by the State Water Resources Control Board to enforce the provisions of the Porter-Cologne Water Quality Control Act of 1969, which incorporates federal water protection laws (see Appendix F). This Act gives the RWQCB authority to require groundwater investigations when the quality of the groundwaters or surface waters of the state have been or could be threatened, and to remediate the site if necessary. Clean-up standards are often more stringent than employed by the RWQCB those used by EPA or the State Department of Health Services depending on the particular contaminant, and are region-specific./2/ The level of required site remediation is determined on a case-by-case basis.

Local Administering Agencies

The San Mateo County Office of Environmental Health and the San Mateo County Department of Public Works are involved directly in the management of hazardous materials and wastes within the Airport. Under a joint agreement, the Airports Commission shares these responsibilities with the County agencies.

The County Office of Environmental Health is designated by the State Water Resources Control Board to enforce the state underground storage tank (UST) program. Permitting of underground storage tank installation and removal is overseen by the Office of Environmental Health. The Office of Environmental Health also issues permits to businesses that store hazardous materials and conducts inspections on a regular basis to ensure compliance with regulatory requirements. The Office of Environmental Health, State Department of Health Services, and RWQCB jointly oversee subsurface investigations and remediation at sites containing hazardous materials.

The SFIA Fire Department, in coordination with the SFIA Facilities, Operations and Maintenance Division, regulates the use and storage of flammable liquids. The Fire Department conducts regular inspections of above-ground storage tanks and facilities in which hazardous materials are used or stored, and reports of those inspections are kept on file. The Facilities, Operations and Maintenance Division follows up on any suspected violations in hazardous material handling.

HAZARDOUS MATERIAL USE AT SFIA

Hazardous materials are used for various purposes throughout the Airport. Their uses focus around maintenance and fueling of airplanes and ground vehicles, and the maintenance of the airport facilities. For the purposes of this EIR, the use of hazardous materials is divided into use at Airport-owned facilities and use at tenant facilities (i.e., facilities that lease space from the Airport). Because of the specific considerations involved with the use of aircraft and motor vehicle fuels, these are discussed below in separate sections.

Airport-Owned Facilities

Most of the hazardous materials used by the Airport and by City and County employees at SFIA are handled by the Facilities, Operations and Maintenance Division of the Airports Commission. The Facilities, Operations and Maintenance Division is responsible for the following areas of airport operation: Environmental Control, Maintenance, Technical Services, Construction Support, Quality Control, and Scheduling and Control.

The Airport facilities in which hazardous materials are used include the Engineering Building, the Maintenance Building, the Water Quality Laboratory and Water Quality Plants, the Central Plant in the center of the parking garage at the terminals, and the custodial offices in the terminals. The Engineering Building (676 McDonnell Road) contains one reproduction shop. The Airport Maintenance Base (682 McDonnell Road) contains offices and maintenance shops. Work operations in this building include wood-working, painting, varnishing, auto maintenance, welding, and soldering. The electrical shop works on a 24-hour schedule. The facility also has an adjacent annex that houses part of the auto shop and the sheet metal shop. The courtyard contains the paving and grounds office, steam cleaner, and gasoline pumps.

The two wastewater treatment plants, at the end of the North Access Road, handle all of the industrial waste and sewage from the Airport. In addition, the plants have a maintenance shop and a water quality testing laboratory.

The Airport has completed and submitted to the County of San Mateo a Hazardous Materials Release Response Plan (Business Plan) in accordance with the Hazardous Materials Release Response Plans and Inventory Law. In addition to emergency response procedures, the plan includes facility diagrams, a hazardous materials inventory and an employee training plan. The hazardous materials stored in the maintenance shops in the Maintenance Building include detergents, industrial cleaners, paints/primers, paint thinners, degreasers, lubricants, oils, solvents, motor oils, sealants, gasoline, kerosene, rust penetrators, herbicides, insecticides, fertilizers and dyes./1/ The water quality laboratory stores and uses a number of chemicals in relatively small quantities for testing purposes. The wastewater treatment plant uses lubricants and degreasers for the operation of the plant, as well as chlorine, acrylamide polymer, aluminum sulfate, ferrous cupric sulfate, and sodium triphosphate for treatment of wastewater.

San Mateo County has reviewed and approved the Airport's Business Plan, with the exception of a few changes that the Airport is currently addressing./2/

Within the last five years the Airport has formalized its safety practices and procedures, and instituted training programs for employees. Employees take part in a safety program with both classroom instruction and written material contained in the

SFIA Employee Safety Practices and Procedures Manual. Employees are informed of California Occupational Safety and Health Administration (Cal/OSHA) regulations for employers and employees regarding safety and accident investigation, and informed of the Airport's safety standards for engineering work and job safe practices for everyday operations. Industrial health issues are discussed, including personal protective equipment and medical surveillance. In addition, the Airport is in the process of instituting a Safety and Hazardous Materials Training Program. This training program provides the employees with basic facts about safety and hazardous materials, including physical properties, material safety data sheets, emergency spill procedures, hazardous waste management, electrical hazard control, and earthquake preparedness, as well as background information regarding the state and federal regulation of hazardous materials. Employees attend safety training at the start of employment and also receive annual refresher courses./3/

Tenant Facilities

As presented in the Project Description, the tenant facilities include airfreight administrative buildings and hangars, base and line maintenance buildings and hangars, General Aviation hangars, airline catering and support buildings and a U.S.Coast Guard facility. For the purposes of this section of the EIR, the facilities that store and use most of the hazardous materials at the airport are summarized.

United Airlines (UAL) Maintenance Center, the only "major" maintenance facility at SFIA, is the largest major maintenance facility in the United States. The operations conducted at UAL aircraft maintenance shops include full overhaul of aircraft engines, airframe maintenance, and upper-level phase checks for the UAL fleet. The types of hazardous materials that are used for these operations include cleaners, solvents, greases/oils/lubricants, paints/primers/thinners, developers, penetrants, adhesives and dyes./4/ In addition, the United Airlines Maintenance Center operates a pre-treatment facility for its industrial wastewater, which uses treatment chemicals such as chlorine and sodium hydroxide. As usual, fuel is stored in underground storage tanks.

Eight airlines operate line maintenance facilities at the Airport. Line maintenance includes routine as well as non-scheduled procedures and relatively low-level maintenance checks. The airlines operating these facilities include American Airlines (the largest), Quantas, Continental, Delta, Pan Am, TWA, Northwest and United Airlines, which operates a smaller line maintenance hangar in addition to its larger facility. Most of the line maintenance facilities also work on aircraft from other airlines that do not have maintenance facilities. Some of the air freight companies also have maintenance operations.

The operations conducted at the line maintenance facilities include aircraft washing, painting and necessary overnight maintenance. Hazardous materials commonly used at these facilities include cleaning solutions, welding gases, defoamers, and deflocculants for pre-treating their industrial waste streams. In addition, most line maintenance facilities have underground storage tanks for motor vehicle fuel./5/

Five rental car companies maintain operations at SFIA: Avis, Budget, Hertz, National and Dollar. As the operations at these facilities are limited to basic car maintenance and car washing, the hazardous materials stored consist of only car wash cleaners, stored above-ground and unleaded gasoline, new oil and waste oil, in underground storage tanks./6/

Airport Regulation of Hazardous Material Use

Following the lead of the Business Plan Act, the Airport has instituted a similar program as part of the Airport tenant regulations. All airport tenants who wish to store hazardous material at any one time equal to at least 500 pounds for solids, 55 gallons for liquids or 200 cubic feet for compressed gases are required to apply for a Hazardous Materials permit and submit a Business Plan to the Airport. Included in the application for the permit must be a Hazardous Materials Disclosure form, Material Safety Data Sheets, an Emergency Response Plan and a Business Map. After receipt of a completed application, inspections of the premises are conducted by the Airports Commission Safety and Fire Departments. The items checked include the construction, suitability, and condition of storage and use facilities, labeling of hazardous materials, organization of storage and suitability, and condition of emergency and spill equipment. A permit is then issued if no violations are identified. Permits are valid for one year, at which time inspections occur again for renewal of the permit. The tenant regulations include specific instructions for reporting unauthorized releases of hazardous materials./7/

The SFIA and the Director of Health Services, San Mateo County, have an agreement regarding the submission of Business Plans. The protocol for implementing both the San Mateo County and SFIA hazardous material inventory, control, and response programs is that business plans are to be submitted to SFIA's Facilities, Operations and Maintenance office for review first. In turn, the Airport files the business plans with the County of San Mateo for review. In addition, representatives from both the Airport and San Mateo County conduct inspections in concert as needed. The Business Plan Act was passed in 1985; thus, the hazardous material permitting program at the Airport is relatively new and has not yet been instituted fully. The Airport has not yet received Business Plans from all of the tenants./8/

The SFIA Fire Department also regulates the storage of hazardous materials. In enforcement of National Fire Protection Association standards and San Francisco Fire Code regulations, the Fire Department conducts regular inspections of facilities for proper handling of hazardous materials. Terminal areas are inspected on a monthly basis, while all other facilities, airport and tenant, are inspected yearly. Violations are issued if hazardous materials are found to be handled improperly. When a violation is issued, a Fire Department inspector will stay until the problem is abated, or the violator will be given up to fifteen days to comply with regulations, at which time the facility will be inspected again for compliance./9/

SFIA Airport-owned facilities have received three citations from Cal/OSHA in the past three years, none of which pertained to the use of hazardous materials. Two citations were issued for improper guarding of machinery. The Airport has purchased and installed the appropriate protective equipment for these machines. The third citation was issued for the inability to produce required heating, ventilating and air-conditioning (HVAC) maintenance and inspection records at the time of the Cal/OSHA visit. These records were later found and the citation abated./10/

FUELS AT SFIA

Motor Vehicle and Generator Fuel Storage

Petroleum fuels are needed for ground service vehicles and for power generators at both Airport-owned and tenant-owned facilities. All underground storage tanks have valid permits from the County of San Mateo. All underground and above-ground tanks must be reported to the Airport Fire Marshal. Appendix F (Tables F-1 and F-2, pp. A.158-159) includes a list of all Airport-owned underground and above-ground storage tanks and their location, capacity, contents and age.

The storage of hazardous materials in underground tanks by tenants is monitored by the Facilities, Operations and Maintenance Division's (FOM) Quality Control Department, in compliance with applicable laws and regulations. As part of the tenant regulations, all storage of hazardous materials in underground tanks must be permitted by the FOM. A permit is not issued unless the applicant demonstrates to the FOM and the Airport Fire Marshal, by the submittal of drawings specifications and other information, that the design and proposed construction of the underground tank is suitable for hazardous-substance storage. All tanks must have an adequate monitoring plan. All tanks are required to have both primary and secondary levels of containment, overflow protection, and monitoring systems. Permittees must carry out maintenance, ordinary upkeep, and minor repairs in accordance with the provisions of the Tenant Improvement Guide, as well as obtain closure permits for any tank closure. Response plans to indicate the procedure for determining, confirming and containing unauthorized releases of hazardous substances must be prepared for all tanks./11/ The ● Airport instituted the tank permit program in 1985. Appendix F includes a list of all tenant-owned underground storage tanks and their location, capacity, contents, Airport I.D., construction material and installation year. Above-ground storage tanks are not yet as strictly regulated by the government as underground tanks have been, although secondary containment is required. Therefore, the Airport has not instituted a monitoring program for them at this time.

Aviation Fuel Storage and Distribution

Aviation fuel is stored at the Airport in the bulk fuel storage tanks in the North Field area and in smaller day storage tanks in the South Field area. Most aircraft at the

Airport are refueled from a hydrant system, as it is safer than transporting fuel by tanker truck. Fuel from the bulk storage tanks is distributed by pipeline directly to hydrants in the terminal area. Smaller aircraft are refueled by tanker trucks that use the day storage tanks. Because of the recent decrease in use of the day storage tanks, the Airport has decided to remove the tanks. For a complete description of the fuel distribution system, see Section III.E. Energy, pp. 178-79.

The Airport regulates the distribution of jet fuel by requiring the owners of the pipelines to perform pressure tests yearly and file the results with the Quality Control department of SFIA's Facilities, Operations and Maintenance Division. In addition, oil companies are required to monitor for fuel leaks through inventory reconciliation./12/ Chevron, the major supplier and distributor of fuel at the Airport, performs daily pressure checks of the distribution lines in the early morning hours when traffic is light. In addition, the entire system is locked and tested once per month./13/ The individual airlines own the portions of the fuel distribution lines extending to their terminal areas and conduct yearly checks of the hydrant systems.

Fuel Spills

As a means of complying with Federal regulations, all spills of petroleum products that have a potential of reaching waterways and are of sufficient volume to create a visible sheen on the water must be reported to the Airport Authority and the U.S. Coast Guard. A discharge of oil or hazardous substance, (i.e. jet fuel, gasoline) is classified as a spill when the material enters a navigable waterway. A discharge that is contained and does not reach a navigable waterway is not considered a spill under by EPA reporting requirements.

SFIA has established emergency response procedures in the event of any fuel spill, to prevent contamination of water. All fuel spills must be reported to the Airport Communications Department immediately. The Airport then notifies the Fire Department, Water Quality Control and the Safety Office, all of which report to the scene. The first priority is to prevent the fuel from entering the storm drains or any other waterway access. This is accomplished through the use of drain plugs and dikes to eliminate fuel spreading. Spill carts with various spill clean-up and containment supplies are located in the terminal areas. Emergency shut-off switches that can stop the flow of fuel to the entire boarding area in the case of an emergency, such as hydrant pipeline puncture, are located around the periphery of each boarding area. This shut-off system is tested on a monthly basis to assure it is in working order.

In the event that fuel from a spill does reach a storm drain, the industrial wastewater plant is notified. Usually, the fuel-contaminated water can be held at some point in the system by shutting off that section of pipeline. The fuel then can be skimmed off the surface at one of several system-access locations.

In order to minimize the discharge of pollutants into the Bay from the drainage pump stations, oil skimmers have been installed upstream from the drainage pump stations. In the event that a spill occurs which cannot be contained in a retention pond, or occurs on the outer portions of the runways where drainage does not flow to the ponds, the fuel can be recovered from catch basins before reaching the Bay. Contaminated drainage can be held in the catch basins by interrupting the operation of pumps. As a preventive measure, wet well sumps and channels are inspected daily by Airport Stationary Engineers to record pump activities. As required by the Airport's National Pollutant Discharge Elimination System (NPDES) permit, the effluent from drainage stations is monitored monthly.

Airport Airfield Safety Officers (on duty 24 hours a day) have been trained in water-pollution abatement activities and patrol the gate positions, aprons, ramps, taxiways, and runways for water-pollution problems. Citations are issued to alert airline management of a problem and prevent recurrence.

Relatively small fuel spills that occur during aircraft refueling are not uncommon and do not require reports to regulatory agencies. Spills often are the result of a malfunction of the shut-off valve, faulty gauges or operator error. These spills occur about seven to nine times per month and each results in ten to twenty gallons of fuel loss. These spills occur on a tarred surface and are relatively easily contained. After the spill is contained, the fuel on the tarred surface is collected with absorbent material, becoming hazardous waste. These types of fuel spills are relatively minor and are usually cleaned up by the time the Safety Office and Water Quality Control representatives arrive at the scene as it is in the best interest of the airline to continue with service as soon as possible. These spills do not have to be reported to the County, the Regional Water Quality Control Board (RWQCB) or the FAA./14/

In the event of a larger release of fuel, the FAA Regional Office, the Coast Guard and IT Corporation are notified immediately. IT Corporation performs large-scale clean-ups for the Airport. In addition, the California Office of Emergency Services, RWQCB, San Mateo County Health Department and State Fire Marshal are notified.

Two relatively large fuel spills have occurred in the past few years at SFIA. On February 5, 1990, diesel fuel was discovered floating on the water at a drainage pump station during a routine sampling. The fuel was found to have been coming from the FAA Air Landing Strip (ALS) facility where an underground diesel fuel storage tank system used to supply power for the runway lights had malfunctioned, causing a spill. The spilled fuel mixed with rainwater and flowed to the storm catch basin. The estimated quantity of fuel released was 1,500 gallons.

IT Corporation, brought in to clean up the spill, recovered approximately 1,300 gallons of the spilled fuel in liquid form by vacuuming the affected areas; absorbent was used to collect additional material. In order to contain the spill, all the pumps at the drainage station were shut off to prevent the diesel fuel from flowing to the Bay. Contaminated soil was excavated and disposed of at an approved dump site. All appropriate agencies were notified of the spill./15/

On November 18, 1988, a pipeline rupture occurred at SFIA, releasing approximately 83,000 gallons of jet fuel. The rupture occurred when a roto-tiller cut into a buried aircraft fuel line during an excavation. The pre-defined emergency contingency plan was implemented; it included emergency closure of appropriate valves and sounding of alarms to summon Airport emergency units including the Fire Department, Environmental Control and the Airfield Safety Officers.

The jet fuel itself was diverted to a retention pond for recovery and/or treatment at the industrial waste treatment plant. Absorbent material and cleaning chemicals were used to clean up the remaining spill. Some soil and other materials were contaminated; those materials were removed from the area in consultation with the RWQCB, and disposed of at an appropriate landfill.

In order to prevent this type of accident from happening again, the Airport has requested fuel companies to provide it with current accurate locations of all lines, which will be maintained on an electronic geographic information system (GIS). In addition, the Airport requires hand exploratory excavation for existing utilities before heavy machinery is used, and continues to require that emergency contingency plans be walked through prior to the start of construction./16/

HAZARDOUS WASTE GENERATION

Airport operations generate hazardous wastes, primarily in relation to maintenance activities. Two types of wastes are generated: hazardous waste produced from ongoing operations, such as used motor oil and spent cleaning solvents, and wastes produced as part of the remediations of accidental spills, such as a fuel leak.

- Copies of Hazardous Waste Manifests are collected by the California Department of Toxic Substance Control's Manifest Unit, which compiles annual waste volumes by waste category into what are known as the Tanner Lists. Table 19A, "1990 Hazardous Waste Generation By SFIA and Tenants," summarizes these data for SFIA facilities. The volume of waste generated at the Airport in 1990 may be indicative of a typical year, but individual wastestreams could vary widely from year to year. Asbestos-containing waste and contaminated soil from site clean-ups are especially unpredictable. Generally, when asbestos is removed from a source, it is unnecessary to remove it from the same location again. Some generators, such as Budget Rent-a-Car and Hilton Hotels, may not create waste on an ongoing basis, because they have received "one-time-only" EPA generator numbers. One-time-only wastestreams are identified in the footnotes of Table 19A.

<u>Airport Facilities</u>

- Nearly all (97 percent) of the hazardous waste generated by SFIA in 1990 contained asbestos, presumably from asbestos removal projects. The rest of SFIA's hazardous waste was produced by the Airport maintenance shops and the water quality lab.

- Every year, approximately 3.5 tons of hazardous waste are shipped, consisting mainly of waste solvents and a small amount of waste from the water quality lab. Waste oil and waste antifreeze (ethylene glycol) are recycled. A solvent distillation system has been purchased and is being installed at the Airport Maintenance base. The system will recycle waste solvents, leaving only a sludge left to be shipped as hazardous waste.

<u>Tenant Facilities</u>

Hazardous wastes produced by tenants are not closely monitored by the Airport. The tenant is responsible for the proper removal and disposal of its manifested wastes.

The Airport requests copies of hazardous waste manifests from tenants for all shipments of fuel-spill-related hazardous wastes (such as contaminated soil) transported from SFIA. However, not all tenants have complied with the request. In addition, the Airport has recently requested each tenant to submit copies of all waste manifests for all hazardous wastes transported off airport property. As this program has been instituted recently, few manifests have been submitted./7/

The United Airlines Maintenance Center produces the greatest amount of manifested wastes, including solvents, methylene chloride (paint stripper), plating wastes (nickel, cadmium, copper, hexavalent chromium, and cyanides), acids and hydroxides./4/ Common wastes produced by the line maintenance operations include solvents, waste oils, paint sludges, ethylene glycol, and rust-contaminated gasoline./18/ Occasionally, these facilities must dispose of fuel-contaminated soil and absorbent material from spills. As shown in Table 19A, United Airlines generated approximately 3,600 tons of hazardous waste in 1990. The bulk of the waste from Trans World Airlines, American Airlines, and Delta Airlines is related to oil, but otherwise their wastes are similar to those of United Airlines line maintenance operations.

The car rental agencies produce ongoing hazardous waste in the form of used oil and other wastes used for vehicle tuneups and minor vehicle repair, and occasionally need to dispose of contaminated soils resulting from fuel tank leaks./6/ Fuel suppliers generate volumes of waste similar to the car rental agencies. Hazardous waste generated by the U.S. Coast Guard Air Station, the U.S. Postal Service, and Aircraft Service International are minor (less than 0.03 percent of the total waste generated).

INDUSTRIAL WASTEWATER TREATMENT

Industrial wastewater is collected and treated at SFIA at an independent treatment plant located in the North Field area. The industrial wastewater treatment plant receives wastewater from aircraft service, maintenance, and washing; ground-vehicle service and maintenance; rental-car service; and surface runoff from aircraft-washing areas and polluted portions of aircraft ramps and maintenance areas.

Seventy-five percent of the total wastewater flow to the plant originates from the United Airlines Maintenance Center./19/ The operations at the United Airlines Maintenance Center include aircraft washing, parts cleaning, paint stripping, electroplating, laundry activities and cell testing. The generated wastewater contains heavy metals, solvents and detergents. UAL operates its own pretreatment facility for its industrial waste and submits monthly reports to the Airport. None of the other maintenance shops or car washes have pretreatment facilities, but the majority of them have oil and grease separators./20/

● TABLE 19A: 1990 HAZARDOUS WASTE GENERATION BY SFIA AND TENANTS

Generator /a/	Waste Category /b/	Volume (tons)	Total Volume (tons)
United Airlines	Alkaline solution (pH>=12.5) with heavy metals	16.12	3608.45
	Aqueous solution with <10% organic residues	1516.44	
	Asbestos-containing waste /c/	256.96	
	Other inorganic solid waste	116.03	
	Halogenated solvents	406.96	
	Oxygenated solvents	207.21	
	Hydrocarbon solvents	70.65	
	Unspecified solvent mixture	284.97	
	Waste oil and mixed oil	216.06	
	Off-specification, aged, or surplus organics	5.45	
	Organic solids with halogens	109.36	
	Other organic solids	17.71	
	Unspecified sludge waste	3.47	
	Contaminated soil from site clean-ups /c/	8.20	
	Liquids with halogenated organic compounds >=1000 mg/l	15.98	
	Solids or sludges with halogenated organic compounds >=1000 mg/l	35.88	
	Not reported	321.00	
Trans World Airlines	Halogenated solvents	0.20	316.62
	Oxygenated solvents	0.39	
	Hydrocarbon solvents	0.20	
	Waste oil and mixed oil	5.80	
	Oil/water separation sludge	1.66	
	Unspecified oil-containing waste	212.97	
	Organic liquids (nonsolvents) with halogens	0.41	
	Unspecified organic liquid mixture	0.77	
	Other organic solids	1.20	
	Contaminated soil from site clean-ups /c/	93.02	

(Continued)

● TABLE 19A: 1990 HAZARDOUS WASTE GENERATION BY SFIA AND TENANTS
(Continued)

Generator /a/	Waste Category /b/	Volume (tons)	Total Volume (tons)
American Airlines	Alkaline solution (pH>=12.5) without heavy metals	0.20	149.70
	Unspecified alkaline solution	0.29	
	Asbestos-containing waste /c/	0.84	
	Unspecified solvent mixture	8.00	
	Waste oil and mixed oil	81.70	
	Organic monomer waste	1.34	
	Other organic solids	1.35	
	Other empty containers >=30 gal.	0.50	
	Contaminated soil from site clean-ups /c/	1.20	
	(Acidic) Liquids with pH <=2	0.20	
	Not reported	54.08	
SFIA	Asbestos-containing waste /c/	123.02	126.60
	Halogenated solvents	0.20	
	Hydrocarbon solvents	1.85	
	Unspecified solvent mixture	0.20	
	Waste oil and mixed oil	0.83	
	Other empty containers >=30 gal.	0.50	
Chevron USA	Unspecified oil-containing waste	3.32	24.20
	Other empty containers >=30 gal.	2.00	
	Contaminated soil from site clean-ups /c/	18.53	
	Liquids with polychlorinated biphenyls (PCBs) >=50 mg/l /d/	0.35	
Shell Oil	Other inorganic solid waste	15.92	21.93
	Tank bottom waste	0.50	
	Unspecified organic liquid mixture	1.37	
	Other organic solids	0.02	
	Unspecified sludge waste	3.90	
	Detergent and soap	0.22	

(Continued)

● TABLE 19A: 1990 HAZARDOUS WASTE GENERATION BY SFIA AND TENANTS (Continued)

Generator /a/	Waste Category /b/	Volume (tons)	Total Volume (tons)
Hertz Rent-A-Car	Waste oil and mixed oil	0.18	11.43
	Tank bottom waste	11.25	
Delta Airlines	Oxygenated solvents	0.22	10.80
	Unspecified solvent mixture	0.68	
	Waste oil and mixed oil	9.90	
Budget Rent-A-Car	Tank bottom waste /d/	5.42	6.26
	Gas scrubber waste /d/	0.84	
U.S. Coast Guard Air Station	Oxygenated solvents	0.18	0.88
	Hydrocarbon solvents	0.18	
	Off-specification, aged, or surplus organics	0.02	
	Organic liquids with metals	0.16	
	Not reported	0.34	
Hilton Hotels	Hydrocarbon solvents /d/	0.22	0.22
U.S. Postal Service Airport Mail Facility	Unspecified solvent mixture	0.22	0.22
Aircraft Service International	Oxygenated solvents	0.12	0.12

NOTES:

/a/ Some users generate hazardous wastes at two or more Airport locations separated by public roadways; therefore, they are required to have more than one EPA generator number. Their wastes are separated by EPA generator number on the Tanner Lists, but they have been combined in this table.

/b/ Waste categories are defined by the State of California (CCR, Title 22).

/c/ Some waste streams, such as asbestos and contaminated soils, are usually generated as part of a specific project, and annual volumes of these wastes may be inconsistent from year to year.

/d/ This material was disposed of under a one-time-only EPA generator number.

SOURCE: California Department of Toxic Substance Control, Manifest Unit, Hazardous Waste Information System, 1990.

The treatment of industrial wastewater at the plant consists of preliminary, primary, and secondary treatment, and a disinfection step. Initially, wastewaters are held in an equalization tank, which provides mixing and detention time to avoid fluctuations in flow quality and quantity. Primary treatment consists of the addition of caustic to adjust the pH, and alum to induce coagulation of suspended solids. Then wastewater flows into one of two dissolved-air flotation units where flocculated (fine suspended particles aggregated into a mass) solids float to the top and can be skimmed off. Following pH adjustment, wastewater is pumped through a trickling filter for secondary biological treatment. Finally, the effluent is disinfected by the addition of chlorine. For a complete description of the industrial wastewater system, see Section III.J. Utilities, p. 232.

The Airport currently operates twelve sludge drying beds serving both the sanitary and industrial wastewater plants. The dry sludge is disposed of at Ox Mountain Class III sanitary landfill in San Mateo County. The sludge is sampled and tested four times per year for heavy metals and priority pollutants to assure that it can be disposed of legally at a Class III landfill.

Wastewater treatment plant discharges to San Francisco Bay are regulated by the San Francisco Bay RWQCB, which sets and enforces discharge limitations through NPDES permits. The Airport's current NPDES permit for the industrial wastewater treatment plant was issued in September, 1987. The NPDES permit includes a self-monitoring program defining sampling frequencies for influent, effluent, receiving waters, land observations and overflows and bypasses.

As part of its NPDES permit requirements, the Airport has instituted an industrial and domestic waste monitoring program for its tenants as part of the Tenant Improvement Guide. The Airport has set concentration limits for various constituents of the waste stream. If the wastewater from a specific facility does not meet the prescribed standards, those substances in violation must be removed by some other means, such as a pre-treatment facility, which must be permitted by the Airport and monitored monthly.

As part of the waste-monitoring program, the Airport reserves the right to test samples from the tenant's sewer or storm drain. Any violation discovered as a result is reported to the tenant and must be remediated by the tenant. Accidental discharges must be reported to the Airport immediately so that countermeasures may be taken to minimize damage to the sewer system, treatment plant, treatment processes or receiving waters.

Some stormwater runoff also is handled by the industrial wastewater treatment plant. ● Stormwater runoff and its handling are discussed in Section III.J. Utilities, pp. 233-35.

The Airport submits to the RWQCB monthly monitoring reports on influent and effluent quality. In general, both water treatment plants at the airport have been in compliance with their NPDES permits over the past several years, although recent violations of NPDES levels for heavy metals have occurred. In response, United Airlines Maintenance Center, as the only base maintenance facility and principal contributor to the plant, has proposed the installation of an additional pre-treatment facility at its Maintenance Center. Nevertheless, RWQCB is considering issuing its own enforcement order to the Airport. UAL plans to run a pilot program with an additional treatment facility, to determine if additional treatment will solve the problem./21/

SOIL/GROUNDWATER CONTAMINATION

Research Methods

The information presented below was compiled from data available from public agencies. On the basis of the public agency records, the current or past presence of soil or groundwater contamination in the Project Area was inferred. For the purposes of this report, past and current owners and occupants of Project Area property were not consulted, nor were soil or groundwater samples collected. Thus, while the information presented below is indicative of the types and possible impacts associated with soil and groundwater contamination, it does not mean that only those sites discussed below are contaminated (nor does it mean that the contaminants discussed are the sole hazardous-material problems at a particular site). In addition, because public agency records are sometimes incomplete, it is possible that remediation of the environmental contamination reported below has already occurred at one or more sites.

Areas of known soil and groundwater contamination exist at the Airport. Aircraft- and motor-vehicle fuel leaks are the cause of most of the contamination at the Airport. The contents of leaking underground storage tanks and pipelines can migrate through soil, and may contaminate groundwater as well. Sixty-eight groundwater monitoring wells have been installed at the Airport in areas of Airport underground storage tanks and along the perimeter of the Airport. Groundwater samples are tested for petroleum hydrocarbon concentrations at least three times per year. The tests have been performed since 1987.

The summaries of contaminated areas below were made from review of data contained in state and local regulatory agency databases and files, and through discussions with regulatory agency personnel.

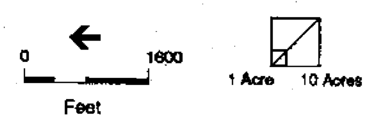
<u>Areas with Identified Contamination</u>

Areas with identified contamination are described below and shown in Figure 24. Each area is identified by a letter that corresponds to the area's location in Figure 24.

Hertz (A)

In 1986, during an excavation for the installation of two 12,000-gallon storage tanks, gasoline contamination was discovered in soil at the Hertz Car Rental facility. Contaminated soil was excavated at that point. Later that year, the two older tanks that were the cause of the contamination were removed, leading to the discovery that the soil and groundwater below were contaminated. In 1988, monitoring showed continuing contamination, which caused an investigation of the extent of contamination. The extent of contamination appeared to be restricted to within twenty feet of the underground tanks. Quarterly monitoring was performed and results were submitted to the RWQCB and San Mateo County to confirm contamination. Remedial action was taken to remove the floating product from the groundwater in the vicinity of the tanks. Groundwater at the site continues to be monitored and remediated; floating product continues to be removed./22,23,24/

A Hertz
B National Car Rental
C Avis
D Pan Am
E TWA Hangar
F TWA Terminal Area
G USCG Facility
H Flying Tigers
I Chevron Fuel Farm
J UAL Maintenance Center
K North and South Oxidation Ponds



SOURCE: Environmental Science Associates, Inc.

San Francisco International Airport

Figure 24
Area of Known Contamination

National Car Rental (B)

In March 1988, an unauthorized fuel release was reported to the RWQCB by National Car Rental. Sampling of a monitoring well at the site revealed contamination of the groundwater. Semi-annual reports have been submitted since 1988 and still reveal levels of petroleum hydrocarbons above state standards./22/

Avis (C)

In 1986, soil contaminated with gasoline hydrocarbons was revealed during excavation for a new tank. Monitoring reports of groundwater through 1987 showed a relatively thin film of gasoline. Avis is still in the process of cleaning up this contamination./23/

Pan Am Hangar (D)

Four underground storage tanks were removed from the Pan Am Service Center in July, 1986. During excavation, both the soil and groundwater were found to be contaminated by petroleum hydrocarbons. Monitoring wells were installed to determine the extent of contamination. Pan Am has not completed clean-up of this site and no clean-up activities are currently being undertaken. Semi-annual status reports are being submitted to the RWQCB and the County of San Mateo./22/ The San Mateo County Department of Health Services and the RWQCB are working together to hasten the clean-up of contaminated areas. These agencies and SFIA are working on a clean-up agreement./25/

TWA Hangar (E)

A tank removal in 1986 at the TWA maintenance facility revealed an area of contaminated soil, which was excavated and transported to a Class I (hazardous waste) treatment, storage and disposal facility./23/

TWA Terminal Area (F)

During the early part of 1990, inventory reports at Shell Oil, an oil distributor at the Airport, indicated an unexplained loss of fuel from an underground pipeline, but the exact location of the leak was not determined readily. After a number of incidences of fuel leaking up to the surface, the leak was located. Shell estimated the loss to be 8,200 gallons. Approximately 6,000 gallons were recovered through excavation, leaving 2,200 gallons yet to be recovered. The contamination is believed to be limited to the concrete. No groundwater contamination as a result of this leak has been detected, but contamination may be discovered in the future./23,25/

U.S. Coast Guard Facility (G)

Two fuel leaks have been reported at the U.S. Coast Guard facility. One tank was removed in 1987 and groundwater monitoring is being conducted at this site. The other tank was removed in 1989. No monitoring of the second site has begun. The County of San Mateo has formally informed the U.S. Coast Guard of the latter's responsibilities for investigation and clean-up of this site. /22/

In the fall of 1990, 17,000 gallons of jet fuel were released at the U.S. Coast Guard facility. The majority of the spilled fuel was recovered because the spill occurred on a paved area, but some fuel ran into the sewer system. The sewer line was closed and this fuel was recovered before it reached the treatment plant. The spill came in contact with an unprotected soil area (of about 500 square feet). Soil sampling has been performed under the oversight of the County of San Mateo to determine the extent of contamination./25/

Flying Tigers (H)

During excavation for a 1986 tank installation, initial groundwater monitoring results indicated that the water contained levels of benzene, toluene and xylene. Further investigation revealed that initial test results were incorrect and the contamination was limited. No further work was required by the San Mateo County Office of Environmental Health./22/

Chevron Tank Farm (I)

There is known hazardous waste contamination in the area of the bulk fuel storage facility./26/

United Airlines Maintenance Center (J)

The United Airlines Maintenance Center appears on the RWQCB Fuel Leaks List. Soil remediation is in process, according to the Airport./26/

North and South Oxidation Ponds (K)

Prior to construction of the Industrial Wastewater Treatment Plant in 1980, industrial wastewaters were transported through ditches to the north and south oxidation ponds, where the wastewater was treated by evaporation. Nothing has been done with the ponds since their deactivation in 1980 and the Airport has no future plans for them.

Other Sites with Reported Contamination

The RWQCB compiles a list of all reported cases of fuel leaks. Included on this list, in addition to selected cases above, are leak reports for these other airport facilities: Chevron, and Unocal. However, further information on these sites was not available./22/ For the purposes of this report, it will be assumed that soil and groundwater contamination may be present at each of these sites.

Other Potential Sources of Contamination at the Airport

To evaluate the potential for contamination of the development sites at the Airport, the previous land use must be considered. The above sites of known contamination are all the result of fuel leakage. However, some of the facilities at the Airport, especially the maintenance facilities, also store hazardous materials other than fuel. There is the potential for site contamination through misuse of these materials or mishandling of hazardous wastes generated by their use. The RWQCB maintains a list of sites, called the North Bay Toxics List, known to have elevated levels of contaminants in soil or groundwater, other than those resulting from fuel leaks. The most recent available North Bay Toxics List (January, 1990) did not include any sites on or around the Airport property. However, it is still possible that past hazardous-material uses, especially around airport maintenance and washing areas, may have caused unidentified soil or groundwater contamination.

Underground storage tanks located at the Airport, listed in Appendix F, Tables F-1 and F-3, pp. A.158 and A.159, are a potential source of soil and groundwater contamination. Recent federal and state law requires upgrading of tank containment and installation of leak detection systems in a phased process that will require a number of years to complete. Unidentified fuel leaks, which will become less likely as new laws are implemented, have the potential to contaminate soil and groundwater in the area. In addition to the sites listed above, one potential source of contamination to the soil and/or groundwater (not identified through review of agency files) that may apply to the parts of the Airport closer to the present shoreline is the underlining heterogeneous fill. The area to the east of the 1880 levee line can be considered artificial fill (see Section III.G. Geology and Seismicity, Figure 22, p. 193). The exact quality of the fill is unknown. In addition to sand materials, other materials such as bricks, bottles, wood and unspecified refuse may have been used. The presence of such materials may be associated with elevated levels of organic and inorganic contaminants, as they have been found in other filled areas around the Bay.

BUILDING MATERIALS

Polychlorinated Biphenyls

A common hazard in older buildings is electrical equipment that contains polychlorinated biphenyls (PCBs). In response to the Toxic Substances Control Act, the Airport removed all PCB-containing equipment from all City-owned buildings as of early 1987. All tenant-owned PCB-containing equipment complies with the current concentration regulations for PCB content. The Airport has records of the locations of all PCB-containing equipment and its PCB concentrations./27/

Asbestos

Limited asbestos surveys have been conducted by the Airport over the past two to three years. In compliance with Division 20, Section 25915 of the California Health and Safety Code, the Airport has prepared an asbestos notification, disclosing all areas where asbestos has been detected. All employees who work in any of the identified areas, and any contractor expected to do work in those areas, have received the notification. The Airport plans to conduct a more thorough asbestos survey of Airport facilities in the near future./8/

The South Terminal received internal damage as a result of the October, 1989 earthquake. Asbestos had been found previously in the South Terminal in materials such as spray fireproofing and pipe lagging. Because of the damage produced by the earthquake, much of the asbestos-containing material previously encapsulated was exposed, allowing the possible release of asbestos fibers. The Airport contracted an abatement company to remove or encapsulate the exposed asbestos-containing material.

In response to concern about asbestos, the Airport is in the process of implementing an asbestos policy and abatement program with the goal of limiting asbestos exposure at the Airport. The Safety Office is responsible for maintaining the asbestos notification program at the Airport. Its duties include maintaining all records pertaining to asbestos, training other departments on request and ensuring that appropriate tenants, employees and contractors receive asbestos notifications. The employee procedures for renovation limit the maintenance and routine operations Airport employees can perform on asbestos-containing materials. The Airport supplies personal protective equipment and special training necessary for asbestos operations. All renovations, demolition and construction must be reviewed by the Safety Office to determine if there is asbestos in the area. Asbestos surveys may be required, and depending on the extent of the renovation, an industrial hygienist may be hired by the project manager to ensure that asbestos specifications are followed. Asbestos policy procedures appear in the *SFIA Employees Procedures and Practices Manual.*

In addition, all tenants are required to submit a disclosure of all known asbestos-containing construction material within their buildings. Notification must also be sent to the employees of the tenant, and warning must be posted.

Air Toxics

The Air Toxics "Hot Spots" Information and Assessment Act of 1987 (AB 2588) requires that a number of permitted air pollution sources, including all larger Publicly Owned Treatment Works (POTWs) in the San Francisco Area prepare and submit to the Bay Area Air Quality Management District (BAAQMD) an emission inventory. AB 2588 requires each POTW to prepare an inventory plan and source test data for its emissions. The BAAQMD then categorizes the facilities as high, medium or low priority, depending on the amount of hazardous materials released from the facility, the toxicity of the substances, the proximity of the facility to potential receptors, and other factors that the BAAQMD judges to be important.

Each facility conducts source tests that have been pre-approved by the BAAQMD. Emissions for the contaminants are then grouped as carcinogens and non-carcinogens. A final total score is finally obtained after a series of calculations. This is the score upon which the facilities are prioritized. As noted above, rankings of high, medium and low priorities are given to the facilities. A high-priority facility is not necessarily a high-risk facility. Only upon completion of a risk assessment will the risks posed by a high-priority facility be characterized accurately. Low-priority facilities are considered, within the limits of current data, to be low-risk facilities.

SFIA submitted its Emission Inventory Report to the BAAQMD in June, 1990. Source testing was performed at the Industrial Wastewater Treatment Plant, the Water Quality Control Plant, and the Central Plant. The total scores calculated from the source data placed the Airport in the category of low priority./28/ No further action has been required of the Airport due to their low priority rating, as the BAAQMD is addressing only those facilities with high risk emissions rates at this time.

NOTES - Hazardous Materials

/1/ Facilities, Operations and Maintenance Division, SFIA, *SFIA Hazardous Materials Release and Response Plan*, June 1, 1989.

/2/ Lack, Richard, Safety Officer, Facilities, Operations and Maintenance Division, SFIA, personal communication, July 3, 1990.

/3/ *SFIA Employee Safety Procedures and Practices Manual*, Airports Commission, City and County of San Francisco.

/4/ *United Airlines Maintenance Center Hazardous Material Business Plan*, 1989. Hazardous materials used at the UAL Maintenance Center were summarized from its Business Plan.

/5/ *TransWorld Airlines Hazardous Materials Business Plan*, 1988. TWA was chosen to represent a typical line maintenance facility at SFIA.

/6/ *National Car Rental Hazardous Materials Business Plan*, 1990. National Car Rental was chosen to represent a typical car rental agency at SFIA.

/7/ City and County of San Francisco, Airports Commission, *SFIA Tenant Improvement Guide*, Appendix F, Hazardous Material Release Response and Inventory Tenant Regulations, July 1, 1982 (revised).

/8/ Leong, Melvin, Assistant Deputy Director, Environmental Control Branch, Facilities, Operations and Maintenance Division, SFIA, conversation, July 12, 1990.

/9/ Pegueros, Manuel, Assistant Inspector, Fire Marshal, SFIA, telephone conversation, July 25, 1990.

/10/ Lack, Richard, Safety Officer, SFIA, telephone conversation, August 9, 1990.

/11/ City and County of San Francisco, Airports Commission, *SFIA Tenant Improvement Guide*, Appendix D, Storage of Hazardous Substances in Underground Tanks, July 1, 1982 (revised).

/12/ Henry, Vance, Quality Control, SFIA Facilities, Operations and Maintenance Division, conversation, August 8, 1990.

/13/ Anderson, Craig, Chevron Tank Farm, SFIA, telephone conversation, August 7, 1990.

/14/ Rodriguez, Mario, Sanitary Engineering Technician, SFIA Facilities, Operations and Maintenance Division, conversation, July 3, 1990.

/15/ SFIA Facilities, Operations and Maintenance Division, Environmental Control Section, SFIA, *Diesel Fuel Spill Recovery*, February 1990.

/16/ SFIA Facilities, Operations and Maintenance Division, Environmental Control Section, SFIA, *Jet Fuel Spill Recovery*, December, 1988.

/17/ Lack, Richard, Safety Officer, SFIA, telephone conversation, August 9, 1990.

/18/ Leong, Melvin, Assistant Deputy Director, Environmental Control Branch, Facilities, Operation and Maintenance Division, SFIA, telephone conversation, August 14, 1990.

/19/ SFIA Industrial Wastewater Treatment Plant, NPDES permit, September 21, 1987.

/20/ Lee, Russell, Environmental Control Branch, SFIA, conversation, July 18, 1990.

/21/ Jang, John, Inspector, Regional Water Quality Control Board, telephone conversation, July 25, 1990.

/22/ Regional Water Quality Control Board, Fuel Leaks List.

/23/ County of San Mateo, Environmental Health Services Division, Underground Storage Tank Files.

/24/ Vance, Henry, Quality Control SFIA Facilities, Operations and Maintenance Division, telephone conversation, April 19, 1991.

/25/ Montufar, Estuardo, Hazardous Materials Specialist, San Mateo County Department of Health Services, telephone conversation, January 15, 1991.

/26/ Costas, John, Planning and Construction, SFIA, letter, May 17, 1990.

/27/ Leong, Melvin, Assistant Deputy Director, Environmental Control Branch, SFIA Facilities, Operations and Maintenance Division, telephone conversation, August 7, 1990.

/28/ SFIA, *Emission Inventory Report*, June 13, 1990.

I. EMPLOYMENT AND RESIDENCE PATTERNS

SFIA EMPLOYMENT AND RESIDENCE PATTERNS

Approximately 33,400 persons, including 6,500 flight-crew personnel, were employed directly due to operations at SFIA in 1990./1,2/ This represents about 11 percent of the 303,600 jobs in San Mateo County./3/ The majority of the employees worked for the airlines as either flight crews or maintenance workers. United Air Lines' maintenance base at SFIA is the largest in the United States and employs over 6,000 maintenance and mechanic workers at SFIA. Total full-time equivalent employment at the maintenance base is approximately 11,500. The employment at SFIA falls into eight employment sector categories: airlines (includes flight crews, passenger service personnel, ramp/aircraft support personnel, ramp maintenance workers, fixed-base maintenance workers, and associated management personnel), government agencies (includes City and County of San Francisco Airport employees, U.S. Postal Service, U.S. Coast Guard, U.S. Customs, USDA, Dept. of Public Health and FAA employees), concessionaires and caterers, General Aviation and services, freight transportation (includes employees of freight airlines, freight forwarders, and trucking firms), ground transportation (includes rental car employees, limo and taxi drivers), Airport Hilton and construction and consulting. Estimates of the breakdown of employment among these categories are presented in Table 20.

The majority of these employees work at the Airport. However, some work in other locations during all or part of the day. Examples of those working part of the day off-site would include airline flight crews, who may be in the air or at another airport, and limo, van and taxi drivers who may be picking up or delivering passengers to sites outside the Airport. Examples of those working all day off-site would include passenger service ticket personnel who work in San Francisco.

SFIA employees live in all of the nine Bay Area counties./4/ The largest number of the workers live in San Mateo County (37.6%), followed by San Francisco (22.9%) and Alameda (12.7%) counties. The distribution of workers' place of residence is presented in Table 21, p. 230.

TABLE 20: SFIA EMPLOYMENT, 1990

Employment Sector	Number of Employees/a/
Airlines	22,400
Government Agencies	2,200
Concessionaires and Caterers	2,700
General Aviation and Services	700
Freight Transportation	2,000
Ground Transportation	2,000
Hotel	300
Construction and Consulting	900
TOTAL/b/	33,400

/a/ Based on "1987 Airport Economic Impact Study", Martin Associates, updated using 1990 activity projections from the *SFIA Final Draft Master Plan* and the SFIA proposed budget for FY 1990-91.
/b/ Total does not add due to rounding.

SOURCE: SFIA; Environmental Science Associates, Inc.

SECONDARY EMPLOYMENT

In addition to the direct airport-dependent employment, the operation of the airport creates indirect employment through firms that supply businesses at SFIA and travelers, and induced employment in various service and retail industries created by the spending of the direct and indirect employees. In a 1987 study, Martin Associates estimated that about 0.5 induced jobs are created for every direct SFIA job, and that about 4.3 indirect and induced jobs are created for every direct SFIA job due to expenditures by visitors to the Bay Area who arrive at SFIA./5,6/

TABLE 21: SFIA EMPLOYEES, PLACE OF RESIDENCE, 1990

County	Number of Employees/a/	Percent
San Mateo	12,550	37.6%
San Francisco	7,650	22.9%
Alameda	4,240	12.7%
Santa Clara	3,280	9.8%
Contra Costa	1,350	4.0%
Marin	1,220	3.7%
Solano	840	2.5%
Sonoma	630	1.9%
Napa	100	.3%
Other	1,510	4.5%
TOTAL	33,400	100.0%

/a/ Based on "1987 Airport Economic Impact Study", Martin Associates, updated using 1990 activity projections from the *SFIA Final Draft Master Plan* and the SFIA proposed budget for FY 1990-91.

SOURCE: SFIA; Environmental Science Associates, Inc.

NOTES - Employment and Residence Patterns

/1/ Estimated employment for 1990 is based on data from a 1987 employee survey conducted for the *1987 Airport Economic Impact Study*, Martin Associates, February 1988, updated to reflect changes in: airport flight operations, total passengers, international passengers, domestic cargo, international cargo, mail and terminal area, and supplemented by employment levels identified in the SFIA proposed budget for FY 1990-91.

/2/ San Francisco Airports Commission, *Proposed Budget: Fiscal Year 1990-91*, San Francisco, California, 1990.

/3/ Association of Bay Area Governments, *Projections - 90: Forecasts for the San Francisco Bay Area to the Year 2005*, Oakland, California, December 1989.

/4/ The residential distribution of employees is based on data from a 1987 employee survey conducted for the *1987 Airport Economic Impact Study*, Martin Associates, February 1988. Projections of 1990 residential distributions are calculated on the sub-employment-section level, i.e., fixed-based maintenance workers in 1990 are assumed to maintain the same geographical distribution as the fixed-based maintenance workers in 1987. Estimated employment for 1990 is based on data from the 1987 employee survey updated to reflect changes in: airport flight operations, total passengers, international passengers, domestic cargo, international cargo, mail and terminal area, and supplemented by employment levels identified in the SFIA proposed budget for FY 1990-91.

/5/ Martin Associates, *1987 Airport Economic Impact Study*, February 1988. The employment multiplier is specific for air transportation and was used in this analysis.

/6/ The secondary employment multiplier from the Association of Bay Area Governments "1982 Input-Output Model and Economic Multipliers for the San Francisco Bay Region: 1988 Update," Oakland, Calif., November 1988, does not identify a secondary employment multiplier specifically for the Air Transportation Sector and was not used in this report. ABAG's closest employment sector is a much broader "Transportation Services Sector" which includes: railroad transportation, water transportation, motor freight transportation, freight warehousing, local and suburban transit and interurban highway passenger transportation, travel agencies and the United State Postal Service. This multiplier was not used in this report.

J. UTILITIES

WATER

San Francisco International Airport (SFIA) is served by the San Francisco Water Department (SFWD). SFWD water is supplied from two sources: water transferred from Hetch Hetchy Reservoir in Yosemite National Park to the Crystal Springs and San Andreas Reservoirs in San Mateo County, and water collected from local runoff in reservoirs in San Mateo and Alameda Counties./1/ Currently, water rationing is in effect for all SFWD customers.

Water distribution to SFIA is supplied via two lines. The main supply is from a 24-inch steel pipe that connects to the 60-inch Sunset supply line and the 60-inch Crystal Springs line No. 2 west of the Bayshore Freeway. The 24-inch line then continues east-west under the freeway and San Felipe Avenue to the airport. The 60-inch lines are supplemented by a 12-inch branch that connects to the 44-inch San Andreas line and the 44-inch Crystal Springs line No. 1. An additional 24-inch steel pipe connects to the site south of the Hilton Hotel and runs east-west under the Bayshore Freeway to the San Francisco Water District's Millbrae yard and connects to the 60-inch Crystal Springs line No. 2 north of El Camino Real./2/

Water pressure at the airport is maintained at approximately 115 pounds per square inch. A booster pump station is used to maintain pressure in the north field area. A 300,000-gallon storage reservoir, also located in the north field area, is maintained for fire use. The United Airlines (UAL) Maintenance Center and the American Airlines superbay hangar maintain individual storage reservoirs.

Water consumption at the airport is estimated to be 1.7 million gallons per day (mgd) with a current maximum total water consumption during the yearly peak month of July of approximately two mgd. Currently, 68 percent of the water demand at SFIA is used by airport tenants. The remaining 32 percent is used by public facilities and airport administration./1/ Consumption during the peak month includes water for irrigation, sewage treatment, and systemwide leakage/3/. The current distribution of water usage is not anticipated to change at SFIA during the next ten years./4/ See, however, Section IV.J Utilities (Water) discussion of conservation methods.

WASTEWATER MANAGEMENT

SFIA owns and operates two separate wastewater collection and disposal systems./3/ One is maintained for sanitary sewage and one is maintained for industrial waste.

Sanitary Sewage Collection and Treatment

Sewage from all SFIA facilities and from aircraft is collected through a network of gravity-flow and forced-flow pipelines. A system of seven lift stations and seven sewage pump stations delivers sewage to the water quality control treatment plant in the north field area./2/

The SFIA-operated water quality control treatment plant separates all solids for drying in sludge beds and eventual removal from the site. The remaining fluids are aerobically treated, sanitized, and transported off site through a 20-inch pipeline under the north field access road to the 54-inch Joint Use Deep Water Outfall. The outfall pipeline is owned jointly by SFIA and the cities of South San Francisco and San Bruno. Burlingame and Millbrae both have rights to its use. The pipeline has a capacity of 60 mgd and current use is 30 mgd./3/

The sanitary sewer capacity is based on 100 percent of the water-system demand./5/ The present system is capable of treating a capacity of 2.2 mgd. At the present water consumption rate of 1.7 mgd, the sanitary sewer system operates at 77 percent capacity. The airport is required to have a National Pollution Discharge Elimination System (NPDES) permit for its sanitary sewage. The NPDES permit is administered by the State of California, through the Regional Water Quality Control Board, for the Environmental Protection Agency. Current federal regulations require that wastewater treatment plants be operated at 90 percent capacity or less.

Industrial Waste Treatment

The industrial waste collection system handles stormwater runoff and waste from industrial activities at SFIA. The collection system at SFIA has two components: treatment facilities and first-flush ponds. Airport-generated waste is collected by an independent system and treated by the industrial waste treatment plant. Six industrial-waste pump stations are utilized to transport industrial wastewater in force mains to the industrial-waste treatment plant in the north field area. Industrial wastewater at the Airport is produced mainly from aircraft maintenance services, car wash, and general cleaning functions. Hazardous and flammable industrial wastes are not discharged into the system and are disposed of off site./1,6/

The collection system consists of two first-flush ponds, pumping stations and their sewerlines. The purpose of the system is to collect and store the first portion of storm runoff from service and parking areas. The industrial waste collection system is designed with the capability of channeling most outside runoff to one location. One first-flush pond is located at the north end and one at the south end of the airfield. On the first flush from a storm, water from areas around the terminal gates drains into a canal leading to the ponds for collection and settlement. The retention ponds are used to prevent jet fuel oil and other industrial wastes from entering the Bay. The runoff from most of the Airport property is collected in the Old Bayshore canal (in the north field area) and the South Airport canal (in the south field area) before flowing into the ponds. Both the North and South First Flush Ponds are concrete lined along the sides and have a bay mud bottom, in compliance with Chapter 23, Section 2540 of the California Code of Regulations. Only at the outer part of the runways, where spills are relatively rare, does the storm water run directly into the Bay. Each drainage discharge station has a catch basin to collect flow. Pumping proceeds when these basins are full.

In dry weather, any flow will run through the Old Bayshore Canal and the South Airport canal to the North and South First Flush Ponds, respectively. From that point, the water is pumped through a pump station to the industrial-wastewater treatment plant.

In wet weather, the first flush is collected and stored in the pond to be pumped and treated at a later time. After the pond is full, the gate is closed. During a prolonged rain, additional runoff from the paved areas is considered generally free of pollutants as most pollutants are washed into the pond with the first flush. The additional runoff flows directly to a drainage station to be discharged to the Bay. The first-flush ponds can hold up to 4.25 million gallons of water and require approximately seven days to process the water through the industrial-waste treatment plant./3/ Routine maintenance is performed on the first-flush ponds and their components. The ponds are inspected regularly to assure they are in good working order. Canals are dredged and the valves and gates exercised regularly./6/

The industrial-wastewater treatment plant has a current capacity of 1.65 mgd and operates between 0.8 and 1.2 mgd depending upon whether water conservation control measures are in force, weather conditions, and aircraft schedules. Approximately 50 percent of the plant's average daily treatment is pavement storm-water runoff that is stored in the two first-flush ponds. The plant is operating between 50 percent and 75 percent capacity./7/

As with the sanitary sewage system, the industrial wastewater system must conform to the provisions of its NPDES permit. The permit sets limits on volume of discharge water and concentration of contaminants in the discharge water. In addition, the Airport must follow a self-monitoring program and report results of the testing to the RWQCB on a monthly basis.

In addition, recent federal regulations (November 1990) expanded the NPDES permitting authority of the RWQCB to include permitting of stormwater discharges to waters from industrial facilities and construction sites that disturb greater than five acres. These regulations are intended to control pollutants (i.e., heavy metals, suspended solids, coliform bacteria) that have degraded waters of the state when they are transported by stormwater runoff from residential, commercial and industrial areas. SFIA will have to abide by these new regulations for their stormwater discharges. The main component of the RWQCBs strategy is source identification, discharge characterization, establishment and operation of pollution controls and reduction activities, and implementing management and monitoring programs for stormwater discharge. SFIA plans to file a notice of intent to be covered under a General Permit for the San Francisco Bay Region (Region 2). SFIA has maintained a monitoring program for its stormwater discharge since 1968.

Solid Waste

The major activity centers at SFIA produce 50 to 100 tons of solid wastes each day. The four major activity centers that generate solid wastes include the passenger terminals; airfreight and airmail-handling facilities; aircraft service centers, and the United Airlines Maintenance Center. The aircraft service centers generally perform line or unscheduled maintenance, while the aircraft maintenance base provides full or scheduled maintenance. Full maintenance generates both solid and hazardous waste.

The Airport contracts with the South San Francisco Scavenger Company to provide solid-waste disposal service. Approximately ten percent of the waste generated is recycled. The remaining solid waste is transported to a transfer station at 180 Oyster Point in South San Francisco, approximately five miles from the airport. Solid waste generated within San Mateo County is disposed of at Ox Mountain Landfill in Half Moon Bay, owned and operated by Browning-Ferris industries.

Additional wastes are generated by other activities such as construction and demolition. Wood material, dirt, broken asphalt, and concrete are usually disposed of in an off-site sanitary landfill. Disposal depends upon the type of material, with some of the materials recycled for other uses./9/

NOTES - Utilities

/1/ SFIA, *Final Draft Master Plan*, Chapter 4.0., November, 1989.

/2/ SFIA, *Final Draft Master Plan*, Chapter 6.0., November, 1989.

/3/ Leong, Melvin M., Superintendent Water Quality Control Plant, San Francisco International Airport, meeting, July 24, 1990.

/4/ Landy, Ray, Project Director, DMJM, telephone conversations, August 9 and August 15, 1990.

/5/ An undefined percentage of daily SFIA water demand is used for irrigation and other nonpotable uses. For planning purposes, however, these uses have not been included and the analysis assumes that 100 percent of the water demand would affect the sanitary sewer system. SFIA, *Final Draft Master Plan*, Chapter 6.0, November, 1989.

/6/ SFIA Facilities Operations and Maintenance - Environmental Control, *First Flush Ponds - Management Plan*, March, 1988.

/7/ SFIA, *Final Draft Master Plan*, Chapter 10.0., November, 1989.

/8/ Leong, Melvin M., Superintendent Water Quality Control Plant, San Francisco International Airport, telephone conversation, June 21, 1991.

/9/ Uccelli, Stephanie, Partner, South San Francisco Scavenger Company, telephone conversation, August 23, 1990.

K. PUBLIC SERVICES

CRASH/FIRE/RESCUE

Crash/Fire/Rescue (CFR) operations include airport fire stations, training areas, and special purpose / VIP / emergency facilities. All require roadway and/or airside access as well as special security considerations./1/

The SFIA Fire Department is part of the San Francisco Fire Department. Currently, there are two CFR stations serving SFIA. Station No. 1, at the junction of Taxiways B and R and adjacent to Butler Aviation, is to the north of the passenger terminal complex. Adjacent to the east side of Station 1 is the CFR support building, which is used for storage of equipment required to maintain CFR operations. Station No. 2 is at the intersection of Runways 10L-28R and 1L-19R adjacent to the American Airlines superbay hangar. CFR also maintains the Building 1000 Contingency Facility, which serves as the current emergency response staging area. In addition to these facilities, CFR maintains a training facility between Plot 42 and the American Airlines superbay hangar for instruction in aircraft crash and rescue./2/

The September 1989 five-year SFIA Capital Projects Plan calls for the construction of a new CFR Station No. 2 approximately 500 feet to the northeast of existing Station No. 2 to reduce the facility's potential to interfere with navigational systems on the airfield. A siting study is currently under way to relocate this facility. As part of the SFIA Master Plan an approximately 15,000-square-foot multipurpose airport operations facility (called the Contingency Facility in the SFIA Capital Projects Plan) is planned to replace the existing Building 1000. The facility would be located on Plot 42 adjacent to Taxiway C for aircraft parking. Landside access would be provided via the realigned North Field access road. The new facility would be a multipurpose operations facility for emergency operations as well as a protected building area to process high-security SFIA arrvials. Additionally, the existing CFR support building would be relocated to the west side of CFR Station 1./3/

The SFIA Fire Department maintains an array of CFR vehicles specifically related to Airport firefighting requirements. Except for specialized equipment, the Department generally maintains one or two backup units for each category of operational equipment. The CFR equipment consists of five Aircraft Rescue and Firefighting units. All of the Aircraft Rescue and Firefighting units have aqueous film-forming foam as the primary agent and both halon and dry chemical as their secondary agents. In addition, they have one rapid-intervention vehicle. Combined, they can provide 16,900 gallons of water. There are two pumper trucks, two aerial ladders and two emergency medical trucks. The Department also maintains a CFR boat and related transport equipment, one water trailer and one hose trailer with approximately five miles of five-inch hose and portable hydrants and fittings. The hose trailer and related equipment are for use in the event of hydrant failure, most likely to be caused by an earthquake, and are capable of pumping salt water directly from San Francisco Bay. In addition to this equipment, the Department maintains one command vehicle, four officers' vehicles, one scuba van, and two light units./4/ (See Appendix H, Table H-3, Apparatus Inventory, p. A.172).

The SFIA Fire Department currently is staffed by 17 professional firefighters and one secretary. There are approximately 2,300 calls for CFR operations per year. Most of these calls are for first aid. The Fire Department maintains response-time goals of two minutes for airfield areas and three minutes for passenger terminal areas. The Department indicated that it meets its goals 100 percent for airfield and 90 percent for landside responses. Traffic can interfere with the response time to the passenger terminal areas.

The SFIA Fire Department has a mutual aid agreement with San Mateo County./5/ When called upon, the County will send up to five engine companies from those available on the San Mateo peninsula. If necessary, City of San Francisco companies can respond as well.

SFIA maintains a medical clinic, in the International Terminal. The clinic occupies about 2,870 sq. ft. and provides two types of medical services to the Airport. The clinic provides emergency services and emergency response, and is a component of SFIA's Emergency Preparedness Program. The Airport Medical Group also manages the mini-ambulance service, has triage capability, and coordinates transportation of ill and injured persons to local medical facilities. The clinic is staffed with two medical doctors, a registered nurse and one x-ray technician on-site from 8:00 a.m. to 1:00 a.m. After 1:00 a.m. there is a registered nurse on duty and at least one physician on 30-minute call./6/

In addition, the clinic provides several services for a fee. These include a general practice providing routine checkups, health care advice and medication-dispensing services. The clinic provides on-site CPR certification and training for SFIA staff and provides a drug-testing service for most of the major airline tenants./6/

For ambulance service, SFIA is served by San Mateo County Emergency Medical Service (EMS). San Mateo County EMS responds to all medical emergencies within Airport property and distributes injured individuals to area hospitals, coordinates ambulance service with private contractors, and provides programs such as the Law Enforcement First Responder Program and the Fire Department First Responder Defibrillation Program to SFIA public safety personnel.

San Mateo County EMS responded to 649 emergency medical service requests in 1989. At that time, response time to the airport was approximately nine minutes. However, San Mateo County EMS has established eight minutes or less as its performance standard. The EMS implemented this response time on January 1, 1991, with performance-based contractual ambulance service./7,8/

Patients are sent to area hospitals on the basis of the patient's medical condition, available hospital ability to accept the patient's condition at the time of the incident, and, if the first two conditions are met, the patient's preference. During both major and minor events, San Mateo County EMS follows the San Mateo County "Medical Incident Response Plan," which provides for contingencies on medical emergencies ranging from single-patient to multiple-casualty incidents from all causes. The Airport is not singled out in this plan.

EMS dispatchers are aware of special plans for road closures that are specific to the Airport. A road closure plan for on-field emergencies is critical because of the need for emergency medical service to enter and depart while operations are under way during an emergency event. This plan has never been exercised in real time under current traffic conditions because there has not been a recent emergency to require implementation./7/

AIRPORT POLICE

SFIA maintains an internal police department with operational capabilities that include: records, internal affairs, tactical, bomb squad, narcotics, and traffic divisions.

Additionally, a detectives department from the San Mateo County Sheriff's Department is included within the operation. The Police Department also operates the five gatehouses that control access onto the airfield.

Police Department facilities include the central administrative offices occupying approximately 4,200 sq. ft. in the mezzanine of the North Terminal. This facility provides administrative and police personnel support services. Additionally, three substations are on the main levels of the North, Central, and South Terminals. The substations provide general police services and assistance to terminal security personnel. The SFIA Police Department also maintains a police firing range on SFIA property.

Currently, the SFIA Police Department comprises 220 staff members, includes sworn officers and unsworn uniformed officers (traffic control and security monitors) and five office staff. The Police Department responds to approximately 100 calls per day. Response time for preflight screening calls is approximately one and one-half minutes. The FAA requires a preflight screening response time of five minutes or less. The response time to other terminal calls is approximately two minutes./9/

The SFIA Police Department does not have formal mutual aid agreements with any police departments, but unofficially engages in mutual aid with nearby Peninsula police departments.

NOTES - Public Services

/1/ SFIA, *Final Draft Master Plan*, Chapter 8.0., November, 1989.

/2/ SFIA, *Final Draft Master Plan*, Chapter 6.0., November, 1989.

/3/ SFIA, *Final Draft Master Plan*, Chapter 10.0., November, 1989.

/4/ Anderson, Milton, Operations and Training Supervisor, San Francisco International Airport, telephone conversations, August 8, 15 and 27, 1990.

/5/ O'Brien, Peter J., Fire Chief, San Mateo County Area Disaster Coordinator and Emmet D. Condon, Fire Chief, San Francisco Fire Department, "Mutual Aid Agreement Between San Mateo County Fire Departments and San Francisco Fire Department."

/6/ Turpen, Louis A, Director, San Francisco International Airport, Memorandum to Airports Commission, April 23, 1990.

/7/ Woods, Doug, EMS Coordinator, San Mateo County, telephone conversations, August 15 and August 24, 1990, and February 27, 1991.

/8/ Woods, Doug, EMS Coordinator, San Mateo County, fax to Jim Nicholas, ESA, August 24, 1990.

/9/ Driscoll, Ron, Chief, SFIA Police Department, telephone conversations, August 22 and 28, 1990.

L. AVIATION SAFETY

The FAA's primary role is to promote the safety and the safe use of airspace. The FAA enforces safety standards for commercial and private carriers, domestically and internationally, that will maintain or improve current levels of aviation safety. Violations are investigated and corrected as appropriate. The FAA constantly assesses the safety of the aviation system and reviews the current state of technology to identify advancements that may improve the safety of the system.

The FAA has primary responsibility for airspace and the safe operation of the national aviation system. The FAA operates the Air Traffic Control System, certifies airline companies and the aircraft they fly, certifies commercial and general aviation pilots, develops the National Plan of Integrated Airport Systems (NPIAS), administers the Airport and Airway Trust Fund, and establishes Federal Noise Standards./1/

Facilities at airports, including SFIA, are subject to and must comply with specific FAA design criteria and standards. The FAA has established a series of criteria, known as Part 77 of the Federal Aviation Regulations, that limit the location and height of structures both on and off airport property. These criteria are intended to prevent buildings and other objects from penetrating the airspace required to effect safe aircraft takeoffs and departures; i.e., from becoming an obstruction to air navigation. Section 77.25 of Part 77 sets forth imaginary surfaces of minimum flight altitudes for civil airports. The specifications of each imaginary surface vary for each runway, depending upon the type of approach used or planned for that runway. Approach surfaces are used to determine height restrictions because airplanes approach runways at a much shallower angle (on the order of 35:1, horizontal to vertical) than the angle at which they depart from runways (on the order of 7:1)./2/ The imaginary surfaces defined by Part 77 include primary surface, approach surface, and transitional surface. These surfaces extend beyond SFIA, over the cities of Burlingame, Millbrae, San Bruno, and South San Francisco. Other FAA design criteria affect the layout of the airfield at SFIA and provide for protection zones at the ends of runways.

The FAA Air Traffic Control System coordinates all domestic air traffic and international air traffic entering U.S. airspace. Airborne aircraft always have priority for airfield operations and, consequently, delays are absorbed by aircraft on the ground awaiting clearance for takeoff from or takeoff to the congested airport. Congestion of airspace is therefore avoided to the greatest degree possible. The immediate airspace at SFIA is referred to as a Terminal Control Area, which "consists of controlled airspace extending upward from the surface.... to specified altitudes, within which all aircraft are subject to... federal aviation regulations"./3/ Pilots who wish to enter this airspace must receive authorization from the FAA Air Traffic Control Tower at SFIA.

AIRCRAFT ACCIDENTS

Five aircraft accidents have occurred at SFIA since 1970. Four of those accidents involved commercial aircraft and resulted in no casualties. The accidents occurred in 1971, 1972, 1980 and 1991. The fifth accident involved a two-seater private plane that crash-landed at SFIA in 1984, resulting in the death of the pilot and passenger./4/

NOTES - Aviation Safety

/1/ California Department of Transportation, Division of Aeronautics, *California Aviation System Plan (CASP), Element III: Policies*, April 1989.

/2/ Section 77.11 of the Federal Aviation Regulations defines restricted locations and dimensions of construction or alteration. They are as follows:

(1) Any construction or alteration of more than 200 feet in height above the ground level at its site.

(2) Any construction or alteration of greater height than an imaginary surface extending outward and upward at one of the following slopes:

(i) 100 to 1 for a horizontal distance of 20,000 feet from the nearest point of the nearest runway of each airport specified in paragraph (a)(5) of this section with at least one runway more than 3,200 feet in actual length, excluding heliports.

(ii) 50 to 1 for a horizontal distance of 10,000 feet from the nearest point of the nearest runway of each airport specified in paragraph (a)(5) of this section with its longest runway no more than 3,200 feet in actual length, excluding heliports.

(iii) 25 to 1 for a horizontal distance of 5,000 feet from the nearest point of the nearest landing and takeoff area of each heliport specified in paragraph (a)(5) of this section.

(3) Any highway, railroad, or other traverse way for mobile objects, of a height which, if adjusted upward 17 feet for an Interstate Highway that is part of the National System of Military and Interstate Highways where overcrossings are designed for a minimum of 17 feet vertical distance, 15 feet for any other public roadway, 10 feet or the height of the highest mobile object that would normally traverse the road, whichever is greater, for a private road, 23 feet for a railroad, and for a waterway or any other traverse way not previously mentioned, an amount equal to the height of the highest mobile object that would normally traverse it, would exceed a standard of paragraph (a)(1) or (2) of this section.

/3/ Federal Aviation Administration, *Airman's Informational Manual*, January, 1990.

/4/ Wilson, Dave, Assistant to the Director of Community Affairs, SFIA Public Relations, telephone conversation, January 11 and February 26, 1991.

IV. ENVIRONMENTAL IMPACTS

INTRODUCTION

An application for environmental evaluation for a development proposal on the site was filed in November 1986. On August 11, 1989 on the basis of an Initial Study, the Department of City Planning, Office of Environmental Review, determined that an Environmental Impact Report (EIR) was required. A formal Notice of Preparation was circulated on July 20, 1990. Issues determined as a result of the Initial Study to require no further environmental analysis included Visual and Biology. Therefore, this document does not discuss these topics (see Appendix A, pp. A.1-16, for the Initial Study).

CUMULATIVE DEVELOPMENT

Four cities in the closest proximity to SFIA are most directly affected by growth and impacts related to growth at SFIA: Millbrae, San Bruno, South San Francisco and Burlingame. For cumulative effects due to SFIA development and other development in these four cities, this EIR combines both a list-based analysis and a summary of projections and/or forecasts contained in planning documents. Other cities in the vicinity of SFIA are, and would continue to be, affected by aircraft noise. Measurable impacts related to issues other than aircraft noise, such as traffic, local air quality, and traffic and construction noise, analyzed in the EIR would not extend to these other cities; thus specific lists of probable future cumulative development in these other cities are not combined with that of SFIA, Millbrae, San Bruno, South San Francisco and Burlingame but is accounted for in an MTC regional travel demand model. The MTC regional travel demand model that, starting in 1990, predicts a four percent growth by 1996 and an eleven percent growth by 2006, is used for overall growth on the freeways to account for through traffic from other parts of the region./1/

For Millbrae, San Bruno and South San Francisco, this EIR evaluates cumulative effects of specific approved projects under construction, approved projects not yet under construction and other reasonably foreseeable future projects. To portray a conservative case, this reasonably foreseeable future development is assumed to be built by 1996 (see Figure 25 below and Table 22, p. 248). Because of the relatively small sizes of the lists in Millbrae and South San Francisco, forecast growth in addition to the list of cumulative development, was assumed on the basis of the MTC regional travel demand model described above. For Millbrae, with one relatively small known development project that is included in the area of impact of SFIA, the full forecast growth of four percent by 1996 and eleven percent by 2006 from the MTC regional travel demand model is used for intersection and freeway ramps, before the list-added-growth is added. For South San Francisco, with two larger developments compared to that in Millbrae, about one-half of the forecast growth rate from the MTC regional travel demand model is used to calculate intersection and freeway-ramp impacts: two percent by 1996 and five percent by 2006, before the list-added growth is included. The list for San Bruno development that is included in the area of impact of SFIA is sufficient, by itself, to address a reasonable development potential until 2006. Therefore, zero percent forecast growth is used for intersections and freeway ramps in each analysis year in San Bruno.

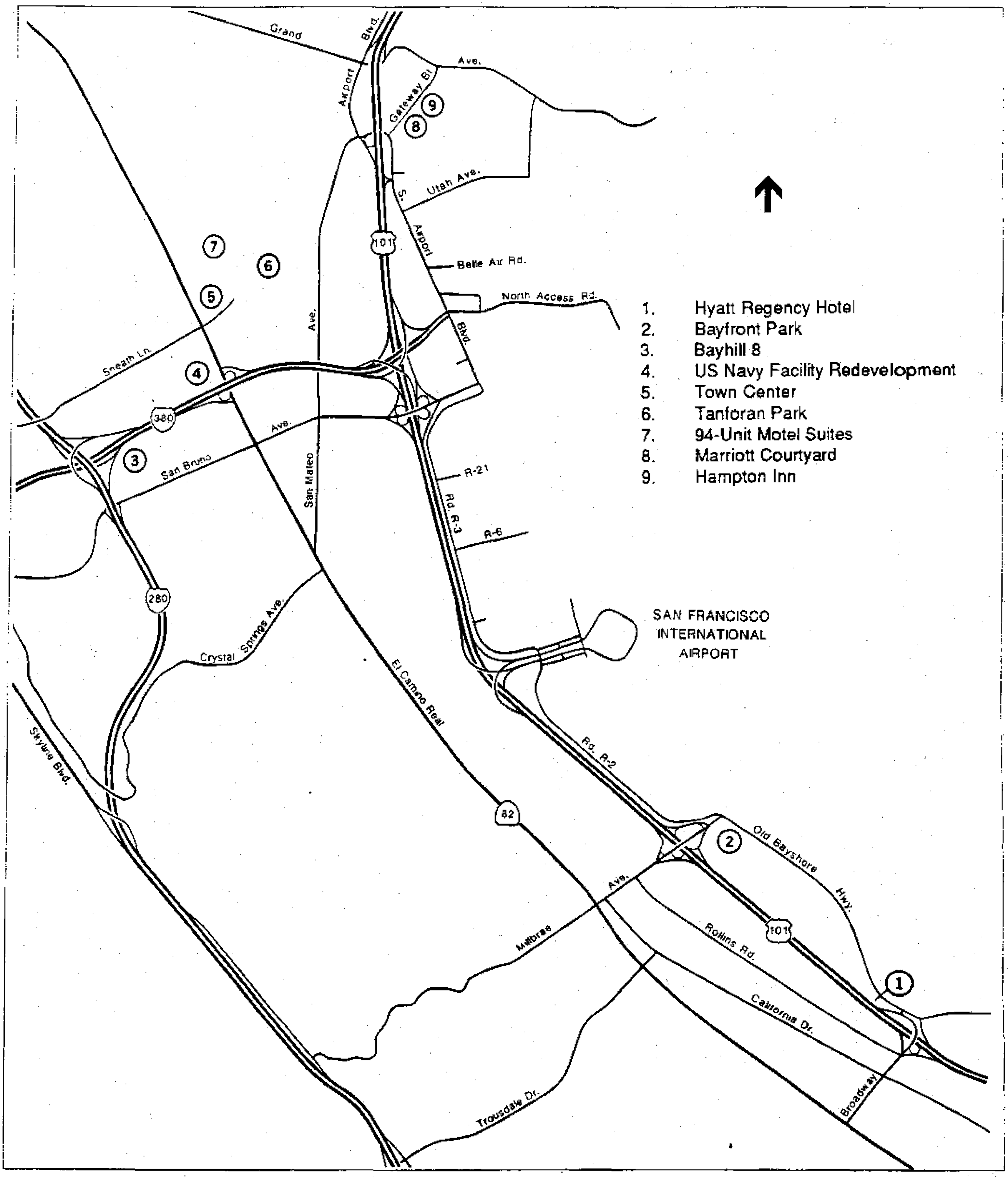
List-added development in the area of impact of SFIA around Burlingame is based on maximum development potential under a planning document (see Table 22)./2/ This is considered to be the maximum potential development in the area. For a conservative analysis, most of this development is assumed to be constructed by 1996. Therefore, zero percent "forecast growth" is used for intersections and freeway ramps each year.

"Forecast growth" as shown in Table 22 is assumed to be the amount of future growth used as a future baseline for analysis of impacts in 1996 and 2000 in this EIR and accounts for most of the cumulative growth in the area. Growth from cumulative lists on this table, or "list-added growth", is assumed to be additional cumulative development used to analyze localized cumulative impacts relevant to the areas affected by the growth.

NOTES - Introduction

/1/ A baseline future growth of 4% and (additional) 11% by 1996 and 2006, respectively, has been assumed for freeway sections in the vicinity of SFIA. These percentages are based on MTC's regional travel demand computer model for growth. This model projects travel demand in the nine-county Bay Area. It is a tool that is commonly used in regional forecast analysis. The growths account for both development in the impact area and regional through-traffic.

/2/ Monroe, Margaret, City Planner, City of Burlingame Planning Department, telephone conversations, April 27, 1990 and January 22, 1991. Other development is potential development under the Burlingame Bayfront Specific Area Plan. The Hyatt Regency Hotel is a project with City Council approval.



SOURCE: DKS Associates

Figure 25
Locations of List-Added Development

● TABLE 22: CUMULATIVE DEVELOPMENT**

	1996 Forcast Growth	1996 Projects	2006 Forcast Growth	2006 Projects
Burlingame /a/	0%		0%	
Hotel Rooms		497 rooms		828 rooms
Restaurants		200,625 gsf*		334,375 gsf
Office Space		267,750 gsf		446,250 gsf
Hyatt Regency Hotel		791 rooms		
Millbrae/b/	4%		11%	
Bay Front Park /c/		2.8 acres		
San Bruno /d,e,f,g/	0%		0%	
Bayhill 8 Office Space		250,000 gsf		
Bayhill 8 Senior Housing		150 du*		
Bayhill 8 Hotel Suites		300 suites		
Tanforan Park		128,300 gsf		
Town Center		109,000 gsf		
94-Unit Motel Suites		94 suites		
US Navy Office Space		107,200 gsf		
US Navy Housing Units		110 du		
South San Francisco /i,j,k/	2%		5%	
Marriott Courtyard		152 rooms		
Hampton Inn		140 rooms		
Freeways /l/	4%	-	11%	-

NOTES:

*du = dwelling units; gsf = gross square feet

** In the traffic analysis, the list-added projects and the adjusted "forecast growth" are applied to local intersections and freeway ramps. The list-added projects are not applied to freeway sections.

/a/ Monroe, Margaret, City Planner, City of Burlingame Planning Department, telephone conversation, April 27, 1990 and January 22, 1991. The Hyatt Regency Hotel is a project with City Council approval. Other development is potential development under the Burlingame Bayfront Specific Area Plan.

/b/ Because one relatively small project is included in the Millbrae list, an additional 4% and 11% forecast growth are predicted for 1996 and 2006, respectively.

/c/ Dragoo, Ron, Assistant Engineer, City of Millbrae, telephone conversation, February 15, 1991.

/d/ Foscardo, George, Director of Planning and Building, City of San Bruno, telephone conversations, April 27, 1990 and January 22, 1991. Projects listed have City Council approval, are in the EIR stage or have been proposed to the City of San Bruno by letter or phone conversation. Navy projects are proposed by way of the Naval Facilities Engineering Command's Westdiv. Master Plan - United States Navy.

(Continued)

●TABLE 22: CUMULATIVE DEVELOPMENT (Continued)

/e/ DKS Associates, for City of San Bruno, *North San Bruno Areawide Traffic Study Final Report*, December 1986.

/f/ DKS Associates, for City of San Bruno, *Tanforan Park - Proposed Median Breaker on El Camino Real*, August 30, 1988.

/g/ DKS Associates, for City of San Bruno, *Bayhill VIII Traffic Study*, May 17, 1989.

/h/ Cordes, Ken, Associate Planner, City of South San Francisco Planning Department, telephone conversation, April 27, 1990.

/i/ Carlson, Steve, Senior Planner, City of South San Francisco Planning Department, telephone conversation, March 27, 1991 and June 17, 1991. The "Precise Plan" approved for Hampton Inn expired in 1990. A new Genentech project, a 225,000-sq.-ft. research and development building, was approved by the Planning Commission on September 21, 1990 and by the City Council on November 14, 1990. The analysis would remain essentially the same with the deletion of the Hampton Inn project and the addition of the Genentech project.

/j/ City of South San Francisco, "Major Projects in South San Francisco," May 1990.

/k/ Because of the relatively small size of the South San Francisco list for cumulative development, an additional two percent and five percent growth has been predicted for 1996 and 2006, respectively.

/l/ A baseline forecast growth factor of 4% and 11% by 1996 and 2006, respectively, has been assumed for freeways in the vicinity of SFIA. These percentages are based on MTC's regional travel demand computer model for growth. This model projects travel demand in the nine-county Bay Area. It is a tool that is commonly used in regional forecast analysis. The growth factors account both for development in the impact area and regional through traffic.

SOURCE: DKS Associates

A. LAND USE AND PLANS

AIRPORT LAND USE

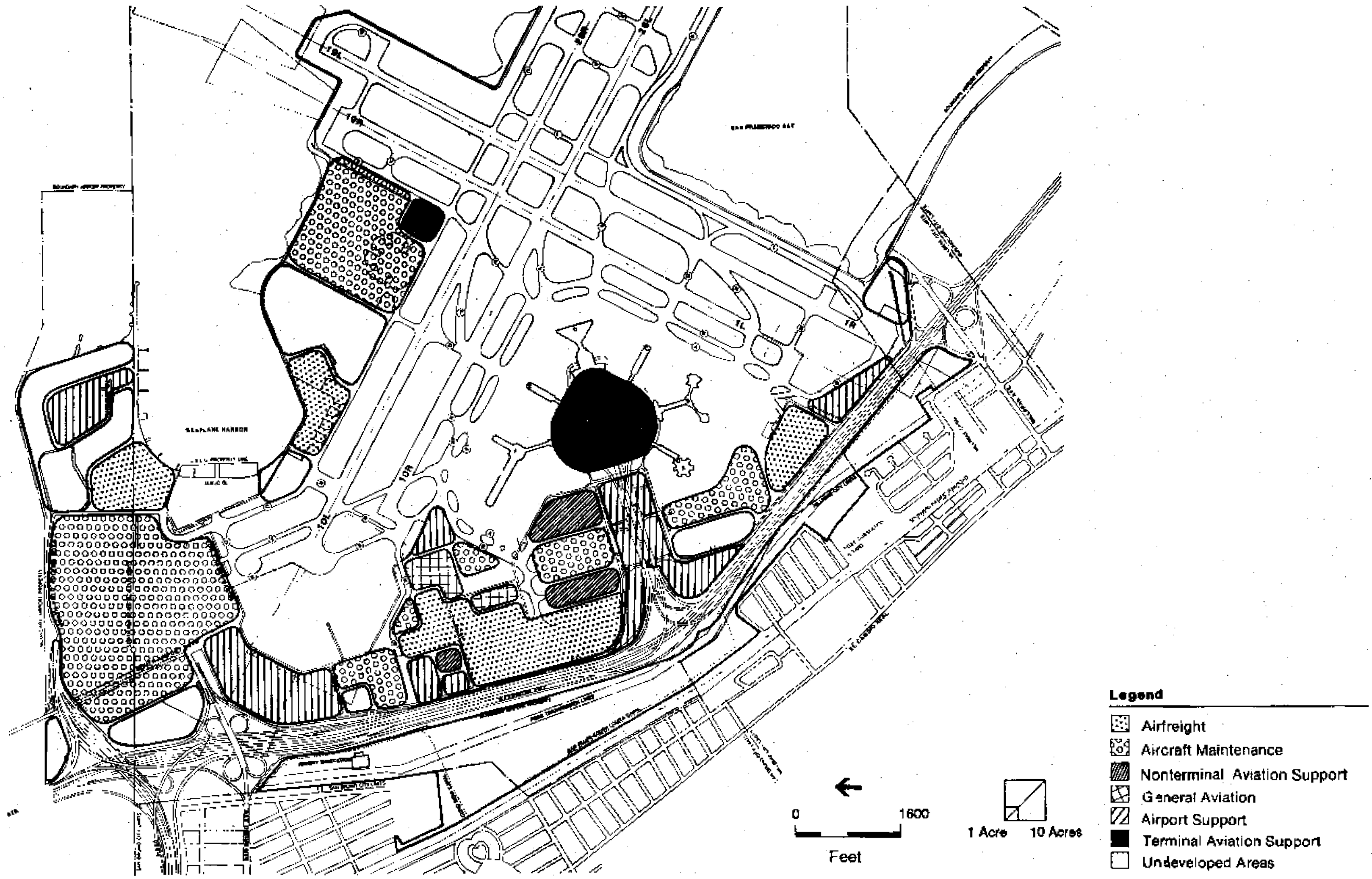
The SFIA Master Plan would not alter land use types at the Airport, but would intensify, reconfigure and/or consolidate existing uses. See Figure 25A below, Airport Land Uses. Several vacant parcels would be developed in Airport uses. The 180-acre West-of-Bayshore site, an identified habitat of the San Francisco garter snake, an endangered species, and red-legged frog, a candidate for the endangered species list, would not be affected by the SFIA Master Plan. Total land area under the Airport's jurisdiction would not increase, nor would additional land area be created by filling of tidelands owned by SFIA. No projects or land use changes are proposed by the SFIA Master Plan on sites within Airport environs cities. Airport-related highway and transit projects under Caltrans and BART jurisdiction could occur within Airport environs cities, however.

Airside Land Uses

Runway expansions and reconfigurations are not included in the SFIA Master Plan; therefore, no runway land use impacts would result directly from near-term or long-term SFIA Master Plan projects. Expansion of runways to accommodate forecast growth in aircraft operations under the SFIA Master Plan, or to mitigate noise, energy consumption or air quality impacts of SFIA Master Plan projects, are not proposed in the SFIA Master Plan. Proposed SFIA Master Plan taxiway reconfigurations would not constitute land use changes.

Landside Land Uses

Terminal land uses would remain concentrated in their present location and would increase by a total of approximately 56 percent (1,476,400 sq. ft. of building area) between 1990 and 2006. Expansion of terminal facilities would displace airline maintenance, airline support and air freight uses currently located in the vicinity of the terminal access road. These uses would be consolidated in the North, West and East Field areas.



SOURCE: San Francisco International Airport Master Plan

● Figure 25A
SFIA Existing Land Use

Airline-support land uses would be reconfigured to accommodate SFIA Master Plan terminal expansion and other projects in the west and east field areas. Airline-support land uses would increase by approximately 48 percent (39,700 building sq. ft.) under the near-term SFIA Master Plan and would not be affected further under the long-term SFIA Master Plan.

Airline-maintenance land uses would be reconfigured to accommodate other SFIA Master Plan projects (primarily the terminal expansion) and would be further concentrated in the east field area. The proposed East Field Maintenance Hangar would be constructed on a currently undeveloped parcel. Total building area in airline-maintenance use would increase by about seven percent (275,300 sq. ft.) between 1990 and 2006.

General Aviation land uses would be consolidated and relocated from the west field area to the east field area. Building area devoted to General Aviation use would increase marginally under the near-term SFIA Master Plan and would not be affected further under the long-term plan.

Air-freight land uses would remain concentrated in the west and north field areas and would be consolidated into fewer buildings. Total building area in air-freight use would increase by about 90 percent (785,000 sq. ft.) between 1990 and 2006.

Commercial land uses would be reconfigured and expanded under the SFIA Master Plan, including construction of hotel space in the proposed new international terminal. Total building area in commercial use would increase by approximately 37 percent (87,000 sq. ft.) between 1990 and 2006.

Administration/office land uses would increase by approximately 179 percent (226,100 building sq. ft.) under the SFIA Master Plan. Additional administration/office uses would be located in the proposed new international terminal and in a new office building proposed for construction on currently vacant land north of the terminal access road near US 101.

Parking, roadway and pedestrian transportation uses would increase under the SFIA Master Plan. Parking and transportation projects would include construction of a Rental Car Garage / Ground Transportation Center adjoining the terminal complex; installation of an Automated People Mover (APM) along the perimeter of the terminal roadway and extending to Parking Lots D and DD; and construction of additional garages and surface parking lots. SFIA Master Plan roadway projects would include widening of key intra-airport roads, roads R-3 (McDonnell Road), R-6, and North Access Road, construction of bi-level access roads for the proposed Rental Car Garage / Ground Transportation Center, and construction of two new ramps connecting SFIA and US 101.

U.S. Coast Guard facilities would be demolished and reconstructed under the SFIA Master Plan, reducing total Coast Guard building area by about 28 percent to roughly 63,400 sq. ft. Existing SFIA dock facilities (about 10,000 sq. ft.) at the Seaplane Harbor would be demolished and replaced with a multi-use harbor dock facility of approximately 20,000 sq. ft.

AIRPORT ENVIRONS CITIES

Two broad categories of land-use impacts on airport environs cities could result from SFIA Master Plan implementation. The first category of impacts is associated with an increased number of flights that could be accommodated at the Airport due to increased landside facilities. Cities could continue to be limited in the amount of residential uses or other noise-sensitive land uses they would permit under their general plans and related regulations, as a result of additional safety risks and noise. Without this increased number of flights, CNEL noise contours would be smaller than forecast for the SFIA Master Plan and would not limit residential or other noise sensitive land uses to the same degree as would the project. See the discussion in Section III.A. Land Use and Plans, under "Airport Environs Cities Land Use," p. 82. These regulations are detailed in EIR Sections III.C. and IV.C. Noise. The cities closest to the Airport, and those within the 65 dBA, CNEL contour (South San Francisco, San Bruno, Millbrae and Burlingame), would be most affected by airport-related safety and noise regulations.

The second category of potential land-use impacts on environs cities is associated with intensified landside activities at the Airport, which could potentially induce growth or other land-use changes in adjoining communities (again, primarily those closest to SFIA, including South San Francisco, San Bruno, Millbrae and Burlingame). Increases in passenger volumes could induce pressure for hotel, restaurant and other travel-serving development, while increases in SFIA employment could stimulate demand for additional housing and public services in the Airport vicinity. Ground transportation and parking needs of both employees and passengers could also induce growth of roadway, parking and transit land uses in airport environs cities. However, while growth in passenger volumes and employment levels could increase demand for off-site parking, hotel accommodations, food service facilities, etc., the overall result would likely be to speed the development of existing land uses rather than to generate new types of land uses within environs cities.

City of Brisbane, Town of Colma, City of Daly City, City of Foster City, Town of Hillsborough, City of Pacifica, City of San Mateo, City and County of San Francisco

Brisbane, Colma, Daly City, Foster City, Hillsborough, Pacifica, San Mateo and San Francisco are outside the 65 dBA, CNEL contours associated with both near-term and long-term SFIA Master Plan aviation activity levels. Future land uses in these cities would not, therefore, be restricted by noise abatement regulations.

Intensified landside activities at SFIA could stimulate further development of residential, commercial, transportation and/or public service and infrastructure land uses in these cities. However, development induced by SFIA would not likely be distinguishable from background development, and would not likely divide or disrupt established communities.

City of Burlingame

A portion of northern Burlingame currently within the 65 dBA, CNEL contour would remain so under both the near-term and the long-term SFIA Master Plan. Total area within the contour would diminish, however, due to use of quieter aircraft (see Section IV.C. Noise, pp. 331). The portion of Burlingame within the 65 dBA, CNEL contour is currently in industrial use; future uses would continue to be restricted by noise-abatement regulations.

Intensified landside activities at SFIA could stimulate further development of hotel, restaurant, residential, transportation and/or public service and infrastructure land uses in Burlingame. Airport-oriented commercial development is supported by Burlingame General Plan policies. Airport-induced commercial, residential and public infrastructure development would not likely divide or disrupt established communities in Burlingame.

Since aircraft approach zones and flight paths would not be altered by the SFIA Master Plan, Airport Land Use Commissions (ALUC) and Federal Aviation Administration (FAA) building-height and clear-zone regulations currently affecting parts of Burlingame would not change as a result of SFIA Master Plan implementation.

City of Millbrae

A portion of eastern Millbrae currently within the 65 dBA, CNEL contour would remain so under both the near-term and the long-term SFIA Master Plan. Total area within the contour would diminish, however, due to use of quieter aircraft (see Section IV.C. Noise, pp. 331). The portion of Millbrae within the 65 dBA, CNEL contour is primarily residential; future uses would continue to be restricted by noise-abatement regulations.

Intensified landside activities at SFIA could stimulate further development of hotel, restaurant, residential, transportation and/or public service and infrastructure land uses in Millbrae; airport-induced development would not likely divide or disrupt established communities in Millbrae.

Since aircraft approach zones and flight paths would not be altered by the SFIA Master Plan, ALUC and FAA building-height and clear-zone regulations currently affecting parts of Millbrae would not change as a result of SFIA Master Plan implementation.

- SFIA's West of Bayshore parcel is within the City of Millbrae Sphere of Influence. As stated on p. 20, the parcel is habitat for the San Francisco garter snake, an endangered species, and the red-legged frog, a candidate for the endangered species list. The number of San Francisco garter snakes inhabiting the Millbrae or other portion(s) of the West of Bayshore is not known. As stated on p. 20, the West of Bayshore parcel is not included in the SFIA Master Plan Process.

City of San Bruno

A portion of northeastern San Bruno currently within the 65 dBA, CNEL contour would remain so under both the near-term and the long-term SFIA Master Plan. Total area within the contour would diminish, however, due to use of quieter aircraft (see

Section IV.C. Noise, pp. 331). The portion of San Bruno within the 65 dBA, CNEL contour is primarily residential; future uses would continue to be restricted by noise-abatement regulations.

SFIA's West-of-Bayshore parcel is within the San Bruno Sphere of Influence. The area is a habitat for the endangered San Francisco garter snake and red-legged frog, which is a candidate for the endangered species list. The parcel would not be affected by the SFIA Master Plan.

Intensified landside activities at SFIA could stimulate further development of residential, commercial, transportation and/or public service and infrastructure land uses in San Bruno. Such airport-induced development would not likely divide or disrupt established communities.

Since aircraft approach zones and flight paths would not be altered by the SFIA Master Plan, ALUC and FAA building-height and clear-zone regulations currently affecting parts of San Bruno would not change as a result of SFIA Master Plan implementation.

City of South San Francisco

Portions of southern South San Francisco currently within the 65 dBA, CNEL contour would remain so under both the near-term and the long-term SFIA Master Plan. Total area within the contour would diminish, however, due to use of quieter aircraft (see EIR Section IV.C. Noise, pp. 331). Portions of South San Francisco within the 65 dBA, CNEL contour are primarily residential and industrial; future uses would continue to be restricted by noise-abatement regulations.

SFIA is not subject to City of South San Francisco land use and zoning regulations. Implementation of the SFIA Master Plan would result in more intensive development of lands owned by SFIA that are within the city limits of South San Francisco, but would not introduce new land uses. These lands, in the SFIA's north and east field areas, would be further developed in airline-maintenance, air-freight and airport-support uses.

Intensified landside activities at SFIA could stimulate further development of hotel, restaurant, residential, transportation and/or public service and infrastructure land uses in South San Francisco; such Airport development would not likely divide or disrupt established communities.

Since aircraft approach zones and flight paths would not be altered by the SFIA Master Plan, ALUC and FAA building-height and clear-zone regulations currently affecting parts of South San Francisco would not change as a result of SFIA Master Plan implementation.

COUNTY OF SAN MATEO

SFIA is not subject to County of San Mateo land use and zoning regulations. Implementation of the SFIA Master Plan would result in more intensive development of lands owned by SFIA that are within unincorporated San Mateo County, but would not introduce new land uses. Since aircraft approach zones and flight paths would not be altered by the SFIA Master Plan, ALUC and FAA building-height and clear-zone regulations currently affecting the unincorporated County land owned by SFIA would not change as a result of SFIA Master Plan implementation.

County of San Mateo Airport Land Use Commission (ALUC)

As noted, Master Plan projects would not alter aircraft approach zones and flight paths. ALUC building height regulations currently affecting portions of Burlingame, Millbrae, San Bruno, South San Francisco and unincorporated areas of San Mateo County owned by SFIA would not change as a result of SFIA Master Plan implementation.

REGIONAL CONTEXT

As discussed in Section III.A. Land Use and Plans, beginning on p. 82, there are a number of plans by various local, regional, and state agencies that address the provision of facilities to accommodate regional air transportation demand. Most of those plans were developed on the basis of forecasts of regional transportation demand, assessments of the capabilities of facilities in the Bay Area (airports and the facilities for other modes of transportation) to accommodate the forecast demand, and various recommended means of meeting demand (such as facility expansion).

The plans do not all include the same recommended means for meeting forecast demand. For example, the *CASP* recommendations (discussed in Appendix I, p. A.177) include shifting air carrier operations to Metropolitan Oakland International Airport and San Jose International Airport; the FAA Capacity Task Force Study recommendations (discussed in Appendix I, p. A.173) include constructing a new runway at SFIA; and the MTC *Regional Airport Plan* recommendations include the use of an additional air carrier airport in the North Bay. Reasons for the differences include the use of different forecasts of regional demand, different conclusions about the capability of SFIA and other Bay Area airports to accommodate forecast demand, and different approaches to developing the means to meet demand (such as the use of a high-speed rail corridor to meet some of the air transportation demand, or the improvement of airport facilities within an agency's own jurisdiction).

Although some of the plans discussed in Section III.A. Land Use and Plans include different means for meeting regional demand than the improvements included in the SFIA Master Plan, it would be speculative to determine how the implementation of the SFIA Master Plan would affect the implementation of the other plans.

<u>Association of Bay Area Governments (ABAG) and Metropolitan Transportation Commission (MTC)</u>

SFIA passenger forecasts for the near-term Master Plan (42.3 million annual passengers in 1996) and for the long-term Master Plan (51.3 million annual passengers in 2006) exceed MTC/ABAG-recommended allocations for SFIA (27 to 31 million annual passengers in 1997). In 1989, the existing passenger "load" was 30 million, already nearly at the maximum recommended by MTC/ABAG for SFIA.

● MTC's Regional Airport System Plan (RASP) Update is scheduled for completion in 1992. When complete, the RASP Update will provide a body of information on the existing regional system and its operations, expected future requirements, and recommendations for accommodating those future requirements. This information can be used by decisionmakers within the region, including the airports themselves, in guiding capital improvement programs and related policy decisions./1,1a/ SFIA and the other air carrier airports in the region are members of the Regional Airport

Planning Committee (RAPC), and therefore have access to information that becomes available through the RASP Update process regarding the optimization of regional aviation resources and the minimization of overall environmental effects.

No authority currently exists that can enforce the RASP; implementation of its policies and recommendations therefore depends principally on voluntary actions by the airports and airlines. MTC's own authority to implement elements of the RASP is generally indirect, in that MTC has responsibility for environmental review and funding approval on regional ground transportation projects, and authority to prioritize applications from airports within the region for limited California State aeronautics Capital Improvement Projects (CIP) funds (the statewide fund estimate for the next cycle, 1995-96, is only $2.1 million)./1b/ MTC can thus potentially influence regional airport planning and operations primarily through its role in major ground transportation projects affecting specific airports. MTC can also use the RASP to educate and thereby potentially influence other agencies with more direct authority over airport systems and operations in the region (e.g., the FAA, airlines, airports and the U.S. military)./1,1a/

The level of detail in the final RASP, moreover, will likely be at a programmatic level. Cooperation by the airports with the RASP would therefore not eliminate the need for development of individual airport Master Plans./1a/

Bay Conservation and Development Commission (BCDC)

Implementation of the SFIA Master Plan would include construction of a public roadway adjacent to the U.S. Coast Guard sea wall that would permit employees and visitors to access East Field area facilities from the North Field access road. Construction of this roadway would require a BCDC permit since it is within 100 feet of the shoreline.

The SFIA Master Plan also would include alteration or construction of a new multi-use dock facility, adjacent to the U.S. Coast Guard Station at Seaplane Harbor. Its planned use is for shipping and receiving freight, ferry service, and as an alternative means of access and transport in an emergency. Alteration or construction of this dock would require a BCDC permit since it is construction along the shoreline.

OTHER REGIONAL AGENCIES

A discussion of the Bay Area Rapid Transit District (BART) is included in Section IV.B. Transportation.

A discussion of the Bay Area Air Quality Management District (BAAQMD) is included in Section IV.D. Air Quality.

A discussion of the San Francisco Bay Regional Water Quality Control Board (RWQCB) is included in Section IV.J. Public Utilities

A discussion of the FAA is included in Section IV.L Aviation Safety

REGIONAL AVIATION ACTIVITY AND REGIONAL CAPACITY

1996 and 2006 forecasts from the FAA *Terminal Area Forecasts*, the *California Aviation System Plan (CASP)*, and the three primary Bay Area airports are presented in Tables 23-26, pp. 261-264. These forecasts can be compared to the 1987 terminal and airside capacity from *CASP*. Shares of regional forecast totals represented by the respective forecasts are also shown.

These forecasts show that there is future demand for aviation activity in the Bay Area that can be accommodated only by actions such as expanding existing facilities, converting military airfields to airline passenger traffic, or by people changing their mode of travel.

NOTE - Land Use and Plans

- /1/ Steve Kiehl, TRA Airport Consulting, telephone conversation, September 16, 1991.
- /1a/ Roddin, Marc, Manager of Seaport and Airport Planning, Metropolitan Transportation Commission, interview, April 22, 1992.
- /1b/ Roddin, Marc, Manager of Seaport and Airport Planning, Metropolitan Transportation Commission, Record of CIP Advisory Committee Meeting, October 24, 1991.

TABLE 23: TOTAL PASSENGERS: COMPARATIVE SAN FRANCISCO BAY AREA AIR CARRIER AIRPORTS FORECASTS, 1996

Airport	FAA Terminal Area Forecasts/a/ Number (000s)	FAA Terminal Area Forecasts/a/ Percent of Total	California Aviation System Plan/a/ Number (000s)	California Aviation System Plan/a/ Percent of Total	SFIA Master Plan W/ Project Number (000s)	SFIA Master Plan W/O Project Number (000s)	San Jose Int'l Prelim. Forecasts/b/ Number (000s)	Oakland Int'l Airport Master Plan/c/ Number (000s)	1987 Terminal Capacity/e/ Number (000s)
San Francisco International	35,668	67.7%	39,268	68.2%	42,280.0	37,780.0	-	-	51,300.0
San Jose International	9,883	18.7%	9,295	16.2%	-	-	11,529.4	-	18,000.0
Metro Oakland International	6,620	12.6%	8,563	14.9%	-	-	-	7,015.2	8,000.0
Buchanan Field (Concord)	388	0.7%	247	0.4%	-	-	-	-	800.0
Sonoma County (Santa Rosa)	164	0.3%	168	0.3%	-	-	-	-	600.0
TOTAL	52,723	100.0%	57,543	100.0%	59,460.0	-	-	51,582.4/d/	78,700.0

NOTES:

/a/ 1996 FAA and *California Aviation System Plan (CASP)* total passenger forecasts are interpolated from 1995 and 2000 enplanement forecasts, doubled to account for deplanements.

/b/ Unpublished demand forecasts, developed as part of the San Jose International Airport Master Plan Update currently in progress (received May 8, 1990 from Mr. Cary Greene, San Jose International Airport Planning). The Master Plan study is currently assessing whether the forecast levels can be accommodated at San Jose International Airport. 1996 total enplaned and deplaned passenger forecasts are interpolated from 1995 and 2000 forecasts.

/c/ Metropolitan Oakland International Airport draft *Master Plan Update* Preferred Forecast ("Moderate Market Share"), from Exhibit IV.12; enplanement forecasts are doubled.

/d/ Metropolitan Oakland International Airport draft *Master Plan Update* total forecast for the region is imputed from 1996 forecast market share represented by 7,015,000 passengers (13.6%).

/e/ *California Aviation System Plan, Element IV: System Requirements*, 1989, Table IV.2.1

SOURCES: U.S. Department of Transportation, Federal Aviation Administration, April 1989; Caltrans Division of Aeronautics, 1989; *SFIA Final Draft Master Plan*, 1989; San Jose International Airport, 1990; Metropolitan Oakland International Airport draft *Master Plan Update* forecasts, 1988; SFIA Airports Commission, 1990; Environmental Science Associates, Inc., 1991.

TABLE 24: TOTAL PASSENGERS: COMPARATIVE SAN FRANCISCO BAY AREA AIR CARRIER AIRPORTS FORECASTS, 2006

Airport	FAA Terminal Area Forecasts/a/ Number (000s)	FAA Terminal Area Forecasts/a/ Percent of Total	California Aviation System Plan/a,b/ Number (000s)	California Aviation System Plan/a,b/ Percent of Total	SFIA Master Plan W/ Project Number (000s)	SFIA Master Plan W/O Project Number (000s)	San Jose Int'l Prelim. Forecasts/c/ Number (000s)	Oakland Int'l Airport Master Plan/d/ Number (000s)	1987 Terminal Capacity/f/ Number (000s)
San Francisco International	40,567	61.9%	52,770	64.1%	51,330.0	39,760.0	-	-	51,300.0
San Jose International	14,773	22.6%	14,986	18.2%	-	-	18,569.4	-	18,000.0
Metro Oakland International	9,360	14.3%	13,857	16.8%	-	-	-	10,530.4	8,000.0
Buchanan Field (Concord)	530	0.8%	440	0.5%	-	-	-	-	800.0
Sonoma County (Santa Rosa)	248	0.4%	312	0.4%	-	-	-	-	600.0
TOTAL	65,478	100.0%	82,365	100.0%	73,310.0	-	-	66,648.1/e/	78,700.0

NOTES:

/a/ 2006 FAA and *California Aviation System Plan (CASP)* total passenger forecasts are extrapolated from 2000 and 2006 enplanement forecasts, doubled to account for deplanements.

/b/ *CASP* recommended passenger levels for 2005 are 32,100,000 annual passengers for SFIA; 20,300,000 annual passengers for San Jose International Airport; 13,300,000 annual passengers for Metropolitan Oakland International Airport; 420,000 annual passengers for Buchanan Field; 300,000 annual passengers for Sonoma County Airport; and 2,070,000 annual passengers for Travis Airforce Base (Element VI, Report on Action Plan, Table VI-1).

/c/ Unpublished demand forecasts, developed as part of the San Jose International Airport Master Plan Update currently in progress (received May 8, 1990 from Mr. Cary Greene, San Jose International Airport Planning). The Master Plan study is currently assessing whether or not the forecast levels can be accommodated at San Jose International Airport. 2006 total passenger forecasts are interpolated from 2000 and 2010 forecasts.

/d/ Metropolitan Oakland International Airport draft *Master Plan Update* Preferred Forecast ("Moderate Market Share"), from Exhibit IV.12; enplanement forecasts are doubled.

/e/ Metropolitan Oakland International Airport draft *Master Plan Update* total forecast for the region is imputed from forecast 2006 market share represented by 10,530,400 passengers (15.8%).

/f/ *California Aviation System Plan, Element IV: System Requirements*, 1989, Table IV.2.1

SOURCES: U.S. Department of Transportation, Federal Aviation Administration, April 1989; Caltrans Division of Aeronautics, 1989; *SFIA Final Draft Master Plan*, 1989; San Jose International Airport, 1990; Metropolitan Oakland International Airport draft *Master Plan Update* Forecasts, 1988; SFIA Airports Commission, 1990; Environmental Science Associates, Inc., 1991.

TABLE 25: TOTAL FORECAST AIRCRAFT OPERATIONS, SAN FRANCISCO BAY AREA AIR CARRIER AIRPORTS, 1996

AIRPORT	FAA Terminal Area Forecasts/a/	California Aviation System Plan/b/	SFIA Master Plan W/ Project/c/	SFIA Master Plan W/O Project/d/	San Jose Int'l Prelim. Forecasts/e/	Oakland Int'l Airport Master Plan/f/	1987 Airfield Capacity/g/
San Francisco International	498,600	605,900	496,800	470,000	-	-	500,000
San Jose International	481,000	442,789	-	-	492,080	-	565,000
Metro Oakland International	485,200	499,922	-	-	-	538,120	525,000
Buchanan Field (Concord)	323,600	242,089	-	-	-	-	355,000
Sonoma County (Santa Rosa)	185,400	160,738	-	-	-	-	295,000
TOTAL	1,973,200	1,951,438	-	-	-	-	2,240,000

NOTES:

/a/ FAA forecasts generally assumed no expansion of facilties except those "recommended by the regions." 1996 FAA total operations forecasts are interpolated from 1995 and 2000 forecasts.

/b/ *California Aviation System (CASP)* forecasts were based on existing airfield configurations and any known planned airfield improvements (no new runways were assumed for Bay Area Air Carrier Airports. Total operations forecasts are interpolated from 1995 and 2000 forecasts.

/c/ See Table 1 for derivation of 1996 forecast *SFIA Master Plan* total aircraft operations.

/d/ 1996 constrained forecasts of air carrier operations were derived by Ken Eldred Engineering (KEE). Total forecast 1996 operations figure combines KEE air carrier forecasts with interpolated FAA forecasts of commuter, General Aviation and military operations.

/e/ Unpublished demand forecasts, developed as part of the San Jose International Airport Master Plan Update currently in progress (received May 8, 1990 from Mr. Cary Greene, San Jose International Airport Planning). The Master Plan study is currently assessing whether or not the forecast levels can be accommodated at San Jose International Airport. 1996 total aircraft operations forecast is interpolated from 1995 and 2000 forecasts.

/f/ Metropolitan Oakland International Airport draft *Master Plan Update*, Exhibit IV.1. 1996 forecast is interpolated from 1992 and 1997 forecasts.

/g/ *California Aviation System Plan, Element IV: System Requirements*, 1989, Table IV.2.1. According to *CASP*, Annual Service Volume (ASV) is "the annual volume of aircraft operations beyond which the average delay to each aircraft increases rapidly with relatively small increases in aircraft operations (and beyond which levels of service on the airfield deteriorate)....When annual aircraft operations are equal to annual service volume, average...aircraft delays are on the order of one to four minutes. If the number of annual operations exceeds the annual service volume, moderate or severe congestion may occur."

SOURCES: U.S. Department of Transportation, Federal Aviation Administration, April 1989; Caltrans Division of Aeronautics, 1989; *SFIA Final Draft Master Plan*, 1989; San Jose International Airport, 1990; Metropolitan Oakland International Airport draft *Master Plan Update* forecasts, 1988; SFIA Airports Commission, 1990; Environmental Science Associates, Inc., 1991.

TABLE 26: TOTAL FORECAST AIRCRAFT OPERATIONS, SAN FRANCISCO BAY AREA AIR CARRIER AIRPORTS, 2006

AIRPORT	FAA Terminal Area Forecasts/a/	California Aviation System Plan/b/	SFIA Master Plan W/ Project /c/	SFIA Master Plan W/O Project/d/	San Jose Int'l Prelim. Forecasts/e/	Oakland Int'l Airport Master Plan/f/	1987 Airfield Capacity/g/
San Francisco International	538,500	802,300	538,500	482,000	-	-	500,000
San Jose International	691,000	582,152	-	-	582,340	-	565,000
Metro Oakland International	597,200	630,763	-	-	-	633,720	525,000
Buchanan Field (Concord)	419,600	250,626	-	-	-	-	355,000
Sonoma County (Santa Rosa)	248,200	178,820	-	-	-	-	295,000
TOTAL	2,494,500	2,444,661	-	-	-	-	2,240,000

NOTES:

/a/ FAA forecasts generally assumed no expansion of facilties except those "recommended by the regions." 2006 FAA total operations forecasts are extrapolated from 2000 and 2005 forecasts.

/b/ *California Aviation System Plan (CASP)* forecasts were based on existing airfield configurations and any known planned airfield improvements (no new runways were assumed for Bay Area Air Carrier Airports. Total operations forecasts are extrapolated from 2000 and 2005 forecasts. *CASP* recommended total aircraft operations for 2005 are 500,969 total operations for SFIA; 543,100 total operations for San Jose International Airport; 600,808 total operations for Metropolitan Oakland International Airport; 303,300 total operations for Buchanan Field; 204,949 total operations for Sonoma County Airport; and 48,708 total operations for Travis Airforce Base (Element VI, Report on Action Plan, Table VI-1).

/c/ See Table 1, p. 24, for derivation of 2006 forecast *SFIA Master Plan* total aircraft operations.

/d/ 2006 constrained forecasts of air carrier operations were derived by Ken Eldred Engineering (KEE). Total forecast 2006 operations figure combines KEE air carrier forecasts with extrapolated FAA forecasts of commuter, General Aviation and military operations.

/e/ Unpublished demand forecasts, developed as part of the San Jose International Airport Master Plan Update currently in progress (received May 8, 1990 from Mr. Cary Greene, San Jose International Airport Planning). The Master Plan study is currently assessing whether the forecast levels can be accommodated at San Jose International Airport. 2006 total aircraft operations forecast is interpolated from 2000 and 2010 forecasts.

/f/ Metropolitan Oakland International Airport draft *Master Plan Update*, Exhibit IV.1. 2006 forecast is interpolated from 1997 and 2007 forecasts.

/g/ *California Aviation System Plan, Element IV: System Requirements,* 1989, Table IV.2.1. According to *CASP*, Annual Service Volume (ASV) is "the annual volume of aircraft operations beyond which the average delay to each aircraft increases rapidly with relatively small increases in aircraft operations (and beyond which levels of service on the airfield deteriorate)....When annual aircraft operations are equal to annual service volume, average...aircraft delays are on the order of one to four minutes. If the number of annual operations exceeds the annual service volume, moderate or severe congestion may occur."

SOURCES: U.S. Department of Transportation, Federal Aviation Administration, April 1989; Caltrans Division of Aeronautics, 1989; *SFIA Final Draft Master Plan*, 1989; San Jose International Airport, 1990; Metropolitan Oakland International Airport draft *Master Plan Update* forecasts, 1988; SFIA Airports Commission, 1990; Environmental Science Associates, Inc., 1991.

B. TRANSPORTATION

SFIA MASTER PLAN TRANSPORTATION ASPECTS

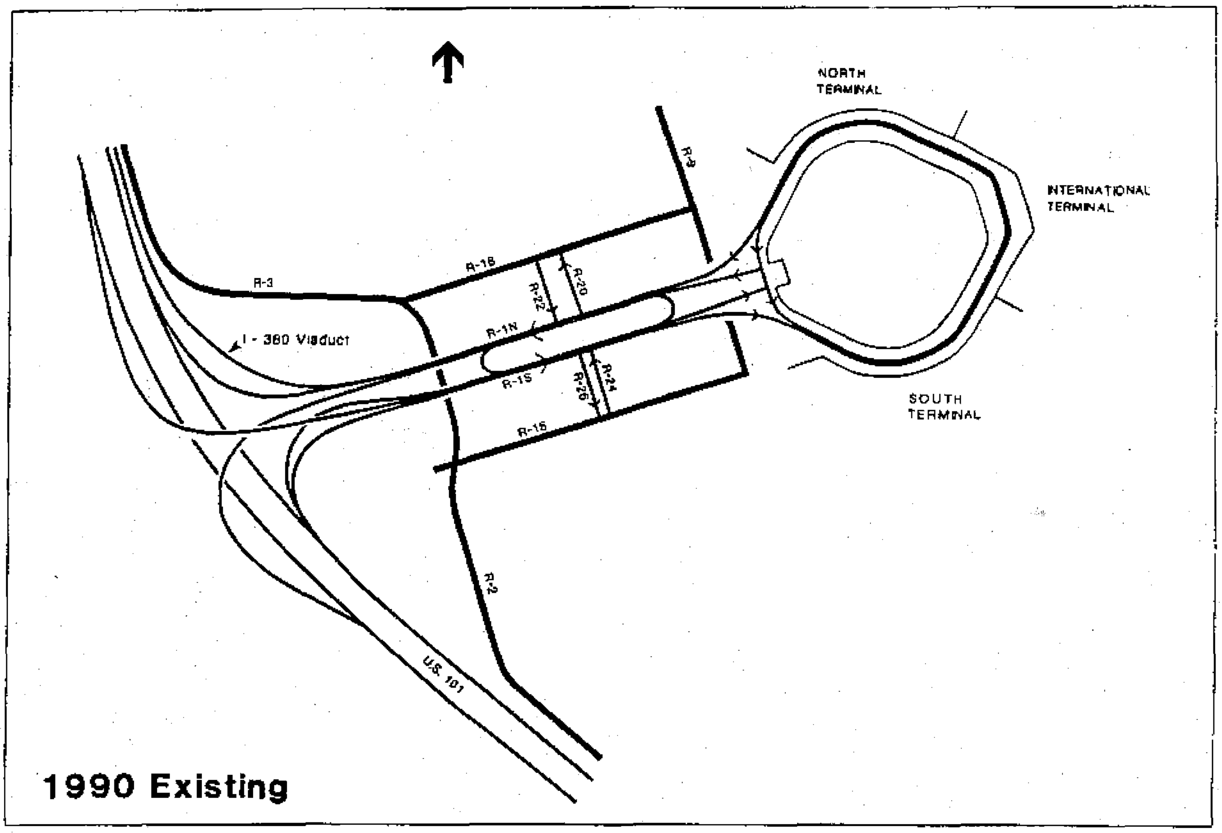
There are proposed changes to transportation infrastructure, including roadway and parking changes and additions included as part of the SFIA Master Plan. These are summarized below.

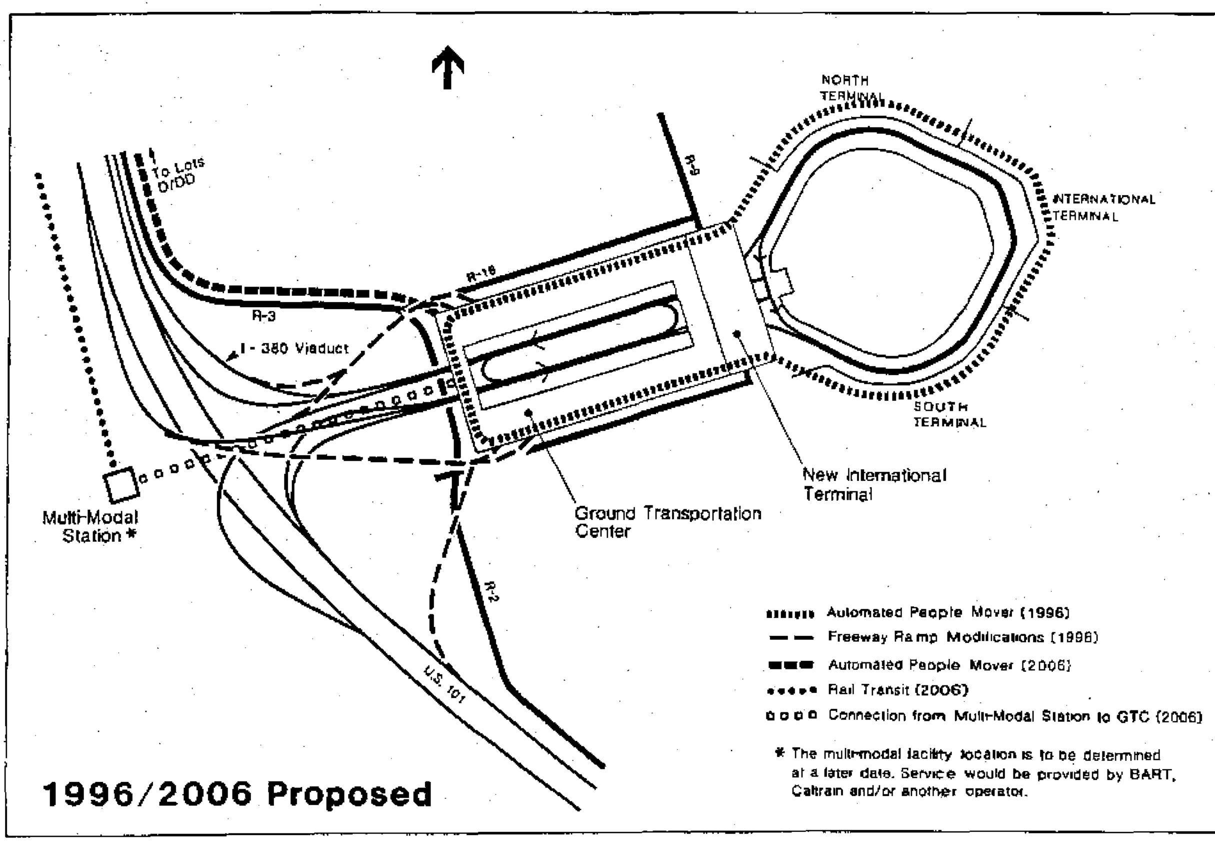
Ground Transportation Center

The proposed Ground Transportation Center (GTC) would centralize the staging areas of buses, vans, regional transit shuttles and rental cars, and provide short-term parking (see Figure 26). A proposed fixed guideway Automated People Mover (most likely light-rail transit) would transport passengers and employees from the GTC to the terminal buildings. The GTC would be constructed as part of the SFIA Master Plan's Near-Term Development Concept, which would be completed in 1996. The Center would be constructed on both sides of and above the terminal access roads (1-N and 1-S) on parcels currently occupied by rental car companies and the Chevron gas station. The Ground Transportation Center would consist of two 5-story parking structures./1/ The October 16, 1989 GTC conceptual layout drawings show GTC levels organized in the following manner:

Level 1	Rental car operations. Direct ramp to/from Freeway.
Level 2	Bus and shuttle van processing and staging. Direct ramp to/from Freeway.
Level 3	Rental car pickup and return. Direct ramp to/from Freeway.
Level 4	Rental car staging and storage, Automated People Mover.
Level 5	Short-term public parking, permit and City / County of San Francisco employee parking.

The GTC proposal provides for a separate, three-level roadway system that would connect to the existing US 101 / I-380 on- and off-ramps via separate ramps from each level. Levels 2 and 3 of the GTC would connect directly to the deplaning and enplaning levels of the proposed new International Terminal. An internal ramp system would permit rental cars (Level 4) and persons who desire short-term public parking (Level 5) to circulate from the Levels 2 and 3 roadway system.





SOURCE: DKS Associates

San Francisco International Airport

Figure 26
Terminal Access

The proposed Automated People Mover would initially have a 20,000-30,000 sq.-ft. interim maintenance facility on the fourth level of the Ground Transportation Center. This interim maintenance facility would remain at the GTC until a permanent facility would be constructed as part of the SFIA Master Plan's Long-Term Development Concept (2006). The Automated People Mover would have stations at each of the seven boarding areas and at four locations on the periphery of the Ground Transportation Center. Its principal purpose would be to distribute passengers from remote parking and rental car facilities quickly and efficiently to the terminal core.

By 2006, the proposed Automated People Mover would serve the relatively remote long-term public and employee parking lots D and DD (see Figure 26, p. 266). The long-term (2006) SFIA Master Plan would accommodate the voter-approved extension of BART to station sites in the vicinity of SFIA./2/ Alternatives for an SFIA BART station currently under consideration include:

- Alternative 3 (and its options) - External SFIA Station. The external station would be located west of U.S. 101 between San Bruno Avenue and Millbrae Avenue. BART passengers would access the Terminal via an extension of the proposed Automated People Mover. Caltrain would operate in the same corridor east of BART and west of U.S. 101, and make use of a multi-modal (BART/CalTrain/SamTrans) station where CalTrain and SamTrans passengers would also be able to access the Terminal via the proposed Automated People Mover. The existing San Bruno CalTrain station would be moved south to the new site. New vehicle access would be provided to the multi-modal station site by ramps from U.S. 101 northbound and southbound. (There would be a Tanforan/San Bruno BART/CalTrain station under I-380, near El Camino Real.)

- Alternative 4 (and its options) - Internal SFIA Subway Station. The internal station would be located below grade underneath the Short Term (SFIA Terminal) parking garage, with pedestrian connections to the existing terminal facility. For this alternative, the proposed Automated People Mover would not be extended to the proposed San Bruno BART/CalTrain station. Rather, CalTrain passengers would transfer to BART at the San Bruno BART/CalTrain station to access the SFIA Terminal, or would board a shuttle bus to access non-Terminal SFIA employment sites. The joint San Bruno BART/CalTrain station would be on the site of the existing San Bruno CalTrain station, south of Angus Avenue.

- Alternative 5 - External SFIA Station via I-380. This alternative would be identical to Alternative 3 but would continue underground from the Tanforan Station and pass under the CalTrain tracks paralleling I-380 on the north side. It would bypass part of San Bruno to the east. The alignment would proceed under I-380 and run south in a cut-and-cover or at-grade profile until it links up with the CalTrain corridor. It would become ground level at the same station designation as in Alternative 3.

- Alternative 6 - Internal SFIA Subway Station with UAL Station. This alternative would be similar to Alternative 5 until just west of US 101 where the alignment continues under the freeway to the Airport. A CalTrain station would be located east of the Tanforan BART Station. (Under Alternative 6A, there would be a CalTrain/BART connection at Tanforan.) A shuttle bus service would transfer passengers between the BART and CalTrain stations. A BART station would be located east of US 101 and south of I-380 near the United Airlines maintenance base with a surface parking lot nearby. The BART line would continue underground to the Airport Station and connect to the same alignment as Alternative 4.

BART would provide service to the SFIA Station every 4-1/2 minutes during peak periods, every 7-1/2 minutes mid-day, and every 20 minutes before 6:00 a.m. and after 7:00 p.m. Two BART lines (routes) would serve the SFIA station before 7:00 p.m. and one line would serve the Station after 7:00 p.m./3/

Although serving different purposes, the Automated People Mover System could be designed to facilitate passenger connections among the multi-model transit station, the terminals, the rental car companies, the parking lots, and the parking garages.

The Automated People Mover would not serve both an SFIA internal BART station and an external (e.g., BART, CalTrain) station. If an SFIA internal BART station is built, the People Mover would not also serve an external BART station. In other words, the People Mover would serve a BART station only if the BART station is located external to the SFIA passenger terminal. With an external BART station, the People Mover would probably serve the station at two-minute headways via a transfer platform with a walk distance of approximately 60 feet./4/

PROGRAMMED AND PLANNED TRANSPORTATION IMPROVEMENTS

Roadway Improvements Programmed by Caltrans

In the vicinity of SFIA, the 1990 Caltrans State Transportation Improvement Program (STIP) lists three programmed improvements:/5/

> I-280 (Junipero Serra Freeway). A northbound auxiliary lane from I-380 to Avalon Drive is scheduled for FY 1992/93. Modified signals and additional turning lanes are to be provided at the San Bruno Avenue interchange.
>
> I-380. On the westbound connector to northbound I-280 there is a programmed improvement to increase the lane width to Caltrans' 12-foot standard. This project is programmed for FY 1992/93.
>
> SR 82 (El Camino Real). Signal modifications and additional turning lanes were programmed at the El Camino Real/San Bruno Avenue intersection for FY 1989/90. This work had not been performed as of May 1991. Completion is now expected by mid-1992.

Caltrans' Traffic Systems Management Plan lists signal coordination on California Drive in Burlingame as a transportation system management (TSM) improvement for FY 1990-91. Each of the above programmed improvements was assumed to be a part of the forecast-growth case for 1996.

Transit Improvements Programmed by BART, CalTrain, and SamTrans

BART is planning a $590 Million (1987 $), 7.1 mile extension of service from the existing terminus at Daly City to SFIA by 2006 (construction beginning in 1994; revenue service by 2000) on the Southern Pacific Railroad alignment near SR 82./6/ Initial passenger service from Daly City to Colma (first station beyond Daly City) is scheduled for 1995, with additional stations at South San Francisco and San Bruno/ Tanforan. As of May, 1991, the BART Board of Directors has not made a formal decision on whether to end heavy rail service west of US 101 and provide connecting light rail/bus service to the SFIA terminal, or to carry heavy rail directly into the SFIA terminal. BART staff has indicated that the Board of Directors has leaned more toward a BART-SFIA station west of US 101, since the long term plan for BART is to continue service further south./7/ Generally, BART will be undertaking capital projects and is considering peak pricing strategies that will allow service frequencies to increase on all lines and enhance the ability of both the existing system and the planned rail extensions to move passengers during peak hours.

Structural and design allowances are being made in the proposed Ground Transportation Center to accommodate both light and heavy rail as well as more frequent bus service. Since a decision has not been made on the connection, and patronage forecasts have not been adopted, this EIR assumes the "2006 with BART" scenario would attract about six percent of air passengers (approximately 6,100 people each day) and about eleven percent of SFIA employees (approximately 4,650 employees each day), based on modified (for employees) mode use tables outlined in the SFIA Master Plan. The employees' BART mode share was modified to account for a larger proportion of BART riders than would be expected from air passengers./8/

The analysis in this EIR considered a rail transit station in the vicinity of SFIA, and the vehicular-traffic results are not dependent on whether the service is BART, CalTrain, or some other transit service. This study frequently refers to a "2006 with BART" scenario, as BART is the only transit operator that has shown interest in providing rail transit service to SFIA.

CalTrain and SamTrans have no capital or operating plans that would alter access to SFIA or the mode share attributed to those modes./9/ An increase in SamTrans use by

SFIA employees (from 3.5 percent today to 4.5 percent in 1996 and 6.0 percent in 2006) has been assumed, based on increased congestion levels' making mass transit more attractive to those employees who have regular work schedules.

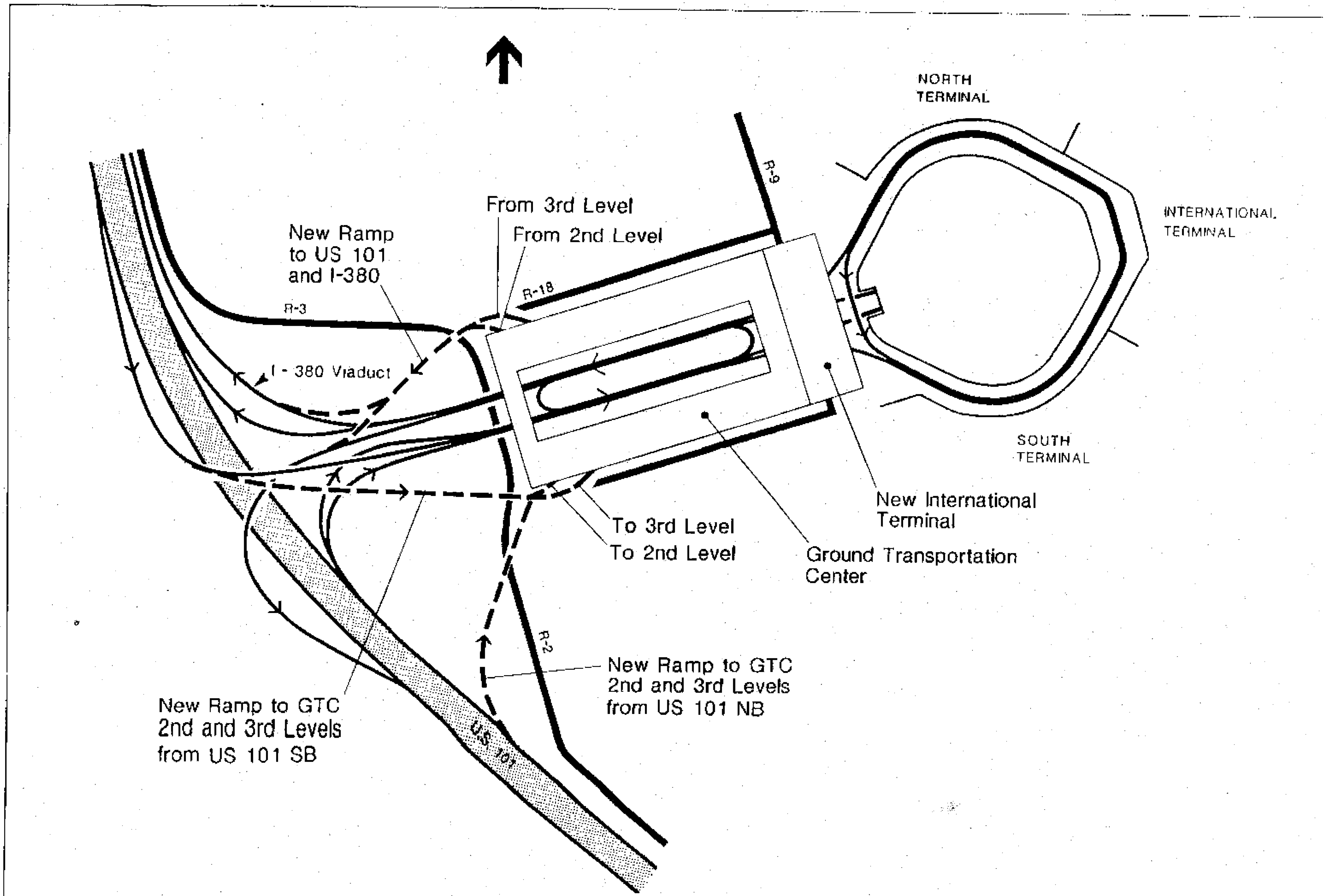
Freeway Interchange Modifications - Part of SFIA Master Plan Project

In order to segregate proposed International Terminal traffic from Ground Transportation Center traffic and traffic using the existing Domestic Terminal roadways, several changes are proposed to the existing US 101 freeway interchange at SFIA. Ground-level traffic using the existing Domestic Terminal roadways would be segregated from traffic going to the GTC and the proposed new International Terminal. Preliminary designs of the GTC (scheduled for completion by 1996) show new ramps leading to both US 101 northbound and US 101 southbound from the GTC's second- and third-level roadways (Figure 27).

1996 Traffic Coming to SFIA from US 101 / I-380.

Access to SFIA from US 101 southbound (e.g., traffic from eastern San Francisco, Brisbane, northern East Bay and other northern areas) would be similar to the current configuration. However, the exit ramp would bifurcate prior to the US 101 overpass, with separate ramps leading to either the Domestic Terminal area or to the GTC and the new International Terminal.

Access to SFIA from US 101 northbound (e.g., traffic from San Mateo, Redwood City or East Bay locations via SR 92) would be altered from the current configuration. Motorists now have a choice of proceeding to either the terminal area or to the garage area via separate lanes that place traffic bound for the arrivals and departures decks in the south (right) lanes of Road 1-S and traffic bound for the garage in the north (left) lanes of Road 1-S. The SFIA Master Plan proposes to have US 101 northbound traffic bound for the Ground Transportation Center or the International Terminal travel on a new elevated roadway (similar to the I-380 westbound viaduct) just west of Road R-2 and east of the Hilton Hotel. Motorists bound for the Domestic Terminal would continue along the existing ramp.



SOURCE: DKS Associates

Figure 27
Freeway Access to
Ground Transportation Center

Access to SFIA from I-380 eastbound (e.g., traffic using I-280 northbound or southbound from western San Francisco, western Daly City, Pacifica, communities in western San Mateo County and portions of Silicon Valley and San Jose) would remain the same via the bifurcated ramp that would also bring US 101 southbound traffic into SFIA.

1996 Traffic Leaving SFIA via US 101 / I-380

Access from the SFIA air passenger terminals to US 101 northbound (e.g., traffic headed toward eastern San Francisco) would be via the existing ramps leading from the Domestic Terminal area and Road 1-N (see Figure 26, p. 266). Motorists on the second and third level of the Ground Transportation Center would not have a direct connection to the US 101 northbound ramp. Instead, they would have to enter the I-380 viaduct and then exit with traffic destined for San Bruno Avenue, where they could connect with the northbound San Bruno Avenue collector road, and then proceed onto a US 101 northbound on-ramp.

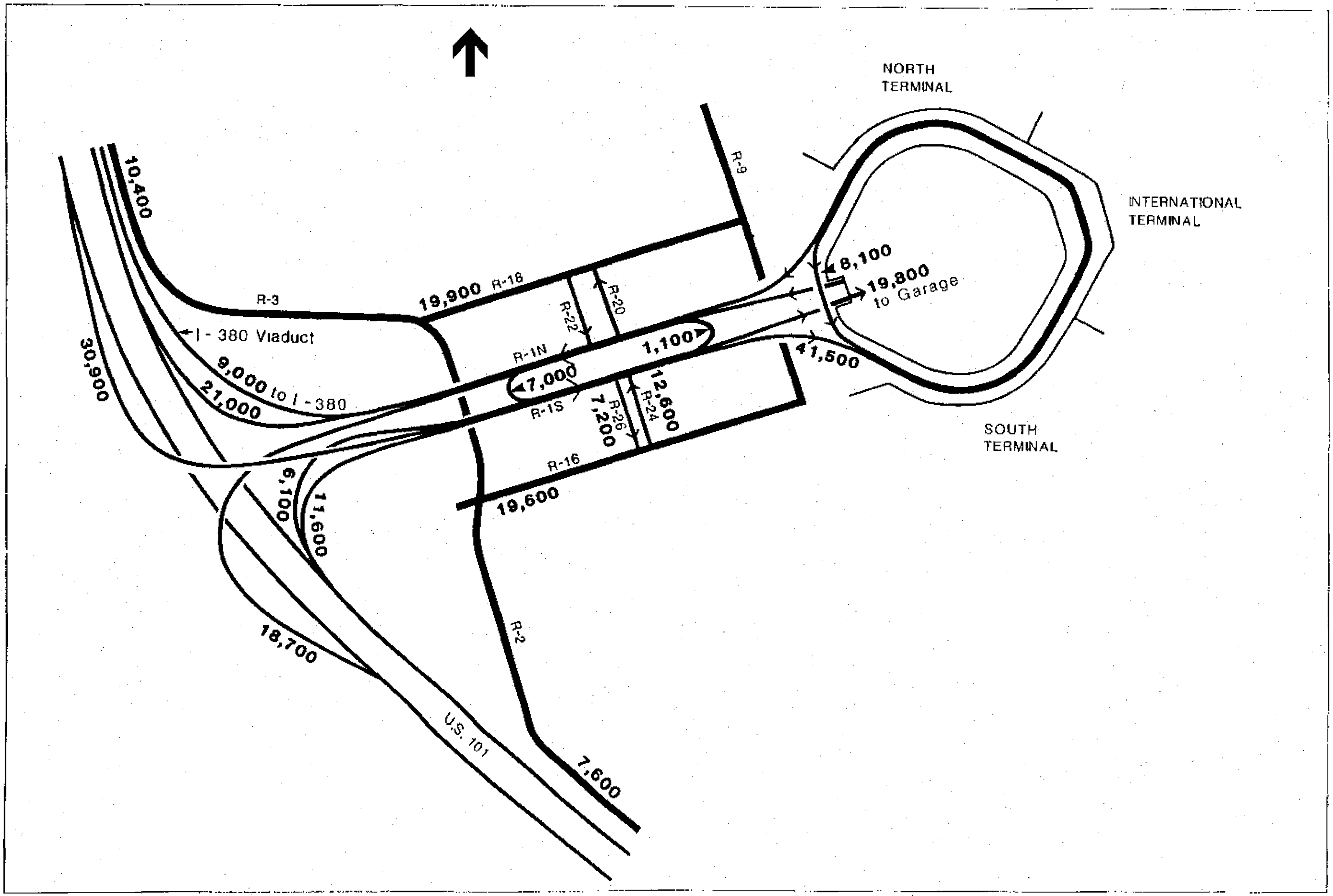
Access from SFIA to US 101 southbound (e.g., traffic headed south to Redwood City or to San Mateo and SR 92) would be provided by ramps from the Domestic Terminal area and the second- and third-level roadways in the Ground Transportation Center.

Access from SFIA to I-380 westbound (e.g., traffic headed to I-280) would continue to be via the I-380 viaduct. The ramps from the terminal buildings would join the I-380 viaduct just west of the Ground Transportation Center. Access would also be provided from a connection to the I-380 viaduct from the second- and third-level roadways in the Ground Transportation Center.

Average daily traffic volumes (ADT's) on the ramps leading in and out of SFIA, and on the SFIA internal roadways, are shown on Figure 28.

FUTURE TRAFFIC CONDITIONS

The analysis of future traffic involved projecting forecast growth (or "background") traffic growth, traffic generated by implementation of the SFIA Master Plan and traffic generated by list-added growth in the traffic impact area. The additional traffic was



SOURCE: SFIA Landside Operations, Summer 1989 ADT's

San Francisco International Airport

Figure 28
Average Daily Traffic
Volumes on SFIA Roadways

then distributed throughout the affected Bay area and assigned to the roadway network. Impacts were assessed in the a.m. and p.m. peak hours for the following scenarios:

<u>1996</u>

- Forecast Growth (existing traffic + background growth traffic from 1990 to 1996); e.g., No Master Plan Project
- Forecast Growth (1996) + SFIA Master Plan (e.g., the project in 1996)
- Forecast Growth (1996) + Project + List-Added Growth (e.g., projects identified by surrounding municipalities as likely to occur, under review, or under construction before 1996)
- "No project" alternative (discussed separately in the "Alternatives" section). This alternative represents the forecast growth plus the list-added growth plus the growth that would occur at SFIA without the Master Plan project, all as of 1996.

<u>2006</u>

- Forecast Growth (existing traffic + background growth traffic from 1990 to 2006); i.e., No Master Plan Project
- Forecast Growth (2006) + SFIA Master Plan
- Forecast Growth + Project + List-Added Growth (2006)
- "No project" alternative (discussed separately in the "Alternatives" section) (2006)

<u>1996 and 2006 Forecast-Growth Traffic Scenarios</u>

The 1996 and 2006 forecast-growth cases represent the projected background traffic growth without including the project or any other specifically known development that may occur in the surrounding jurisdictions. Background (forecast) traffic accounts for the regional trips that travel entirely through the study area, as well as many of the smaller developments in the surrounding cities that may be approved in the future but are not known at this time. (Some generic local development has been assumed in regional forecasting.)

In order to determine the appropriate background traffic growth factors (i.e., account for growth in the municipalities surrounding SFIA that is not known, general growth expected in San Mateo County, and the increase in South-Bay-to-San-Francisco commute trips), projections were taken from a previous Year 2005 traffic model/10/ and factored based on roadway facility type, the roadway's proximity to SFIA and the amount of development identified by the cities that would affect the roadway under consideration. The background traffic growth factors used are 4 percent from 1990 to 1996, and 11 percent from 1990 to 2006.

The 2005 traffic model, which covered an area from San Francisco to SR 92 on the south (including San Mateo, Burlingame, Millbrae, San Bruno, and South San Francisco), incorporated approved projects, and Metropolitan Transportation Commission (MTC) and Association of Bay Area Governments (ABAG) zonal land use data. Since the model's analysis year was 2005, a straight-line projection was used to determine 1996 and 2006 traffic conditions.

ABAG has compiled projections of housing and employment by census tract throughout the Bay Area (ABAG Projections '87). The MTC traffic model has assigned these land use forecasts to 550 analysis zones, which form the basis for the MTC regional transportation model. The 2005 North San Bruno Areawide Traffic Model was derived from MTC's 550-zone regional transportation model. The MTC model is now 700 zones, but was 550 zones at the time the North San Bruno Areawide Study was completed. The North San Bruno Areawide Traffic model has a base year of 1986 and a forecast year of 2005. It is consistent with the General Plans of communities in San Mateo County, and covers an area greater than the study area of this EIR./10/

The across-the-board 4% (1996) and 11% (2006) increase in forecast-growth traffic resulted in consistent future volumes on freeways and at intersections along arterials. For certain intersections where cities had given lengthy lists of projects, the lists were used to project additional traffic growth, and the 4% and 11% forecast-growth factors were scaled back, in order not to forecast unreasonably high traffic volumes at those intersections. This was done in order to avoid any double counting that would result from having a separate (overestimated) forecast-growth case and list-added-growth analysis. Depending on the city/intersection involved, the 1996 forecast growth was scaled back to 0% or 2%, and the 2006 forecast growth to 0% or 5%. This is discussed further under "List-Added-Growth Assumptions," following. For SFIA-project-oriented intersections and ramps, no forecast-growth factor was applied. The increase in traffic at these locations would be accounted for entirely by the project, or by list-added growth. For freeway segment analysis, the forecast-growth from the traffic model alone was used for the analysis, because list-added-growth traffic would be a statistically insignificant addition to freeway mainline traffic.

1996 Project Traffic

The 1996 SFIA Master Plan Near-Term Development scenario includes new developments within SFIA as well as some existing facility expansions. The net increase in existing development and the new development that would generate traffic include:

- 60,000 sq. ft. Automated People Mover interim Maintenance Facility
- 100,670 sq. ft. Pan Am Maintenance Hangar
- 10,000 sq. ft. Service Station relocation
- 5,800 sq. ft. New Building/Construction/Engineering Offices in proposed International Terminal
- 46,200 sq. ft. United Catering Facility
- 36,280 sq. ft. United Cargo Facility expansion
- 268,700 sq. ft. West Field Cargo/Maintenance Facility
- 226,440 sq. ft. East Field Cargo/Maintenance Facility
- 237,000 sq. ft. North Field Cargo/Maintenance Facility
- 7,500 sq. ft. American GSE
- 1,888 sq. ft. FBO Facility
- 5,000 sq. ft. Multipurpose Facility

The 1996 project traffic scenario makes use of the unconstrained passenger forecast of 42,280,000 annual passengers (a net increase of approximately 12,330,000 from 1990 to 1996), and includes the following SFIA roadway improvements proposed as part of the project:

- widening of Road R-3 (McDonnell Road) from 2 lanes to 4 lanes, from US 101 to San Bruno Avenue
- widening of North Access Road from 2 lanes to 4 lanes

The Automated People Mover would affect traffic movement in that vehicles that previously proceeded directly to the terminal buildings would now go to the Ground Transportation Center, and occupants would then use the Automated People Mover to access the terminal buildings. At the very least, the Automated People Mover would make stops in each of the terminal buildings and on both sides of the Ground Transportation Center. The Automated People Mover would move employees and passengers between the terminal and parking areas.

2006 Project Traffic

The 2006 SFIA Final Draft Master Plan Long-Term Development scenario includes, in addition to the items listed above for near-term growth, the following additional developments for 2006:

- 100,000 sq. ft. Office Building
- 162,000 sq. ft. West Field Cargo/Maintenance Facility
- 132,000 sq. ft. U.S. Postal Facility
- 60,000 sq. ft. Automated People Mover permanent Maintenance Facility (replacement for the interim facility)

The 2006 project traffic scenario makes use of the unconstrained passenger forecast of 51,330,000 annual passengers (a net increase of approximately 21,390,000 from 1990 to 2006), and includes the following SFIA roadway improvements proposed as part of the project:

- widening of Road R-2 from 2 lanes to 4 lanes from Millbrae Avenue to Road R-16

The Automated People Mover would be extended from the Ground Transportation Center to the long term parking area (Lot D). The People Mover would now serve employees and passengers accessing the north area of SFIA. Some reduction in the number of SFIA shuttle van and bus trips would be expected along McDonnell Road, as the Automated People Mover would now provide this service. However, the shuttles that currently exist to move passengers and employees between areas within SFIA would still be necessary, as the Automated People Mover would not be able to access points south of the terminal buildings, and northeast of the United Airlines Maintenance Facility.

List-Added-Growth Assumptions

Assumptions regarding developments in the vicinity of SFIA that could affect the traffic operations in the study area were obtained from the cities of Brisbane, Burlingame, Millbrae, San Bruno, and South San Francisco. Brisbane project locations are over six miles from SFIA, and it is unlikely that these projects would affect the study-area intersections in a statistically significant way, and therefore they were not included in the list-added-growth analysis. The projects shown in Table G-4 in Appendix G, p. A.165, were assumed to be completed by 1996 (locations are shown in Figure 13, Section III.A. Land Use, p. 128).

While lists of other developments were provided by the individual cities, only those developments that would affect the subject intersections with a statistically significant volume of traffic were considered. Additional development is accounted for within the framework of future background ("forecast") traffic growth.

Trip Generation

Project - SFIA Master Plan

The future vehicle trip generation that would result from implementation of the SFIA Master Plan project was determined by first establishing the existing trip characteristics of passenger, cargo and employment activity at SFIA. Airports are not typical traffic generators, compared to other types of development. The peak hours of air traffic activity do not correspond to the peak traffic hours on the adjacent roadway network. Employment activity at an airport is not typical of other relatively large employment centers. Airports, and particularly SFIA, have a relatively large number of maintenance and cargo-related employees who work eight-hour shifts, around the clock. The largest shift ends at mid-afternoon, before the evening peak begins.

For the purposes of this analysis, the base day for trip generation analysis was a Friday in May. The following points explain why a typical Friday in May would be appropriate for traffic analysis at SFIA.

- May is the fourth highest month for both enplanements and deplanements at SFIA (8.6% of the annual passengers at SFIA travel in May)./11,12/

- May is the third highest month for all cargo activity at SFIA./13/
- Friday is the busiest weekday for air passengers at SFIA (14.9% of all weekly passengers)./11/
- SFIA administrative and maintenance employees are not yet at the peak of their vacation season (June, July and August).
- School is still in session, and relatively few local residents are on vacation, which results in higher traffic volumes on local streets and arterials in the surrounding jurisdictions.

While May and Fridays are not typically considered to produce the highest overall traffic generation, it is worth noting that SFIA is the largest employment center in San Mateo County and therefore the primary source of employment-generated traffic in the vicinity of SFIA. Thus, employee and passenger traffic to and from SFIA would be considered the determining factors when analyzing any development in the vicinity of SFIA, and particularly when considering the growth anticipated with the SFIA Master Plan.

Trip generation related to air passenger activity at SFIA represents the overwhelming majority of the total trips generated. The remainder of the trips are employment and cargo related. All trips entering and leaving the SFIA terminal area were accounted for in order to establish a trip rate based on the total number of enplanements. The number of trips per enplanement is typically used as a measure of trip generation for passenger activity at commercial airports.

Employees at SFIA were divided into terminal and non-terminal area employees. Of the 31,000 employees (1990 estimate) at SFIA, approximately 14,000 are terminal related and the remaining 17,000 are non-terminal related (e.g., United Air Lines Maintenance, air cargo facilities, etc.). The 14,000 terminal area employees make 28,000 daily commute person trips (one trip to work, one trip home or to another destination), which, when divided among the modes of travel to SFIA, result in approximately 20,500 daily employee-related vehicle trips in the terminal area. The discussion on "mode split" below illustrates these numeric relationships. It is recognized that employees make miscellaneous midday trips as well, but these occur outside the commute hours (i.e., the peak analysis period) and therefore were not quantified for the analysis.

May typically has 20 percent less air passenger activity than August, when the freeway ramp and SFIA roadway traffic counts are conducted every year. The total number of air passenger vehicle trips counted on a Friday in August 1989 was reduced by 20 percent to correspond to the air passenger and employment activity level that was experienced in May 1989. These figures were provided by the SFIA Office of Landside Operations, SFIA Office of Community Affairs, and the SFIA Master Plan, and from traffic counts conducted in May 1990.

For the purposes of this analysis, the peak hours represent the peak hours on the surrounding roadway network, not the air traffic peak hours. This allowed the impact of the greatest magnitude to be analyzed, as the combined traffic from the surrounding communities and the airport-related traffic during those peak hours represent the highest volumes overall. If air traffic peak hours (mid- day and late evening) were used for automobile traffic analysis, volumes on SFIA roadways would be significantly higher./13/ However, the higher SFIA volumes would combine with considerably less traffic from surrounding cities' roadways, and the analysis would therefore not represent the most conservative scenario and the lowest (most-degraded) reasonable traffic service levels.

The impact analysis following assumes that the estimated future number of air passengers can be handled by the existing runways. If this is not so, the peak-hour ground traffic analyzed in this EIR would actually spread out over a longer period (because runway expansion is not proposed, so the peak air traffic would need to be spread over a longer period). Therefore, the peak-hour traffic impacts presented herein are conservative (worst-case).

Calculation of Terminal Area Trips

The following summarizes the calculation method for air passenger and associated employment activity trip generation at SFIA (numbers are rounded):

- August 1989 daily vehicle trips = 102,500
- August 1989 enplanements = 1.61 Million
- May 1989 enplanements = 1.29 Million
- May:August enplanement ratio = 0.80

- Number of fixed daily employment vehicle trips = 20,500
- Number of variable, passenger-related vehicle trips = 102,500-20,500 = 82,000 (August 1989)
- Adjusted total daily passenger-related vehicle trips for May: 82,000 x 0.80 = 65,600
- 65,600 variable + 20,500 fixed = 86,100 (May)
- 1.29 Million enplanements / 4.43 weeks in May x 14.92% of weekly enplanements on Fridays = 43,500 enplanements on a May Friday
- 86,100 / 43,500 enplanements = 1.98 vehicle trips / enplanement for a Friday in May

This figure corresponds directly with other airport trip generation research performed by Greiner Engineering, Inc. in Tampa, Florida./14/ Greiner published an equation, based on data from 20 major North American airports, that can be used to predict that SFIA has a trip rate of 1.98 trips / enplanement.

In order to convert the vehicle trip rate per enplanement to actual a.m. and p.m. peak hour trips on a Friday in May, the following methods were used:

Convert May 1989 Friday enplanements to May 1996 and May 2006 Friday enplanements by using the ratio of future annual enplanements to existing annual enplanements.

- Friday in May 1989 - 43,446 enplanements
- Friday in May 1996 - 61,353 enplanements
- Friday in May 2006 - 74,486 enplanements

Multiply daily enplanements by 1.98 to get daily number of automobile trips (assumes that trips by employees in the terminal area [airline terminals] increase in proportion to enplanements)

- Friday in May 1989 - 86,023 trips
- Friday in May 1996 - 121,479 trips
- Friday in May 2006 - 147,482 trips

Convert daily vehicle trips on a Friday in May to a.m. and p.m. peak-hour trips

- a.m. peak hour trips make up 4.6% of daily trips (2.7% in / 1.9% out)/15/
- Friday in May 1989 - 3,957 vehicle trips in a.m. peak hour
- Friday in May 1996 - 5,588 vehicle trips in a.m. peak hour
- Friday in May 2006 - 6,784 vehicle trips in a.m. peak hour
- p.m. peak hour trips make up 5.0% of daily trips (2.4% in / 2.6% out)/15/
- Friday in May 1989 - 4,301 vehicle trips in p.m. peak hour
- Friday in May 1996 - 6,074 vehicle trips in p.m. peak hour
- Friday in May 2006 - 7,374 vehicle trips in p.m. peak hour

For this illustration, it is assumed that the 1996 and 2006 mode shares remain unchanged (see Tables 27-29, pp. 283-285), except for the percentage of employees who take SamTrans, which was assumed to increase from 3.5% to 4.5% in 1996, and from 4.5% to 6.0% in 2006. A separate analysis has been performed to include the effects of the BART-SFIA extension, which would result in a reduced number of vehicle trips in 2006 (see Table 30, p. 286).

Calculation of Non-Terminal-Area Trips

Cargo-related, maintenance, and other non-terminal-area-related trips were identified by performing a trip generation study of both the TWA Cargo facility and the Federal Express Cargo facility. These two SFIA cargo facilities were selected because they represent two distinct kinds of cargo carriers. TWA handles a relatively large volume of mail in addition to other cargo packages. Federal Express handles many smaller packages that are delivered in bulk from its regional collection centers. After comparing the trip generation at the TWA and Federal Express Cargo facilities with the trips generated in the vicinity of the other cargo facilities at SFIA (i.e., along McDonnell Road, Roads R-6 and R-21, and North Access Road), we determined that cargo-related trips approximate the Institute of Transportation Engineers' (ITE) trip generation rate of light industrial facilities, as functions of building, square footage./16/

The non-terminal areas of SFIA were divided into the following ITE land use categories:

- Light Industrial - including all cargo, maintenance, aviation services, etc.
- Office - including engineering, aviation administration, police

The planned increases in building sizes for each land use were input into the traffic generation model along with the ITE trip generation rates for each respective land use./16/ This accounts for the additional trips generated by employees and visitors (i.e., deliveries) in the non-terminal areas. Project trip generation for 1996 and 2006 is summarized in Tables 31 and 32, pp. 288 and 289, respectively.

TABLE 27: 1990 MODE SPLIT

	Daily Trips				
	1990 Person-Trips		1990 Vehicle-Trips		Average Vehicle
	Volume	Percent	Volume	Percent	Occupancy
Terminal Area					
Air Passengers					
Auto - Park	22,404	20.1%	13,415	20.5%	1.7
Auto - Drop-off	35,396	31.8%	25,283	38.7%	1.4
Rental Car	19,202	17.3%	13,716	21.0%	1.4
Taxi/Limo	6,052	5.4%	4,386	6.7%	1.4
Shuttle Van	12,012	10.8%	6,192	9.5%	1.9
Shuttle Bus	13,271	11.9%	2,064	3.2%	6.4
SamTrans Bus	2,889	2.6%	258	0.4%	11.2
Subtotal	111,226	100.0%	65,313	100.0%	
Employees - based on 14,000 terminal-area employees					
Auto - Park	23,439	83.7%	19,371	94.6%	1.2
Auto - Drop-off	473	1.7%	348	1.7%	1.4
Other	512	1.8%	371	1.8%	1.4
Shuttle Van	252	0.9%	130	0.6%	1.9
Charter	2,341	8.4%	234	1.1%	10
SamTrans Bus	980	3.5%	33	0.2%	30
Subtotal	27,997	100.0%	20,487	100.0%	
Terminal Area Subtotal	139,223		85,800		
Non-Terminal Area					
Employees - based on 17,000 non-terminal-area employees					
Auto - Park	28,461	83.7%	23,522	94.6%	1.2
Auto - Drop-off	575	1.7%	422	1.7%	1.4
Other	622	1.8%	451	1.8%	1.4
Shuttle Van	306	0.9%	158	0.6%	1.9
Charter	2,842	8.4%	284	1.1%	10
SamTrans Bus	1,190	3.5%	40	0.2%	30
Subtotal	33,996	100.0%	24,877	100.0%	
SFIA TOTAL	173,219		110,677		

SOURCE: DKS Associates, Metropolitan Transportation Commission, and SamTrans.

TABLE 28: 1996 MODE SPLIT

	Daily Trips				
	1996 Person-Trips		1996 Vehicle-Trips		Average Vehicle
	Volume	Percent	Volume	Percent	Occupancy
Terminal Area					
Air Passengers					
Auto - Park	32,875	20.1%	19,686	20.5%	1.7
Auto - Drop-off	52,028	31.8%	37,163	38.7%	1.4
Rental Car	28,232	17.2%	20,166	21.0%	1.4
Taxi/Limo	8,879	5.4%	6,434	6.7%	1.4
Shuttle Van	17,698	10.8%	9,123	9.5%	1.9
Shuttle Bus	19,759	12.1%	3,073	3.2%	6.4
SamTrans Bus	4,302	2.6%	384	0.4%	11.2
Subtotal	163,774	100.0%	96,029	100.0%	
Employees - based on 17,161 terminal-area employees					
Auto - Park	28,384	82.7%	23,458	94.4%	1.2
Auto - Drop-off	580	1.7%	427	1.7%	1.4
Other	628	1.8%	455	1.8%	1.4
Shuttle Van	309	0.9%	159	0.6%	1.9
Charter	2,869	8.4%	287	1.2%	10
SamTrans Bus	1,544	4.5%	51	0.2%	30
Subtotal	34,314	100.0%	24,837	100.0%	
Terminal Area Subtotal	198,088		120,866		
Non-Terminal Area					
Employees - based on 20,839 non-terminal-area employees					
Auto - Park	34,468	82.7%	28,486	94.4%	1.2
Auto - Drop-off	704	1.7%	518	1.7%	1.4
Other	763	1.8%	553	1.8%	1.4
Shuttle Van	375	0.9%	193	0.6%	1.9
Charter	3,484	8.4%	348	1.2%	10
SamTrans Bus	1,876	4.5%	63	0.2%	30
Subtotal	41,670	100.0%	30,161	100.0%	
SFIA TOTAL	239,758		151,027		

SOURCE: DKS Associates, Metropolitan Transportation Commission, and SamTrans.

TABLE 29: 2006 MODE SPLIT (WITHOUT BART TO SFIA)

	Daily Trips				
	2006 Person-Trips		2006 Vehicle-Trips		Average Vehicle
	Volume	Percent	Volume	Percent	Occupancy
Terminal Area					
Air Passengers					
Auto - Park	40,926	20.1%	24,506	20.5%	1.7
Auto - Drop-off	64,769	31.8%	46,263	38.7%	1.4
Rental Car	35,146	17.2%	25,104	21.0%	1.4
Taxi/Limo	11,053	5.4%	8,009	6.7%	1.4
Shuttle Van	22,032	10.8%	11,357	9.5%	1.9
Shuttle Bus	24,597	12.1%	3,825	3.2%	6.4
SamTrans Bus	5,356	2.6%	478	0.4%	11.2
Subtotal	203,879	100.0%	119,542	100.0%	
Employees - based on 19,103 terminal-area employees					
Auto - Park	31,023	81.2%	25,639	94.3%	1.2
Auto - Drop-off	646	1.7%	475	1.7%	1.4
Other	699	1.8%	507	1.9%	1.4
Shuttle Van	344	0.9%	177	0.7%	1.9
Charter	3,194	8.4%	314	1.2%	10
SamTrans Bus	2,292	6.0%	76	0.3%	30
Subtotal	38,198	100.0%	27,188	100.0%	
Terminal Area Subtotal	242,077		146,730		
Non-Terminal Area					
Employees - based on 23,197 non-terminal-area employees					
Auto - Park	37,672	81.2%	31,134	94.3%	1.2
Auto - Drop-off	784	1.7%	577	1.7%	1.4
Other	835	1.8%	605	1.9%	1.4
Shuttle Van	418	0.9%	215	0.7%	1.9
Charter	3,897	8.4%	390	1.2%	10
SamTrans Bus	2,784	6.0%	93	0.3%	30
Subtotal	46,390	100.0%	33,014	100.0%	
SFIA TOTAL	288,467		179,744		

SOURCE: DKS Associates, Metropolitan Transportation Commission, and SamTrans.

TABLE 30: 2006 MODE SPLIT (WITH BART TO SFIA)

	Daily Trips				
	2006 Person-Trips		2006 Vehicle-Trips		Average Vehicle
	Volume	Percent	Volume	Percent	Occupancy
Terminal Area					
Air Passengers					
Auto - Park	38,287	18.8%	22,926	20.2%	1.7
Auto - Drop-off	60,485	29.7%	43,204	38.1%	1.4
Rental Car	35,029	17.2%	25,020	22.1%	1.4
Taxi/Limo	10,997	5.4%	7,969	7.0%	1.4
Shuttle Van	19,958	9.8%	10,288	9.1%	1.9
Shuttle Bus	24,642	12.1%	3,832	3.4%	6.4
SamTrans Bus	2,037	1.0%	182	0.2%	11.2
BART	12,219	6.0%	0	0.0%	n/a
Subtotal	203,654	100.0%	113,421	100.0%	
Employees - based on 19,103 terminal-area employees					
Auto - Park	28,349	74.2%	23,429	94.2%	1.2
Auto - Drop-off	573	1.5%	421	1.7%	1.4
Other	611	1.6%	443	1.8%	1.4
Shuttle Van	535	1.4%	276	1.1%	1.9
Charter	2,674	7.0%	267	1.1%	10
SamTrans Bus	1,261	3.3%	42	0.2%	30
BART	4,203	11.0%	0	0.0%	n/a
Subtotal	38,206	100.0%	24,878	100.0%	
Terminal Area Subtotal	241,860		138,299		
Non-Terminal Area					
Employees - based on 23,197 non-terminal-area employees					
Auto - Park	34,424	74.2%	28,450	94.2%	1.2
Auto - Drop-off	696	1.5%	512	1.7%	1.4
Other	742	1.6%	538	1.8%	1.4
Shuttle Van	650	1.4%	335	1.1%	1.9
Charter	3,248	7.0%	325	0.2%	10
SamTrans Bus	1,531	3.3%	51	0.2%	30
BART	5,103	11.0%	0	0.0%	0
Subtotal	46,394	100.0%	30,211	100.0%	
SFIA TOTAL	288,254		168,510		

SOURCE: DKS Associates, Metropolitan Transportation Commission, and SamTrans.

List-Added Growth

Traffic generation of the proposed list-added land uses was estimated based on standard Institute of Transportation Engineers (ITE) trip generation rates. Table G-4 in Appendix G, p. A.165, summarizes the list-added-projects trip generation for the a.m. and p.m. peak hours.

<u>Trip Distribution</u>

Project - SFIA Master Plan

The trip distribution for project-related traffic was developed based on the 1983 Employee Survey conducted by SamTrans and the 1989 Air Passenger Survey conducted by the Metropolitan Transportation Commission (MTC). These documents note the cities and/or counties of origin for trips destined for SFIA. The trip distributions (shown in Figure 29 for air passengers and Figure 30 for SFIA employees, pp. 290-291) were assumed not to change for the future-year scenarios. The employee and air passenger trip distributions were combined into an overall SFIA trip distribution, which was then compared against the MTC nine-county Bay Area 700-zone model's trip distribution for the SFIA zone. The trip distribution based on survey data was determined to be consistent with MTC's SFIA trip distribution. (Note: in Figure 29, trip percentages for I-280 North, I-280 South and San Bruno Avenue do not total the percentage for I-380 due to rounding. In Figure 30, 6.5 percent of trips are shown for I-380 west of I-280, although I-380 does not extend west of 280. These trips are assumed to dissipate on the western portions of Sneath Lane and San Bruno Avenue.)

List-Added Growth

The trip distribution for each list-added project was determined from MTC's 700-zone Bay Area traffic model. List-added growth traffic was distributed to the network according to the distribution percentages outlined in Table 33, p. 292.

Mode Split

A variety of travel modes are available for both employees and air passengers to get to SFIA: drive alone, carpool, bus transit, shuttle vans, shuttle buses, public transit

(SamTrans), combined use of public transit with CalTrain or BART, rental cars, taxis and limousines.

TABLE 31: PROJECT TRIP GENERATION 1996 A.M. AND P.M. PEAK HOURS

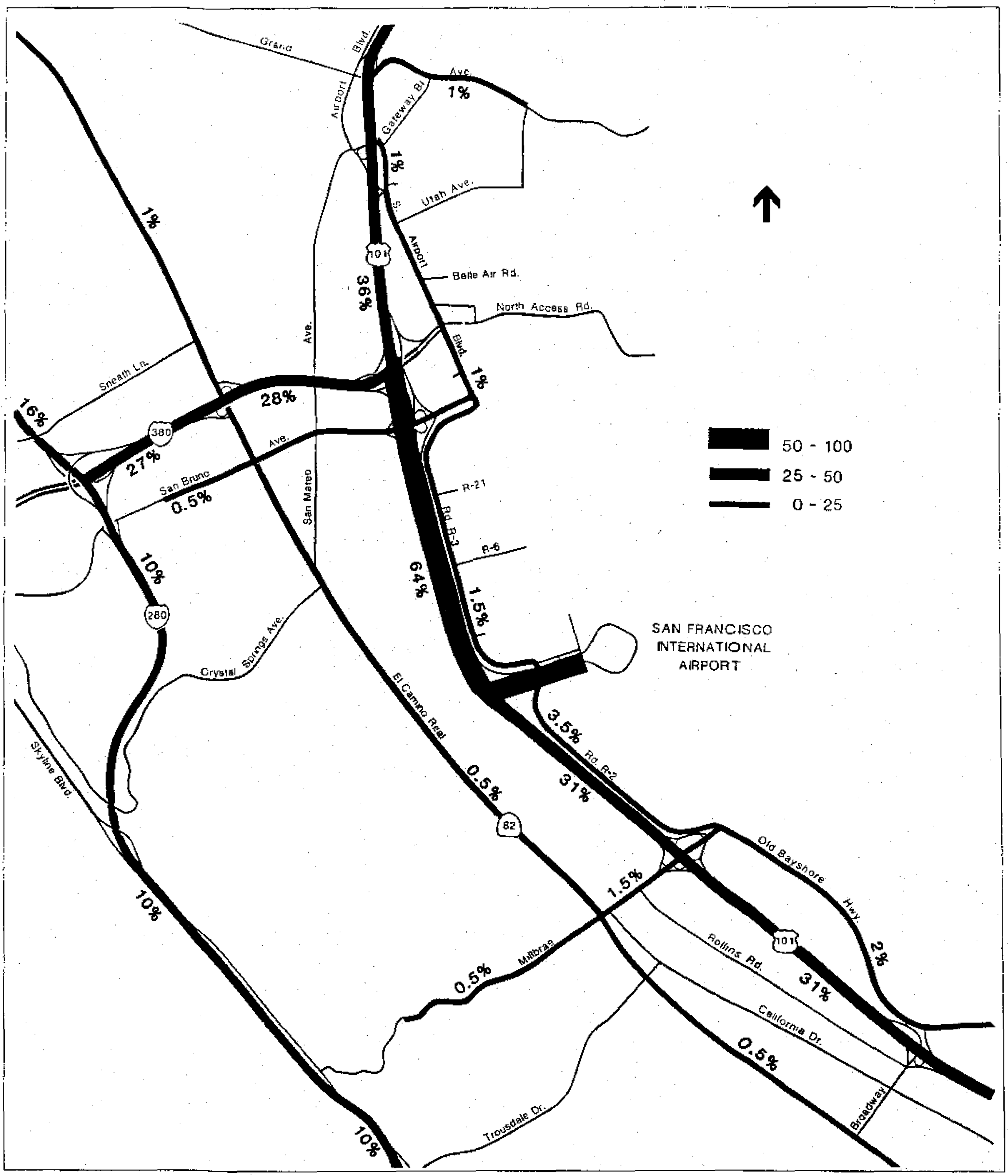
Name		Units	A.M. Peak Hour Rate In	Rate Out	Trips In	Trips Out	Total Trips	P.M. Peak Hour Rate In	Rate Out	Trips In	Trips Out	Total Trips
APM Interim Maint. Facility	60.00	KSF	0.85	0.12	51	7	58	0.13	0.91	8	55	63
Pan Am Maintenance Hangar	100.67	KSF	0.85	0.12	86	12	98	0.13	0.91	13	92	105
Service Station Relocate	0.10	KSF	0.85	0.12	0	0	0	0.13	0.91	0	0	0
New Bldg/Const/Engine Office	5.80	KSF	0.46	0.07	3	0	3	0.08	0.42	0	2	3
Unconstrained Growth A.M.	824.00	Enp	1.10	0.88	904	728	1,632					
Unconstrained Growth P.M.	895.00	Enp						0.950	1.030	856	922	1,772
UAL Catering Facility	46.20	KSF	0.85	0.12	39	6	45	0.13	0.91	6	42	48
UAL Cargo Facility Expand	36.28	KSF	0.85	0.12	31	4	35	0.13	0.91	5	33	38
W. Field Cargo/Maint.	268.70	KSF	0.85	0.12	228	32	260	0.13	0.91	35	245	280
American GSE	7.50	KSF	0.85	0.12	6	1	7	0.13	0.91	1	7	8
E. Field Cargo/Maint.	226.44	KSF	0.85	0.12	192	27	219	0.13	0.91	29	206	235
FBO Facility	1.89	KSF	0.85	0.12	2	0	2	0.13	0.91	0	2	2
N. Field Cargo/Maint.	237.00	KSF	0.85	0.12	201	28	229	0.13	0.91	31	216	247
Multipurpose Facility	5.00	KSF	0.85	0.12	4	1	5	0.13	0.91	1	5	6

SOURCES: ITE, DKS Associates

TABLE 32: PROJECT TRIP GENERATION 2006 A.M. AND P.M. PEAK HOURS

Name		Units	A.M. Peak Hour Rate In	A.M. Peak Hour Rate Out	A.M. Peak Hour Trips In	A.M. Peak Hour Trips Out	A.M. Peak Hour Total Trips	P.M. Peak Hour Rate In	P.M. Peak Hour Rate Out	P.M. Peak Hour Trips In	P.M. Peak Hour Trips Out	P.M. Peak Hour Total Trips
Pan Am Maintenance Hangar	100.67	KSF	0.85	0.12	86	12	98	0.13	0.91	13	92	105
Service Station Relocate	0.10	KSF	0.85	0.12	0	0	0	0.13	0.91	0	0	0
100K Office Building	86.94	KSF	0.46	0.07	40	6	46	0.08	0.42	7	37	43
New Bldg/Const/Engine Office	5.80	KSF	0.46	0.07	3	0	3	0.08	0.42	0	2	3
Unconstrained Growth A.M.	1,428.00	Enp	1.10	0.88	1,567	1,261	2,827					
Unconstrained Growth P.M.	1,552.00	Enp						0.950	1.030	1,474	1,599	3,073
UAL Catering Facility	46.20	KSF	0.85	0.12	39	6	45	0.13	0.91	6	42	48
UAL Cargo Facility Expand	36.28	KSF	0.85	0.12	31	4	35	0.13	0.91	5	33	38
W. Field Cargo/Maint.	268.70	KSF	0.85	0.12	228	32	260	0.13	0.91	35	245	280
American GSE	7.50	KSF	0.85	0.12	6	1	7	0.13	0.91	1	7	8
W. Field Cargo/Maint.	102.00	KSF	0.85	0.12	87	12	99	0.13	0.91	13	93	106
US Post Office	132.00	KSF	0.85	0.12	112	16	128	0.13	0.91	17	120	137
APM Maintenance Facility	60.00	KSF	0.84	0.12	50	7	58	0.12	0.91	7	55	62
E. Field Cargo/Maint.	226.44	KSF	0.85	0.12	192	27	219	0.13	0.91	29	206	235
FBO Facility	1.89	KSF	0.85	0.12	2	0	2	0.13	0.91	0	2	2
N. Field Cargo/Maint.	237.00	KSF	0.85	0.12	201	28	229	0.13	0.91	31	216	247
Multipurpose Facility	5.00	KSF	0.85	0.12	4	1	5	0.13	0.91	1	5	6

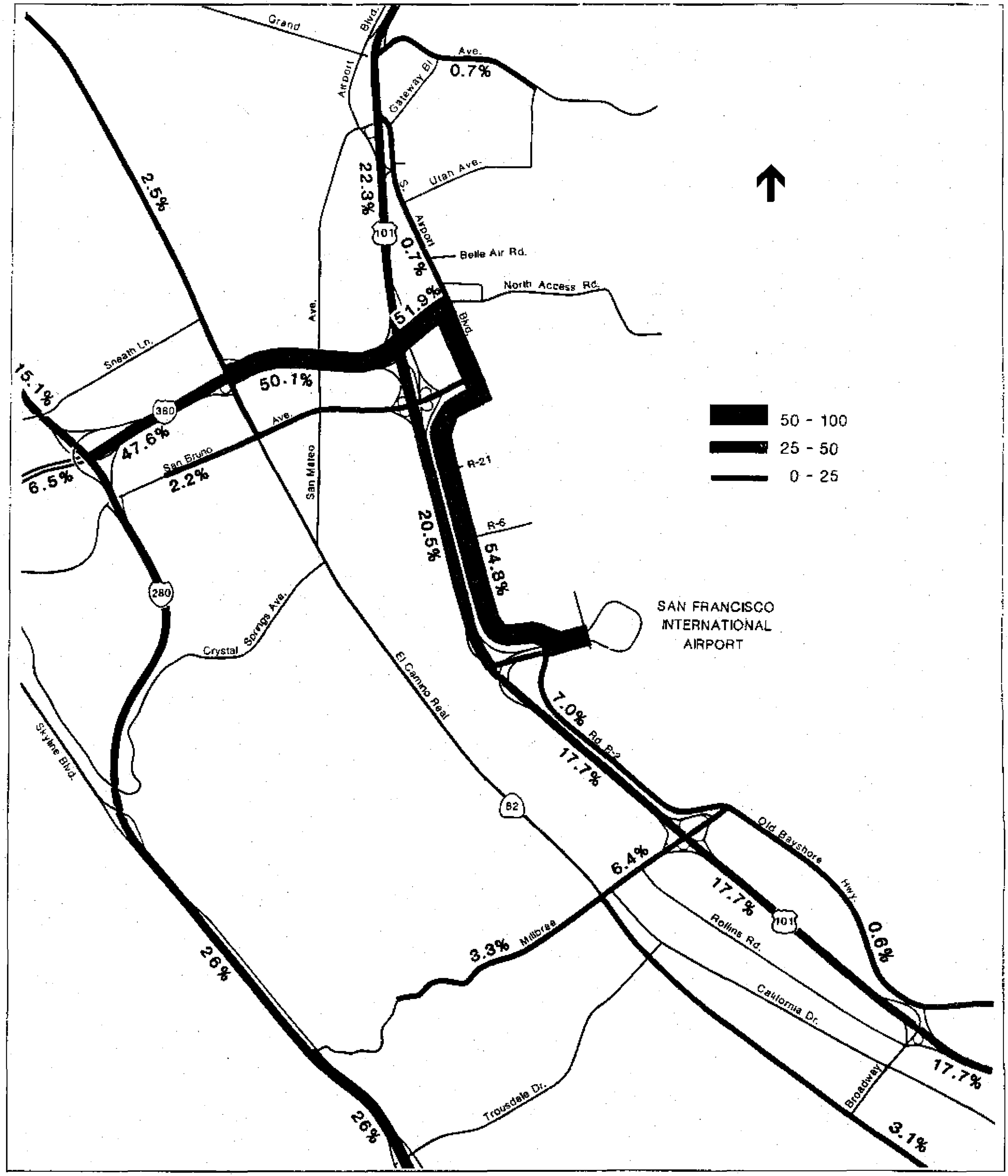
SOURCES: ITE, and DKS Associates



SOURCE: 1985 MTC Air Passenger Survey
1989 San Francisco Airport Commission Air Passenger Survey

San Francisco International Airport ■

Figure 29
Trip Distribution
of SFIA Passengers



SOURCE: 1983 SamTrans Employee/Employer Survey

Figure 30
Trip Distribution of
SFIA Employees

TABLE 33: TRIP DISTRIBUTION FOR LIST-ADDED GROWTH

	Percent of Trips Assigned			
To	From Burlingame	From Millbrae	From San Bruno	From South San Francisco
SFIA Terminal Area	3.1%	5.1%	3.1%	2.5%
South San Francisco	2.7	4.0	18.7	31.2
US 101 NB	11.5	21.7	38.0	30.8
El Camino Real (SR 82) NB	1.9	11.1	2.2	2.2
I-280 NB	3.4	9.4	15.9	11.0
I-380 WB	0.2	0.9	3.0	1.7
Burlingame	16.2	10.3	2.4	2.5
US 101 SB	37.5	15.4	8.8	7.9
El Camino Real (SR 82) SB	16.0	9.7	2.3	1.1
I-280 SB	2.3	2.2	1.2	1.0
Millbrae Avenue	4.7	7.4	1.6	0.6
San Bruno Avenue	0.5	2.8	2.9	7.5
TOTAL:	100.0%	100.0%	100.0%	100.0%

SOURCE: MTC 2005 Trip Tables, June 1989.

In order to estimate future transit mode splits, it was necessary to convert vehicle trips, as estimated above, to person-trips, forecast changes in mode use at the person-trip level, then reconvert to vehicle trips. This method was useful in determining a likely number of person trips that would shift to BART in 2006 and the number of vehicle trips that would be removed from roadways in the impact area as a result of BART service to SFIA. Tables 27, 28, and 29, pp. 283-285 illustrate mode split for SFIA person and vehicle trips in 1990, 1996 and 2006. Table 30, p. 286 illustrates mode split for 2006 with the BART to SFIA scenario.

EXISTING TRAFFIC CONDITIONS

The results of the existing traffic conditions analysis, which are described in the setting section, have been summarized in Table 34 for intersections shown on Figure 31, p. 294.

TABLE 34: EXISTING INTERSECTION LEVELS OF SERVICE IN THE VICINITY OF SFIA

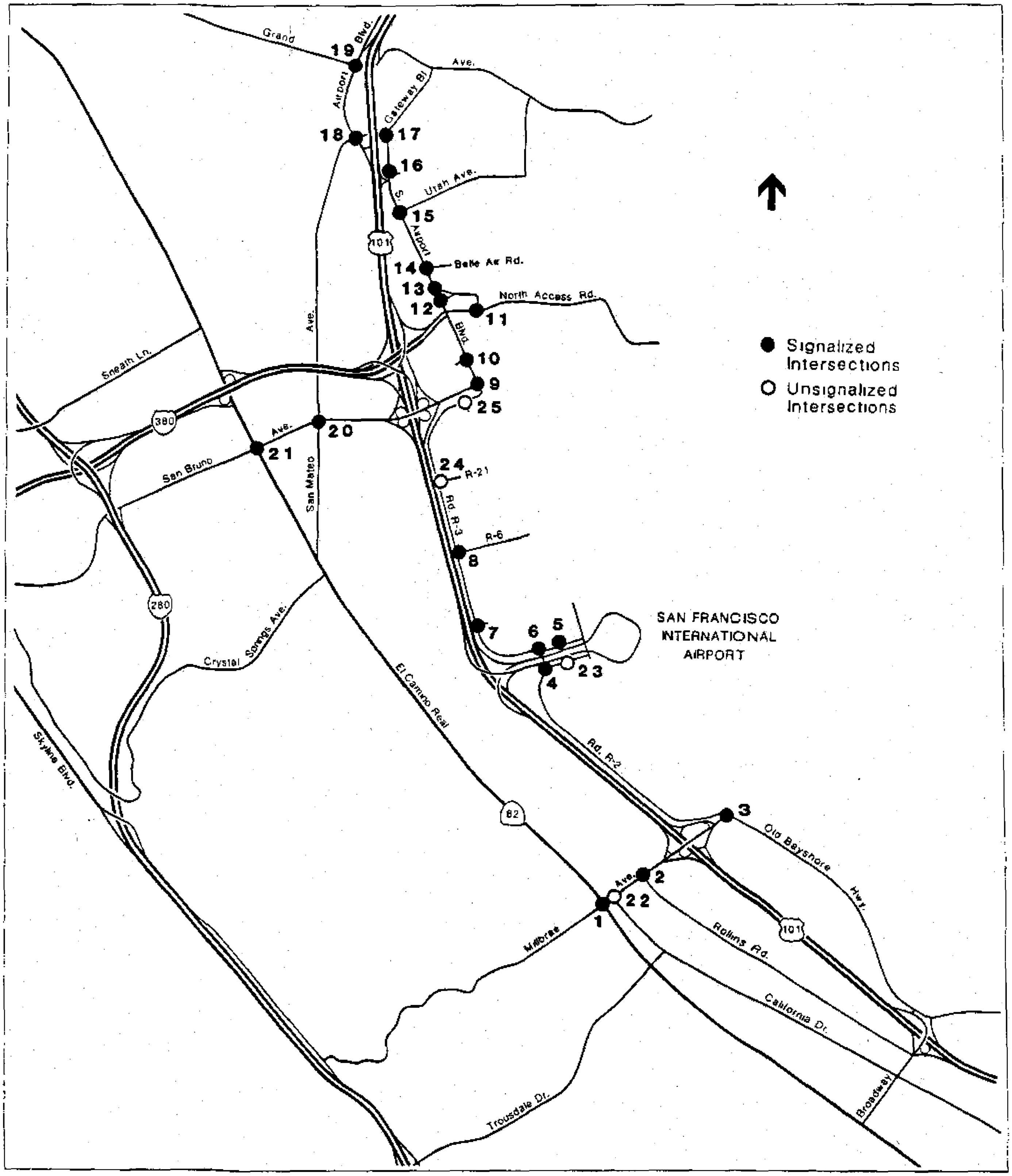
Intersection	A.M. Peak Hour V/C	A.M. Peak Hour LOS	P.M. Peak Hour V/C	P.M. Peak Hour LOS
Signalized				
1. El Camino Real/Millbrae Ave	0.92	E	1.00	F
2. Rollins Rd/Millbrae Ave	0.94	E	0.77	C
3. Old Bayshore Hwy/Millbrae Ave	0.24	A	0.49	A
4. Rd R-2/Rd R-16/Hilton Hotel	0.24	A	0.42	A
5. Rds R-20, R-22/Rd R-18	0.24	A	0.23	A
6. Rd R-3 (McDonnell)/Rd R-18	0.28	A	0.32	A
7. Rd R-3/UAL Cargo	0.15	A	0.18	A
8. Rd R-3/Rd R-6	0.25	A	0.28	A
9. S. Airport Blvd/San Bruno Ave	0.39	A	0.39	A
11. N. Access Rd/N. Access Road E. (101/380 on-/off-ramp)	0.51	A	0.35	A
12. S. Airport Blvd/N. Access Rd S. (101/380 off-ramp)	0.44	A	0.51	A
13. S. Airport Blvd/N. Access Rd N. (101/380 on-ramp)	0.32	A	0.33	A
14. S. Airport Blvd/Belle Air Rd	0.30	A	0.71	C
15. S. Airport Blvd/Utah Ave	0.50	A	0.91	D/E
16. S. Airport Blvd/US 101 NB ramps/ Radisson Hotel	0.52	A	0.52	A
17. S. Airport Blvd/Gateway Blvd	0.30	A	0.45	A
18. Airport Blvd/Produce Ave/ San Mateo Ave	0.37	A	0.71	C
19. Airport Blvd/Grand Ave	0.65	B	0.70	C
20. San Mateo Ave/San Bruno Ave	0.59	A	0.69	B
21. El Camino Real/San Bruno Ave	0.61	B	1.00	F
Unsignalized /a/				
22. California Dr/Millbrae Ave		A/A		A/C
23. Rds R-24, R-26/Rd R-16/b/		> C		> C
24. Rd R-3/Rd R-6		< C		< C
25. Long-Term Parking/Rd R-3		A/C		A/C

NOTES: > C = LOS C or better (e.g., LOS A, B or C); < C = LOS D or worse (e.g., LOS D, E or F). Intersection 10 in Figure 17 in Section III.B was counted for pedestrian volumes only, so does not appear in this table.

/a/ Unsignalized intersection levels of service reflect the delays for left-turning movements from the major street onto the minor street (the first letter), and from the minor street onto the major street (the second letter). They are based on the excess capacity available to make the indicated movement.

/b/ For multi-stop controlled intersections (3-way and 4-way stop signs), the 1985 *Highway Capacity Manual* specifies a total intersection approach volume that corresponds to LOS C.

SOURCE: DKS Associates.



SOURCE: DKS Associates

San Francisco International Airport

Figure 31
Intersections Analyzed

PROJECT IMPACTS

Intersections

The project's impacts on signalized and unsignalized intersection operations were determined by adding traffic generated by the project to 1996 and 2006 forecast-growth traffic volumes and calculating intersection levels of service. Table 35 shows the intersections' levels of service with project traffic in 1996. This table compares 1990 existing conditions to future forecast-growth conditions (e.g., no-project with a maximum of 4 percent background (forecast) growth, and also to future-forecast-growth-plus-project conditions. For some intersections, volume/capacity (V/C) ratios decrease from existing (1990) values to No-Project (1996) values. This is the result of planned intersection improvements, to be completed by 1996, that would offset expected increases in area traffic growth.

1996 Forecast Growth Plus Project

The forecast-growth traffic condition alone in 1996 would cause the intersection of Airport Boulevard at Grand Avenue to degrade from LOS B to LOS D in the a.m. peak hour. No other intersection would experience a LOS grade change as a result of 1996 a.m. peak-hour forecast-growth traffic. The addition of 1996 project traffic to 1996 a.m. peak-hour forecast-growth traffic volumes would cause the level of service (LOS) at two intersections to degrade to LOS F from LOS E: El Camino Real (SR 82) at Millbrae Avenue, and Rollins Road at Millbrae Avenue. The intersection of Airport Boulevard at Grand Avenue would remain at LOS D with 1996 project traffic.

Forecast-growth traffic alone in 1996 would cause the intersection of Rollins Road at Millbrae Avenue to degrade from LOS C to LOS C/D during the p.m. peak hour. The addition of 1996 project traffic to 1996 p.m. peak-hour forecast-growth traffic volumes would cause no degradations in level of service to unacceptable levels (LOS E or F). The LOS at South Airport Boulevard at Utah Avenue would remain at LOS E with the addition of 1996 project traffic. The intersections of El Camino Real at Millbrae Avenue and El Camino Real at San Bruno Avenue would remain at LOS F and LOS E/F, respectively, with the addition of 1996 project traffic, although the poor conditions would occur for a longer period of time.

TABLE 35: 1996 PROJECT IMPACTS - INTERSECTION LEVELS OF SERVICE IN THE VICINITY OF SFIA - A.M. PEAK HOUR

Intersection	1990 Existing V/C	1990 Existing LOS	1996 Forecast Growth V/C	1996 Forecast Growth LOS	1996 With Project V/C	1996 With Project LOS
Signalized						
1. El Camino Real/Millbrae Ave.	0.92	E	0.96	E	1.03	F
2. Rollins Rd./Millbrae Ave.	0.94	E	0.97	E	1.02	F
3. Old Bayshore Hwy./Millbrae Ave.	0.24	A	0.24	A	0.31	A
4. Rd. R-2/Rd. R-16/Hilton Hotel	0.24	A	0.24	A	0.28	A
5. Rds. R-20, R-22/Rd. R-18	0.24	A	0.24	A	0.28	A
6. Rd. R-3 (McDonnell)/Rd. R-18	0.28	A	0.20	A	0.29	A
7. Rd. R-3/UAL Cargo	0.15	A	0.15	A	0.18	A
8. Rd. R-3/Rd. R-6	0.25	A	0.19	A	0.29	A
9. S. Airport Blvd./San Bruno Ave.	0.39	A	0.39	A	0.46	A
11. N. Access Rd./N. Access Road E. (101/380 on-/off-ramp)	0.51	A	0.40	A	0.53	A
12. S. Airport Blvd./N. Access Rd. S. (101/380 off-ramp)	0.44	A	0.45	A	0.60	A/B
13. S. Airport Blvd./N. Access Rd. N. (101/380 on-ramp)	0.32	A	0.33	A	0.34	A
14. S. Airport Blvd./Belle Air Rd.	0.30	A	0.31	A	0.31	A
15. S. Airport Blvd./Utah Ave.	0.50	A	0.50	A	0.50	A
16. S. Airport Blvd./US 101 NB ramps/ Radisson Hotel	0.52	A	0.53	A	0.54	A
17. S. Airport Blvd./Gateway Blvd.	0.30	A	0.29	A	0.29	A
18. Airport Blvd./Produce Ave./ San Mateo Ave.	0.37	A	0.37	A	0.37	A
19. Airport Blvd./Grand Ave.	0.65	B	0.86	D	0.86	D
20. San Mateo Ave./San Bruno Ave.	0.59	A	0.52	A	0.55	A
21. El Camino Real/San Bruno Ave.	0.61	B	0.61	A/B	0.66	B
Unsignalized/a/						
22. California Dr./Millbrae Ave.		A/A		A/C		A/D
23. Rds. R-24, R-26/Rd. R-16/b/		> C		> C		< C
24. Rd. R-3/Rd. R-6		< C		> C		> C
25. Long-Term Parking/Rd. R-3		A/C		A/C		A/D

NOTE: > C = LOS C or better (e.g., LOS A, B or C); < C = LOS D or worse (e.g., LOS D, E or F). Intersection 10 in Figure 17, Section III.B Transportation Setting, was counted for pedestrian volumes only, so does not appear in this table.

/a/ Unsignalized intersection levels of service reflect the delays from left-turning movements from the major street onto the minor street (the first letter), and from the minor street onto the major street (the second letter). They are based on the excess capacity available to make the indicated movement.

/b/ For multi-stop controlled intersections (3-way and 4-way stop signs), the 1985 *Highway Capacity Manual* specifies a total intersection approach volume that corresponds to LOS C.

SOURCE: DKS Associates.

TABLE 35: 1996 PROJECT IMPACTS (Continued) - INTERSECTION LEVELS OF SERVICE IN THE VICINITY OF SFIA - P.M. PEAK HOUR

		1990 Existing		1996 Forecast Growth		1996 With Project	
	Intersection	V/C	LOS	V/C	LOS	V/C	LOS
	Signalized						
1	El Camino Real/Millbrae Ave.	1.00	F	1.05	F	1.10	F
2.	Rollins Rd./Millbrae Ave.	0.77	C	0.80	C/D	0.84	D
3.	Old Bayshore Hwy./Millbrae Ave.	0.49	A	0.49	A	0.55	A
4.	Rd. R-2/Rd. R-16/Hilton Hotel	0.42	A	0.42	A	0.43	A
5.	Rds. R-20, R-22/Rd. R-18	0.23	A	0.23	A	0.30	A
6.	Rd. R-3 (McDonnell)/Rd. R-18	0.32	A	0.23	A	0.36	A
7.	Rd. R-3/UAL Cargo	0.18	A	0.18	A	0.24	A
8.	Rd. R-3/Rd. R-6	0.28	A	0.19	A	0.23	A
9.	S. Airport Blvd./San Bruno Ave.	0.39	A	0.35	A	0.38	A
11.	N. Access Rd./N. Access Road E. (101/380 on-/off-ramp)	0.35	A	0.22	A	0.24	A
12.	S. Airport Blvd./N. Access Rd. S. (101/380 off-ramp)	0.51	A	0.51	A	0.62	B
13.	S. Airport Blvd./N. Access Rd. N. (101/380 on-ramp)	0.33	A	0.33	A	0.49	A
14.	S. Airport Blvd./Belle Air Rd.	0.71	C	0.73	C	0.73	C
15.	S. Airport Blvd./Utah Ave.	0.91	D/E	0.94	E	0.94	E
16.	S. Airport Blvd./US 101 NB ramps/ Radisson Hotel	0.52	A	0.54	A	0.54	A
17.	S. Airport Blvd./Gateway Blvd.	0.45	A	0.48	A	0.48	A
18.	Airport Blvd./Produce Ave./ San Mateo Ave.	0.71	C	0.73	C	0.73	C
19.	Airport Blvd./Grand Ave.	0.70	C	0.72	C	0.72	C
20.	San Mateo Ave./San Bruno Ave.	0.69	B	0.65	B	0.69	B
21.	El Camino Real/San Bruno Ave.	1.00	F	1.00	E/F	1.01	E/F
	Unsignalized/a/						
22.	California Dr./Millbrae Ave.		A/C		A/C		A/D
23.	Rds. R-24, R-26/Rd. R-16/b/		> C		> C		< C
24.	Rd. R-3/Rd. R-6		< C		> C		> C
25.	Long-Term Parking/Rd. R-3		A/C		A/C		A/D

NOTE: > C = LOS C or better (e.g., LOS A, B or C); < C = LOS D or worse (e.g., LOS D, E or F). Intersection 10 in Figure 17, Section III.B. Transportation Setting, was counted for pedestrian volumes only, so does not appear in this table.

/a/ Unsignalized intersection levels of service reflect the delays from left-turning movements from the major street onto the minor street (the first letter), and from the minor street onto the major street (the second letter). They are based on the excess capacity available to make the indicated movement.

/b/ For multi-stop controlled intersections (3-way and 4-way stop signs), the 1985 *Highway Capacity Manual* specifies a total intersection approach volume that corresponds to LOS C.

SOURCE: DKS Associates.

1996 Project + List-Added Growth

The results of the intersection level of service analyses with the addition of list-added growth traffic are shown in Table 36. Table 36 compares 1990 existing LOS to 1996 no-project (forecast-growth) conditions, 1996-forecast-growth-with-project conditions, and 1996-with-project-and-list-added-growth conditions.

The addition of 1996 list-added-growth traffic to 1996 a.m. peak hour project traffic volumes would cause the intersection of El Camino Real at San Bruno Avenue to degrade from LOS B to LOS E (the degradation in level of service is largely attributable to the planned urban development projects in the immediate vicinity of this intersection). LOS F conditions at the Millbrae Avenue intersections at El Camino Real and at Rollins Road would remain, but occur over a longer period of time in the future. List-added-growth in San Bruno would contribute to traffic at Millbrae Avenue and El Camino Real. The intersection of San Mateo Avenue at San Bruno Avenue would degrade from LOS A (existing) to LOS C during the a.m. peak hour with list-added-growth traffic in 1996.

The addition of 1996 list-added-growth traffic to 1996 p.m. peak-hour project traffic volumes would cause the level of service at South Airport Boulevard at Utah Avenue to degrade from LOS E to LOS F. The intersection of San Mateo Avenue and San Bruno Avenue would degrade from LOS B to LOS E with the addition of 1996 list-added growth traffic. Then existing LOS F conditions at El Camino Real at Millbrae Avenue and at El Camino Real at San Bruno Avenue would occur over a longer period of time. South Airport Boulevard at Belle Air Road would degrade from LOS C today to LOS D in 1996 with list-added-growth traffic.

2006 Project

Table 37, p. 301 presents the LOS comparison for the 2006 with-project condition. The table includes the LOS summaries for the 1990 existing, 2006 no-project (forecast-growth), and 2006 with-project cases.

The addition of 2006 forecast-growth a.m. peak hour traffic to 1990 existing conditions would cause the intersections of El Camino Real at Millbrae Avenue and

TABLE 36: PROJECT PLUS LIST-ADDED-GROWTH TRAFFIC (1996) - A.M. PEAK HOUR

Intersection	1990 Existing V/C	1990 Existing LOS	1996 Forecast Growth V/C	1996 Forecast Growth LOS	1996 With Project V/C	1996 With Project LOS	1996 Project Plus List-Added Growth V/C	1996 Project Plus List-Added Growth LOS
Signalized								
1. El Camino Real/Millbrae Ave.	0.92	E	0.96	E	1.03	F	1.09	F
2. Rollins Rd./Millbrae Ave.	0.94	E	0.97	E	1.02	F	1.05	F
3. Old Bayshore Hwy./Millbrae Ave.	0.24	A	0.24	A	0.31	A	0.40	A
4. Rd. R-2/Rd. R-16/Hilton Hotel	0.24	A	0.24	A	0.28	A	0.28	A
5. Rds. R-20, R-22/Rd. R-18	0.24	A	0.24	A	0.28	A	0.32	A
6. Rd. R-3 (McDonnell)/Rd. R-18	0.28	A	0.20	A	0.29	A	0.34	A
7. Rd. R-3/UAL Cargo	0.15	A	0.15	A	0.18	A	0.18	A
8. Rd. R-3/Rd. R-6	0.25	A	0.19	A	0.29	A	0.29	A
9. S. Airport Blvd./San Bruno Ave.	0.39	A	0.39	A	0.46	A	0.48	A
11. N. Access Rd./N. Access Road E. (101/380 on-/off-ramp)	0.51	A	0.40	A	0.53	A	0.53	A
12. S. Airport Blvd./N. Access Rd. S. (101/380 off-ramp)	0.44	A	0.45	A	0.60	A/B	0.69	B
13. S. Airport Blvd./N. Access Rd. N. (101/380 on-ramp)	0.32	A	0.33	A	0.34	A	0.39	A
14. S. Airport Blvd./Belle Air Rd.	0.30	A	0.31	A	0.31	A	0.36	A
15. S. Airport Blvd./Utah Ave.	0.50	A	0.50	A	0.50	A	0.55	A
16. S. Airport Blvd./US 101 NB ramps/ Radisson Hotel	0.52	A	0.53	A	0.54	A	0.68	B
17. S. Airport Blvd./Gateway Blvd.	0.30	A	0.29	A	0.29	A	0.44	A
18. Airport Blvd./Produce Ave./ San Mateo Ave.	0.37	A	0.37	A	0.37	A	0.37	A
19. Airport Blvd./Grand Ave.	0.65	B	0.86	D	0.86	D	0.86	D
20. San Mateo Ave./San Bruno Ave.	0.59	A	0.52	A	0.55	A	0.78	C
21. El Camino Real/San Bruno Ave.	0.61	B	0.61	A/B	0.66	B	0.94	E
Unsignalized/a/								
22. California Dr./Millbrae Ave.		A/A		A/C		A/D		A/D
23. Rds. R-24, R-26/Rd. R-16/b/		> C		> C		< C		< C
24. Rd. R-3/Rd. R-6		< C		> C		> C		> C
25. Long-Term Parking/Rd. R-3		A/C		A/C		A/D		A/D

NOTE: > C = LOS C or better (e.g., LOS A, B or C); < C = LOS D or worse (e.g., LOS D, E or F). Intersection 10 in Figure 17, Section III.B. Transportation Setting, was counted for pedestrian volumes only, so does not appear in this table.

/a/ Unsignalized intersection levels of service reflect the delays from left-turning movements from the major street onto the minor street (the first letter), and from the minor street onto the major street (the second letter). They are based on the excess capacity available to make the indicated movement.

/b/ For multi-stop controlled intersections (3-way and 4-way stop signs), the 1985 *Highway Capacity Manual* specifies a total intersection approach volume that corresponds to LOS C.

SOURCE: DKS Associates.

TABLE 36: PROJECT PLUS LIST-ADDED GROWTH TRAFFIC (1996) (Continued)- P.M. PEAK HOUR

Intersection		1990 Existing V/C	1990 Existing LOS	1996 Forecast Growth V/C	1996 Forecast Growth LOS	1996 With Project V/C	1996 With Project LOS	1996 Project Plus List-Added Growth V/C	1996 Project Plus List-Added Growth LOS
Signalized									
1.	El Camino Real/Millbrae Ave.	1.00	F	1.05	F	1.10	F	1.16	F
2.	Rollins Rd./Millbrae Ave.	0.77	C	0.80	C/D	0.84	D	0.87	D
3.	Old Bayshore Hwy./Millbrae Ave.	0.49	A	0.49	A	0.55	A	0.64	B
4.	Rd. R-2/Rd. R-16/Hilton Hotel	0.42	A	0.42	A	0.43	A	0.43	A
5.	Rds. R-20, R-22/Rd. R-18	0.23	A	0.23	A	0.30	A	0.33	A
6.	Rd. R-3 (McDonnell)/Rd. R-18	0.32	A	0.23	A	0.36	A	0.41	A
7.	Rd. R-3/UAL Cargo	0.18	A	0.18	A	0.24	A	0.24	A
8.	Rd. R-3/Rd. R-6	0.28	A	0.19	A	0.23	A	0.23	A
9.	S. Airport Blvd./San Bruno Ave.	0.39	A	0.35	A	0.38	A	0.42	A
11.	N. Access Rd./N. Access Road E. (101/380 on-/off-ramp)	0.35	A	0.22	A	0.24	A	0.24	A
12.	S. Airport Blvd./N. Access Rd. S. (101/380 off-ramp)	0.51	A	0.51	A	0.62	B	0.76	C
13.	S. Airport Blvd./N. Access Rd. N. (101/380 on-ramp)	0.33	A	0.33	A	0.49	A	0.50	A
14.	S. Airport Blvd./Belle Air Rd.	0.71	C	0.73	C	0.73	C	0.81	D
15.	S. Airport Blvd./Utah Ave.	0.91	D/E	0.94	E	0.94	E	1.04	F
16.	S. Airport Blvd./US 101 NB ramps/ Radisson Hotel	0.52	A	0.54	A	0.54	A	0.67	B
17.	S. Airport Blvd./Gateway Blvd.	0.45	A	0.48	A	0.48	A	0.60	B
18.	Airport Blvd./Produce Ave./ San Mateo Ave.	0.71	C	0.73	C	0.73	C	0.73	C
19.	Airport Blvd./Grand Ave.	0.70	C	0.72	C	0.72	C	0.72	C
20.	San Mateo Ave./San Bruno Ave.	0.69	B	0.65	B	0.69	B	0.96	E
21.	El Camino Real/San Bruno Ave.	1.00	F	1.00	E/F	1.01	E/F	1.30	F
Unsignalized/a/									
22.	California Dr./Millbrae Ave.		A/C		A/C		A/D		A/D
23.	Rds. R-24, R-26/Rd. R-16/b/		> C		> C		< C		< C
24.	Rd. R-3/Rd. R-6		< C		> C		> C		> C
25.	Long-Term Parking/Rd. R-3		A/C		A/C		A/D		A/D

NOTE: > C = LOS C or better (e.g., LOS A, B or C); < C = LOS D or worse (e.g., LOS D, E or F). Intersection 10 in Figure 17, Section III.B. Transportation Setting, was counted for pedestrian volumes only, so does not appear in this table.

/a/ Unsignalized intersection levels of service reflect the delays from left-turning movements from the major street onto the minor street (the first letter), and from the minor street onto the major street (the second letter). They are based on the excess capacity available to make the indicated movement.

/b/ For multi-stop controlled intersections (3-way and 4-way stop signs), the 1985 *Highway Capacity Manual* specifies a total intersection approach volume that corresponds to LOS C.

SOURCE: DKS Associates.

TABLE 37: 2006 PROJECT IMPACTS - INTERSECTION LEVELS OF SERVICE IN THE VICINITY OF SFIA - A.M. PEAK HOUR

Intersection	1990 Existing V/C	1990 Existing LOS	2006 Forecast Growth V/C	2006 Forecast Growth LOS	2006 With Project V/C	2006 With Project LOS
Signalized						
1. El Camino Real/Millbrae Ave.	0.92	E	1.01	F	1.12	F
2. Rollins Rd./Millbrae Ave.	0.94	E	1.05	F	1.12	F
3. Old Bayshore Hwy./Millbrae Ave.	0.24	A	0.21	A	0.31	A
4. Rd. R-2/Rd. R-16/Hilton Hotel	0.24	A	0.21	A	0.26	A
5. Rds. R-20, R-22/Rd. R-18	0.24	A	0.24	A	0.31	A
6. Rd. R-3 (McDonnell)/Rd. R-18	0.28	A	0.20	A	0.37	A
7. Rd. R-3/UAL Cargo	0.15	A	0.15	A	0.19	A
8. Rd. R-3/Rd. R-6	0.25	A	0.19	A	0.38	A
9. S. Airport Blvd./San Bruno Ave.	0.39	A	0.39	A	0.53	A
11. N. Access Rd./N. Access Road E. (101/380 on-/off-ramp)	0.51	A	0.41	A	0.54	A
12. S. Airport Blvd./N. Access Rd. S. (101/380 off-ramp)	0.44	A	0.46	A	0.63	B
13. S. Airport Blvd./N. Access Rd. N. (101/380 on-ramp)	0.32	A	0.34	A	0.35	A
14. S. Airport Blvd./Belle Air Rd.	0.30	A	0.32	A	0.32	A
15. S. Airport Blvd./Utah Ave.	0.50	A	0.52	A	0.53	A
16. S. Airport Blvd./US 101 NB ramps/ Radisson Hotel	0.52	A	0.54	A	0.56	A
17. S. Airport Blvd./Gateway Blvd.	0.30	A	0.33	A	0.34	A
18. Airport Blvd./Produce Ave./ San Mateo Ave.	0.37	A	0.39	A	0.38	A
19. Airport Blvd./Grand Ave.	0.65	B	0.88	D	0.88	D
20. San Mateo Ave./San Bruno Ave.	0.59	A	0.52	A	0.56	A
21. El Camino Real/San Bruno Ave.	0.61	B	0.61	B	0.67	B
Unsignalized/a/						
22. California Dr./Millbrae Ave.		A/A		A/D		A/E
23. Rds. R-24, R-26/Rd. R-16/b/		> C		> C		< C
24. Rd. R-3/Rd. R-6		< C		> C		< C
25. Long-Term Parking/Rd. R-3		A/C		A/C		A/D

NOTE: > C = LOS C or better (e.g., LOS A, B or C); < C = LOS D or worse (e.g., LOS D, E or F). Intersection 10 in Figure 17, Section III.B Transportation Setting, was counted for pedestrian volumes only, so does not appear in this table.

/a/ Unsignalized intersection levels of service reflect the delays from left-turning movements from the major street onto the minor street (the first letter), and from the minor street onto the major street (the second letter). They are based on the excess capacity available to make the indicated movement.

/b/ For multi-stop controlled intersections (3-way and 4-way stop signs), the 1985 *Highway Capacity Manual* specifies a total intersection approach volume that corresponds to LOS C.

SOURCE: DKS Associates.

TABLE 37: 2006 PROJECT IMPACTS - INTERSECTION LEVELS OF SERVICE IN THE VICINITY OF SFIA (Continued) - P.M. PEAK HOUR

Intersection	1990 Existing V/C	1990 Existing LOS	2006 Forecast Growth V/C	2006 Forecast Growth LOS	2006 With Project V/C	2006 With Project LOS
Signalized						
1. El Camino Real/Millbrae Ave.	1.00	F	1.11	F	1.20	F
2. Rollins Rd./Millbrae Ave.	0.77	C	0.86	D	0.94	E
3. Old Bayshore Hwy./Millbrae Ave.	0.49	A	0.39	A	0.47	A
4. Rd. R-2/Rd. R-16/Hilton Hotel	0.42	A	0.39	A	0.42	A
5. Rds. R-20, R-22/Rd. R-18	0.23	A	0.23	A	0.34	A
6. Rd. R-3 (McDonnell)/Rd. R-18	0.32	A	0.23	A	0.42	A
7. Rd. R-3/UAL Cargo	0.18	A	0.18	A	0.24	A
8. Rd. R-3/Rd. R-6	0.28	A	0.19	A	0.28	A
9. S. Airport Blvd./San Bruno Ave.	0.39	A	0.35	A	0.42	A
11. N. Access Rd./N. Access Road E. (101/380 on-/off-ramp)	0.35	A	0.22	A	0.24	A
12. S. Airport Blvd./N. Access Rd. S. (101/380 off-ramp)	0.51	A	0.54	A	0.70	C
13. S. Airport Blvd./N. Access Rd. N. (101/380 on-ramp)	0.33	A	0.34	A	0.60	B
14. S. Airport Blvd./Belle Air Rd.	0.71	C	0.75	C	0.76	C
15. S. Airport Blvd./Utah Ave.	0.91	D/E	0.96	E	0.97	E
16. S. Airport Blvd./US 101 NB ramps/ Radisson Hotel	0.52	A	0.55	A	0.56	A
17. S. Airport Blvd./Gateway Blvd.	0.45	A	0.49	A	0.49	A
18. Airport Blvd./Produce Ave./ San Mateo Ave.	0.71	C	0.74	C	0.74	C
19. Airport Blvd./Grand Ave.	0.70	C	0.74	C	0.74	C
20. San Mateo Ave./San Bruno Ave.	0.69	B	0.65	B	0.71	C
21. El Camino Real/San Bruno Ave.	1.00	F	1.00	F	1.02	F
Unsignalized/a/						
22. California Dr./Millbrae Ave.		A/C		A/D		A/E
23. Rds. R-24, R-26/Rd. R-16/b/		> C		> C		< C
24. Rd. R-3/Rd. R-6		< C		> C		< C
25. Long-Term Parking/Rd. R-3		A/C		A/C		B/E

NOTE: > C = LOS C or better (e.g., LOS A, B or C); < C = LOS D or worse (e.g., LOS D, E or F). Intersection 10 in Figure 17, Section III.B. Transportation Setting, was counted for pedestrian volumes only, so does not appear in this table.

/a/ Unsignalized intersection levels of service reflect the delays from left-turning movements from the major street onto the minor street (the first letter), and from the minor street onto the major street (the second letter). They are based on the excess capacity available to make the indicated movement.

/b/ For multi-stop controlled intersections (3-way and 4-way stop signs), the 1985 *Highway Capacity Manual* specifies a total intersection approach volume that corresponds to LOS C.

SOURCE: DKS Associates.

Rollins Road at Millbrae Avenue to degrade from LOS E to LOS F. Airport Boulevard at Grand Avenue would degrade from LOS B to LOS D. The addition of 2006 project traffic to 2006 a.m. peak hour forecast-growth traffic volumes wouldcause the level of service for the California Drive approach right turn only to Millbrae Avenue to degrade from LOS D to LOS E. The intersection of Airport Boulevard at Grand Avenue would remain at LOS D with the 2006 project traffic. The intersections of El Camino Real at Millbrae Avenue, and Rollins Road at Millbrae Avenue, would remain at LOS F, although the poor conditions would occur for a longer period of time.

The addition of 2006 project traffic to 2006 p.m. peak-hour forecast growth traffic volumes would cause the LOS at Rollins Road at Millbrae Avenue, and also for the California Drive approach right turn only to Millbrae Avenue, to degrade from LOS D to LOS E. Both of these are currently LOS C conditions.

The level of service at South Airport Boulevard at Utah Avenue would remain at LOS E and the intersections of El Camino Real at Millbrae Avenue and El Camino Real at San Bruno Avenue would remain at LOS F, with poor conditions occurring for a longer period time during the p.m. peak hour.

2006 Project + List-Added Growth

Table 38 presents the LOS comparisons for the 1990 existing, 2006-no-project, 2006-with-project, and 2006 with-project-and-list-added-growth scenarios.

With the addition of 2006 list-added-growth traffic to 2006 a.m. peak-hour project traffic volumes, the intersection of El Camino Real at San Bruno Avenue would degrade from LOS B in 1990 to LOS E in 2006. The intersection of Airport Boulevard at Grand Avenue would degrade to LOS D; currently it is LOS B. The Millbrae Avenue intersections at El Camino Real and at Rollins Road would degrade from the 1990 LOS E to LOS F, with poor conditions occurring over a longer period of time than before the addition of list-added-growth traffic; the Millbrae Avenue intersections would be affected by list-added-growth in San Bruno, as well as in Millbrae.

The addition of 2006 list-added-growth traffic to 2006 p.m. peak-hour project traffic volumes would cause the level of service at Rollins Road at Millbrae Avenue to degrade

TABLE 38: PROJECT PLUS LIST-ADDED-GROWTH TRAFFIC (2006) - A.M. PEAK HOUR

Intersection	1990 Existing V/C	1990 Existing LOS	2006 Forecast Growth V/C	2006 Forecast Growth LOS	2006 With Project V/C	2006 With Project LOS	2006 Project Plus List-Added Growth V/C	2006 Project Plus List-Added Growth LOS
Signalized								
1. El Camino Real/Millbrae Ave.	0.92	E	1.01	F	1.12	F	1.29	F
2. Rollins Rd./Millbrae Ave.	0.94	E	1.05	F	1.12	F	1.21	F
3. Old Bayshore Hwy./Millbrae Ave.	0.24	A	0.21	A	0.31	A	0.47	A
4. Rd. R-2/Rd. R-16/Hilton Hotel	0.24	A	0.21	A	0.26	A	0.26	A
5. Rds. R-20, R-22/Rd. R-18	0.24	A	0.24	A	0.31	A	0.39	A
6. Rd. R-3 (McDonnell)/Rd. R-18	0.28	A	0.20	A	0.37	A	0.51	A
7. Rd. R-3/UAL Cargo	0.15	A	0.15	A	0.19	A	0.19	A
8. Rd. R-3/Rd. R-6	0.25	A	0.19	A	0.38	A	0.38	A
9. S. Airport Blvd./San Bruno Ave.	0.39	A	0.39	A	0.53	A	0.55	A
11. N. Access Rd./N. Access Road E. (101/380 on-/off-ramp)	0.51	A	0.41	A	0.54	A	0.54	A
12. S. Airport Blvd./N. Access Rd. S. (101/380 off-ramp)	0.44	A	0.46	A	0.63	B	0.73	C
13. S. Airport Blvd./N. Access Rd. N. (101/380 on-ramp)	0.32	A	0.34	A	0.35	A	0.43	A
14. S. Airport Blvd./Belle Air Rd.	0.30	A	0.32	A	0.32	A	0.40	A
15. S. Airport Blvd./Utah Ave.	0.50	A	0.52	A	0.53	A	0.60	B
16. S. Airport Blvd./US 101 NB ramps/ Radisson Hotel	0.52	A	0.54	A	0.56	A	0.77	C
17. S. Airport Blvd./Gateway Blvd.	0.30	A	0.33	A	0.34	A	0.53	A
18. Airport Blvd./Produce Ave./ San Mateo Ave.	0.37	A	0.39	A	0.38	A	0.38	A
19. Airport Blvd./Grand Ave.	0.65	B	0.88	D	0.88	D	0.88	D
20. San Mateo Ave./San Bruno Ave.	0.59	A	0.52	A	0.56	A	0.81	D
21. El Camino Real/San Bruno Ave.	0.61	B	0.61	B	0.67	B	0.99	E
Unsignalized/a/								
22. California Dr./Millbrae Ave.		A/A		A/D		A/E		A/E
23. Rds. R-24, R-26/Rd. R-16/b/		> C		> C		< C		< C
24. Rd. R-3/Rd. R-6		< C		> C		< C		< C
25. Long-Term Parking/Rd. R-3		A/C		A/C		A/D		A/D

NOTE: > C = LOS C or better (e.g., LOS A, B or C); < C = LOS D or worse (e.g., LOS D, E or F). Intersection 10 in Figure 17, Section III.B Transportation Setting, was counted for pedestrian volumes only, so does not appear in this table.

/a/ Unsignalized intersection levels of service reflect the delays from left-turning movements from the major street onto the minor street (the first letter), and from the minor street onto the major street (the second letter). They are based on the excess capacity available to make the indicated movement.

/b/ For multi-stop controlled intersections (3-way and 4-way stop signs), the 1985 *Highway Capacity Manual* specifies a total intersection approach volume that corresponds to LOS C.

SOURCE: DKS Associates.

TABLE 38: PROJECT PLUS LIST-ADDED-GROWTH TRAFFIC (2006) (Continued) - P.M. PEAK HOUR

Intersection	1990 Existing V/C	1990 Existing LOS	2006 Forecast Growth V/C	2006 Forecast Growth LOS	2006 With Project V/C	2006 With Project LOS	2006 Project Plus List-Added Growth V/C	2006 Project Plus List-Added Growth LOS
Signalized								
1. El Camino Real/Millbrae Ave.	1.00	F	1.11	F	1.20	F	1.35	F
2. Rollins Rd./Millbrae Ave.	0.77	C	0.86	D	0.94	E	1.01	F
3. Old Bayshore Hwy./Millbrae Ave.	0.49	A	0.39	A	0.47	A	0.64	B
4. Rd. R-2/Rd. R-16/Hilton Hotel	0.42	A	0.39	A	0.42	A	0.43	A
5. Rds. R-20, R-22/Rd. R-18	0.23	A	0.23	A	0.34	A	0.40	A
6. Rd. R-3 (McDonnell)/Rd. R-18	0.32	A	0.23	A	0.42	A	0.55	A
7. Rd. R-3/UAL Cargo	0.18	A	0.18	A	0.24	A	0.24	A
8. Rd. R-3/Rd. R-6	0.28	A	0.19	A	0.28	A	0.28	A
9. S. Airport Blvd./San Bruno Ave.	0.39	A	0.35	A	0.42	A	0.45	A
11. N. Access Rd./N. Access Road E. (101/380 on-/off-ramp)	0.35	A	0.22	A	0.24	A	0.24	A
12. S. Airport Blvd./N. Access Rd. S. (101/380 off-ramp)	0.51	A	0.54	A	0.70	C	0.86	D
13. S. Airport Blvd./N. Access Rd. N. (101/380 on-ramp)	0.33	A	0.34	A	0.60	B	0.61	B
14. S. Airport Blvd./Belle Air Rd.	0.71	C	0.75	C	0.76	C	0.87	D
15. S. Airport Blvd./Utah Ave.	0.91	D/E	0.96	E	0.97	E	1.10	F
16. S. Airport Blvd./US 101 NB ramps/ Radisson Hotel	0.52	A	0.55	A	0.56	A	0.76	C
17. S. Airport Blvd./Gateway Blvd.	0.45	A	0.49	A	0.49	A	0.66	B
18. Airport Blvd./Produce Ave./ San Mateo Ave.	0.71	C	0.74	C	0.74	C	0.74	C
19. Airport Blvd./Grand Ave.	0.70	C	0.74	C	0.74	C	0.74	C
20. San Mateo Ave./San Bruno Ave.	0.69	B	0.65	B	0.71	C	0.98	E
21. El Camino Real/San Bruno Ave.	1.00	F	1.00	F	1.02	F	1.34	F
Unsignalized/a/								
22. California Dr./Millbrae Ave.		A/C		A/D		A/E		A/E
23. Rds. R-24, R-26/Rd. R-16/b/		> C		> C		< C		< C
24. Rd. R-3/Rd. R-6		< C		> C		< C		< C
25. Long-Term Parking/Rd. R-3		A/C		A/C		B/E		B/E

NOTE: > C = LOS C or better (e.g., LOS A, B or C); < C = LOS D or worse (e.g., LOS D, E or F). Intersection 10 in Figure 17, Section III.B Transportation Setting, was counted for pedestrian volumes only, so does not appear in this table.

/a/ Unsignalized intersection levels of service reflect the delays from left-turning movements from the major street onto the minor street (the first letter), and from the minor street onto the major street (the second letter). They are based on the excess capacity available to make the indicated movement.

/b/ For multi-stop controlled intersections (3-way and 4-way stop signs), the 1985 *Highway Capacity Manual* specifies a total intersection approach volume that corresponds to LOS C.

SOURCE: DKS Associates.

from LOS C today to LOS F. The level of service at South Airport Boulevard and Utah Avenue would degrade from LOS D/E today to LOS F. The intersection of San Mateo Avenue at San Bruno Avenue would degrade from LOS B to LOS E. The El Camino Real intersections at Millbrae Avenue and at San Bruno Avenue would remain at LOS F, and the poor conditions would occur over a longer period of time.

2006 with BART to SFIA

The impacts on intersections of the project with BART to SFIA are shown in Table 39.

If BART were extended to SFIA in 2006, vehicle trips to/from the airport would be reduced. However, none of the study area intersections would experience a change in LOS compared to the 2006-without-BART scenario. In other words, the LOS at each intersection would operate the same during peak hours in 2006 whether or not BART is extended to SFIA. There would be volume reductions at several intersections, but they would not be sufficient to alter any intersection's LOS; either the overall volume reduction would not be great enough, or the reduction would not affect the critical turning movement volume (that which is used to calculate the LOS).

For freeway and ramp LOS analysis (see discussion of Basic Freeway Sections, below), the volume reductions attributable to BART would not affect the LOS. Freeway and ramp LOS analysis is based on volumes per lane, and the threshold levels for an LOS grade change are more than the changes brought about by BART.

The assumed location of the SFIA BART station west of US 101 (BART Alternative 3, p. 267 above) represents the most conservative (least helpful) assumption regarding potential BART ridership and automobile trip reduction. Locating the BART station closer to the SFIA passenger terminals and providing the same automated people mover service, or locating the BART station in a terminal itself (BART Alternative 4, p. 267 above), would result in higher BART patronage than has been assumed in this analysis.

The projected ridership and trip reduction associated with a BART station at SFIA are discussed further in the public transit impacts section of this report.

Basic Freeway Sections

Table 40, p. 309, shows the basic freeway sections' existing levels of service, and Table 41, p. 310, shows the basic freeway sections' levels of service in 1996 and 2006

TABLE 39: PROJECT INTERSECTION IMPACTS IN 2006 WITH BART SERVICE TO THE SFIA VICINITY (INCLUDES FORECAST GROWTH AND LIST-ADDED GROWTH) - A.M. PEAK HOUR

Intersection	1990 Existing V/C	1990 Existing LOS	2006 Project With BART V/C	2006 Project With BART LOS	2006 Project Without BART V/C	2006 Project Without BART LOS
Signalized						
1. El Camino Real/Millbrae Ave.	0.92	E	1.11	F	1.12	F
2. Rollins Rd./Millbrae Ave.	0.94	E	1.11	F	1.12	F
3. Old Bayshore Hwy./Millbrae Ave.	0.24	A	0.30	A	0.31	A
4. Rd. R-2/Rd. R-16/Hilton Hotel	0.24	A	0.25	A	0.26	A
5. Rds. R-20, R-22/Rd. R-18	0.24	A	0.30	A	0.31	A
6. Rd. R-3 (McDonnell)/Rd. R-18	0.28	A	0.33	A	0.37	A
7. Rd. R-3/UAL Cargo	0.15	A	0.19	A	0.19	A
8. Rd. R-3/Rd. R-6	0.25	A	0.36	A	0.38	A
9. S. Airport Blvd./San Bruno Ave.	0.39	A	0.51	A	0.53	A
11. N. Access Rd./N. Access Road E. (101/380 on-/off-ramp)	0.51	A	0.53	A	0.54	A
12. S. Airport Blvd./N. Access Rd. S. (101/380 off-ramp)	0.44	A	0.61	B	0.63	B
13. S. Airport Blvd./N. Access Rd. N. (101/380 on-ramp)	0.32	A	0.34	A	0.35	A
14. S. Airport Blvd./Belle Air Rd.	0.30	A	0.32	A	0.32	A
15. S. Airport Blvd./Utah Ave.	0.50	A	0.53	A	0.53	A
16. S. Airport Blvd./US 101 NB ramps/ Radisson Hotel	0.52	A	0.55	A	0.56	A
17. S. Airport Blvd./Gateway Blvd.	0.30	A	0.34	A	0.34	A
18. Airport Blvd./Produce Ave./ San Mateo Ave.	0.37	A	0.38	A	0.38	A
19. Airport Blvd./Grand Ave.	0.65	B	0.88	D	0.88	D
20. San Mateo Ave./San Bruno Ave.	0.59	A	0.56	A	0.56	A
21. El Camino Real/San Bruno Ave.	0.61	B	0.66	B	0.67	B
Unsignalized/a/						
22. California Dr./Millbrae Ave.		A/A		A/D		A/E
23. Rds. R-24, R-26/Rd. R-16/b/		> C		< C		< C
24. Rd. R-3/Rd. R-6		< C		< C		< C
25. Long-Term Parking/Rd. R-3		A/C		A/D		A/D

NOTE: > C = LOS C or better (e.g., LOS A, B or C); < C = LOS D or worse (e.g., LOS D, E or F). Intersection 10 in Figure 17, Section III.B Transportation Setting, was counted for pedestrian volumes only, so does not appear in this table.

/a/ Unsignalized intersection levels of service reflect the delays from left-turning movements from the major street onto the minor street (the first letter), and from the minor street onto the major street (the second letter). They are based on the excess capacity available to make the indicated movement.

/b/ For multi-stop controlled intersections (3-way and 4-way stop signs), the 1985 *Highway Capacity Manual* specifies a total intersection approach volume that corresponds to LOS C.

SOURCE: DKS Associates.

TABLE 39: PROJECT INTERSECTION IMPACTS IN 2006 WITH BART SERVICE TO THE SFIA VICINITY (INCLUDES FORECAST GROWTH AND LIST-ADDED GROWTH) (Continued) - P.M. PEAK HOUR

Intersection	1990 Existing		2006 Project With BART		2006 Project Without BART	
	V/C	LOS	V/C	LOS	V/C	LOS
Signalized						
1. El Camino Real/Millbrae Ave.	1.00	F	1.19	F	1.20	F
2. Rollins Rd./Millbrae Ave.	0.77	C	0.93	E	0.94	E
3. Old Bayshore Hwy./Millbrae Ave.	0.49	A	0.46	A	0.47	A
4. Rd. R-2/Rd. R-16/Hilton Hotel	0.42	A	0.42	A	0.42	A
5. Rds. R-20, R-22/Rd. R-18	0.23	A	0.32	A	0.34	A
6. Rd. R-3 (McDonnell)/Rd. R-18	0.32	A	0.39	A	0.42	A
7. Rd. R-3/UAL Cargo	0.18	A	0.23	A	0.24	A
8. Rd. R-3/Rd. R-6	0.28	A	0.26	A	0.28	A
9. S. Airport Blvd./San Bruno Ave.	0.39	A	0.40	A	0.42	A
11. N. Access Rd./N. Access Road E. (101/380 on-/off-ramp)	0.35	A	0.24	A	0.24	A
12. S. Airport Blvd./N. Access Rd. S. (101/380 off-ramp)	0.51	A	0.69	B	0.70	C
13. S. Airport Blvd./N. Access Rd. N. (101/380 on-ramp)	0.33	A	0.58	A	0.60	B
14. S. Airport Blvd./Belle Air Rd.	0.71	C	0.76	C	0.76	C
15. S. Airport Blvd./Utah Ave.	0.91	D/E	0.97	E	0.97	E
16. S. Airport Blvd./US 101 NB ramps/ Radisson Hotel	0.52	A	0.56	A	0.56	A
17. S. Airport Blvd./Gateway Blvd.	0.45	A	0.49	A	0.49	A
18. Airport Blvd./Produce Ave./ San Mateo Ave.	0.71	C	0.74	C	0.74	C
19. Airport Blvd./Grand Ave.	0.70	C	0.74	C	0.74	C
20. San Mateo Ave./San Bruno Ave.	0.69	B	0.70	C	0.71	C
21. El Camino Real/San Bruno Ave.	1.00	F	1.02	F	1.02	F
Unsignalized/a/						
22. California Dr./Millbrae Ave.		A/C		A/E		A/E
23. Rds. R-24, R-26/Rd. R-16/b/		> C		< C		< C
24. Rd. R-3/Rd. R-6		< C		< C		< C
25. Long-Term Parking/Rd. R-3		A/C		B/E		B/E

NOTE: > C = LOS C or better (e.g., LOS A, B or C); < C = LOS D or worse (e.g., LOS D, E or F). Intersection 10 in Figure 17, Section III.B Transportation Setting, was counted for pedestrian volumes only, so does not appear in this table.

/a/ Unsignalized intersection levels of service reflect the delays from left-turning movements from the major street onto the minor street (the first letter), and from the minor street onto the major street (the second letter). They are based on the excess capacity available to make the indicated movement.

/b/ For multi-stop controlled intersections (3-way and 4-way stop signs), the 1985 Highway Capacity Manual specifies a total intersection approach volume that corresponds to LOS C.

SOURCE: DKS Associates.

● TABLE 40: EXISTING LEVEL OF SERVICE - FREEWAY MAINLINE SEGMENTS

Segment		1990 A.M. Peak Hour/a/			1990 P.M. Peak Hour/b/		
From	To	Total Volume/c/	Vol. Per Lane	LOS/d/	Total Volume/c/	Vol. Per Lane	LOS/d/
U.S. 101 (Bayshore Freeway)							
Willow Rd. (SR 84)	Marsh Road	5,575	1,394	A-C	5,302	1,326	A-C
Whipple Ave.	Holly Street	6,388	1,597	D	6,075	1,519	D
Holly Street	Ralston Avenue	6,773	1,693	D	6,440	1,610	D
Ralston Avenue	Hillsdale Blvd.	7,269	1,817	E	7,102	1,776	E
Hillsdale Blvd.	SR 92	7,859	1,965	F	7,474	1,869	E
3rd Ave.	Poplar/Dore Ave.	8,363	2,091	F	7,953	1,988	F
Broadway	Millbrae Ave.	8,169	2,042	F	7,769	1,942	F
Millbrae Ave.	SFIA	8,517	2,129	F	8,100	2,025	F
SFIA	San Bruno/I-380	9,059	2,265	F	8,616	2,154	F
I-380	Grand Ave.	7,588	1,897	F	7,216	1,804	E
Oyster Pt. Blvd.	Candlestick Park	6,911	1,728	D	6,572	1,643	D
Candlestick Park	Third Street	6,930	1,733	D	6,591	1,648	D
I-280	Army Street	7,046	1,762	E	6,701	1,675	D
I-280 (Junipero Serra Freeway)							
SR 84/SR 114	Farm Hill Blvd.	3,040	760	A-C	3,480	870	A-C
Edgewood Road	SR 92	3,205	801	A-C	3,668	917	A-C
Hayne Road	Trousdale Drive	3,369	842	A-C	3,856	964	A-C
Larkspur Drive	SR 35	4,232	1,058	A-C	4,843	1,211	A-C
San Bruno Ave.	I-380	4,191	1,048	A-C	4,796	1,199	A-C
I-380	Sneath Lane	6,204	1,551	D	7,100	1,775	E
Sneath Ln.	Avalon Drive	6,122	1,531	D	7,006	1,752	E
Serramonte Blvd.	SR 1 South	7,889	1,972	F	9,028	2,257	F
SR 1 North	Alemany/SR 82	5,259	1,315	A-C	6,019	1,505	D
St. Mary's	US 101	6,368	1,592	D	7,288	1,822	E

Key:	LOS	Per-Lane Volume
	A-C	up to 1,460
	D	1,461 - 1,740
	E	1,741 - 1,880 (capacity = 1800)
	F	1,881 and above

(Continued)

● TABLE 40: EXISTING LEVEL OF SERVICE - FREEWAY MAINLINE SEGMENTS (CONTINUED)

NOTES:

/a/ For US 101 & I-280, A.M. Peak Hour Volumes shown are for northbound traffic only. Northbound is generally the heavier direction of traffic flow on US 101 and & I-280 during the A.M. Peak Hour and therefore represents the worst-case traffic condition.

/b/ For US 101 & I-280, P.M. Peak Hour Volumes shown are for southbound traffic only. Southbound is generally the heavier direction of traffic flow on US 101 & I-280 during the P.M. Peak Hour and therefore represents the worst-case traffic condition.

/c/ Existing freeway volumes were factored from two-direction peak hour volumes presented in Caltrans' 1988 Volumes on California State Highways, based on actual counts taken by Caltrans on November 3, 1989, on U S 101 at Army Street in San Francisco, and at 3rd Avenue in San Mateo. That is, the distribution in volumes along the entire freeway, from San Francisco to San Mateo, as shown in the 1988 Caltrans book, was assumed to remain the same, but volumes at intermediate points were adjusted to be consistent with the actual 1989 counts at the two endpoints.

/d/ Even in segments where the calculations indicate LOS E or F, field observations show that traffic flows well (LOS D or better).

SOURCE: Caltrans District 4, and DKS Associates.

TABLE 41: 1996 AND 2006 PROJECT IMPACTS ON FREEWAY MAINLINE SEGMENTS

YEAR 1996		A.M. Peak Hour/a/ Northbound						P.M. Peak Hour/b/ Southbound					
		Forecast Growth			Plus Project			Forecast Growth			Plus Project		
From	To	Vol	VPL*	LOS	Vol	VPL	LOS	Vol	VPL	LOS	Vol	VPL	LOS
U.S. 101 (Bayshore Freeway)													
Willow Rd (SR 84)	Marsh Road	5,798	1,450	A-C	6,231	1,558	D	5,514	1,379	A-C	5,970	1,492	D
Whipple Avenue	Holly Street	6,644	1,661	D	7,099	1,775	E	6,318	1,580	D	6,798	1,699	D
Holly Street	Ralston Avenue	7,044	1,761	E	7,476	1,869	E	6,688	1,674	D	7,153	1,788	E
Ralston Avenue	Hillsdale Blvd.	7,560	1,890	F	8,015	2,004	F	7,386	1,847	E	7,866	1,966	F
Hillsdale Boulevard	SR 92	8,173	2,043	F	8,653	2,163	F	7,773	1,943	F	8,278	2,069	F
3rd Avenue	Poplar/Dore Avenue	8,698	2,174	F	9,202	2,301	F	8,271	2,068	F	8,803	2,201	F
Broadway	Millbrae Ave.	8,496	2,124	F	9,027	2,257	F	8,080	2,020	F	8,639	2,160	F
Millbrae Avenue	SFIA	8,858	2,214	F	9,417	2,354	F	8,424	2,106	F	9,013	2,253	F
SFIA	San Bruno Av/I-380	9,421	2,355	F	9,534	2,384	F	8,961	2,240	F	9,096	2,274	F
I-380	Grand Avenue	7,892	1,973	F	8,414	2,103	F	7,505	1,876	E	8,152	2,038	F
Oyster Pt. Blvd	Candlestick Park	7,187	1,797	E	7,683	1,921	F	6,835	1,709	D	7,450	1,862	E
Candlestick Park	Third Street	7,207	1,802	E	7,678	1,920	F	6,855	1,714	D	7,439	1,860	E
I-280	Army Street	7,328	1,832	E	7,775	1,944	F	6,969	1,742	E	7,524	1,881	F
I-280 (Junipero Serra Freeway)													
SR 84/SR 114	Farm Hill Boulevard	3,162	790	A-C	3,472	868	A-C	3,619	905	A-C	3,956	989	A-C
Edgewood Road	SR 92	3,333	833	A-C	3,654	913	A-C	3,815	954	A-C	4,162	1,041	A-C
Hayne Road	Trousdale Drive	3,504	876	A-C	3,834	959	A-C	4,010	1,003	A-C	4,369	1,092	A-C
Larkspur Drive	SR 35	4,401	1,100	A-C	4,742	1,185	A-C	5,037	1,259	A-C	5,406	1,352	A-C
San Bruno Avenue	I-380	4,359	1,090	A-C	4,710	1,177	A-C	4,988	1,247	A-C	5,369	1,342	A-C
I-380	Sneath Lane	6,452	1,613	D	6,642	1,661	D	7,384	1,846	E	7,616	1,904	F
Sneath Ln.	Avalon Drive	6,367	1,592	D	6,551	1,638	D	7,286	1,822	E	7,511	1,878	E
Serramonte Blvd	SR 1 South	8,205	2,051	F	8,383	2,096	F	9,389	2,347	F	9,607	2,402	F
SR 1 North	Alemany Blvd/SR 82	5,469	1,367	A-C	5,643	1,411	A-C	6,260	1,565	D	6,472	1,618	D
St. Mary's	US 101	6,623	1,656	D	6,791	1,698	D	7,580	1,895	F	7,785	1,946	F

(Continued)

● TABLE 41: 1996 AND 2006 PROJECT IMPACTS ON FREEWAY MAINLINE SEGMENTS (Continued)

YEAR 2006		A.M. Peak Hour/a/ Northbound						P.M. Peak Hour/b/ Southbound					
		--Forecast Growth--			--Plus Project--			--Forecast Growth--			--Plus Project--		
From	To	Vol	VPL*	LOS	Vol	VPL	LOS	Vol	VPL	LOS	Vol	VPL	LOS
U.S. 101 (Bayshore Freeway)													
Willow Rd (SR 84)	Marsh Road	6,188	1,547	D	6,967	1,742	E	5,885	1,471	D	6,692	1,673	D
Whipple Avenue	Holly Street	7,091	1,773	E	7,910	1,978	F	6,743	1,686	D	7,593	1,898	F
Holly Street	Ralston Avenue	7,518	1,880	E	8,296	2,074	F	7,148	1,787	E	7,955	1,989	F
Ralston Avenue	Hillsdale Blvd.	8,069	2,017	F	8,888	2,222	F	7,883	1,971	F	8,733	2,183	F
Hillsdale Boulevard	SR 92	8,723	2,181	F	9,586	2,397	F	8,296	2,074	F	9,190	2,298	F
3rd Avenue	Poplar/Dore Avenue	9,283	2,321	F	10,191	2,548	F	8,828	2,207	F	9,769	2,442	F
Broadway	Millbrae Ave.	9,068	2,267	F	10,023	2,506	F	8,624	2,156	F	9,614	2,404	F
Millbrae Avenue	SFIA	9,454	2,363	F	10,460	2,615	F	8,991	2,248	F	10,034	2,509	F
SFIA	San Bruno Av/I-380	10,055	2,514	F	10,212	2,553	F	9,564	2,391	F	9,747	2,437	F
I-380	Grand Avenue	8,423	2,106	F	9,387	2,347	F	8,010	2,002	F	9,203	2,301	F
Oyster Pt. Blvd	Candlestick Park	7,671	1,918	F	8,587	2,147	F	7,295	1,824	E	8,428	2,107	F
Candlestick Park	Third Street	7,692	1,923	F	8,562	2,141	F	7,316	1,829	E	8,393	2,098	F
I-280	Army Street	7,821	1,955	F	8,648	2,162	F	7,438	1,860	E	8,461	2,115	F
I-280 (Junipero Serra Freeway)													
SR 84/SR 114	Farm Hill Boulevard	3,374	844	A-C	3,855	964	A-C	3,863	966	A-C	4,374	1,094	A-C
Edgewood Road	SR 92	3,558	889	A-C	4,053	1,013	A-C	4,071	1,018	A-C	4,599	1,150	A-C
Hayne Road	Trousdale Drive	3,740	935	A-C	4,250	1,063	A-C	4,280	1,070	A-C	4,824	1,206	A-C
Larkspur Drive	SR 35	4,698	1,174	A-C	5,224	1,306	A-C	5,376	1,344	A-C	5,936	1,484	A-C
San Bruno Avenue	I-380	4,652	1,163	A-C	5,195	1,299	A-C	5,324	1,331	A-C	5,902	1,475	A-C
I-380	Sneath Lane	6,886	1,722	D	7,249	1,812	E	7,881	1,970	F	8,330	2,083	F
Sneath Ln.	Avalon Drive	6,795	1,699	D	7,148	1,787	E	7,777	1,944	F	8,212	2,053	F
Serramonte Blvd	SR 1 South	8,757	2,189	F	9,098	2,275	F	10,021	2,505	F	10,444	2,611	F
SR 1 North	Alemany Blvd/SR 82	5,837	1,459	A-C	6,169	1,542	D	6,681	1,670	D	7,091	1,773	E
St. Mary's	US 101	7,068	1,767	E	7,390	1,847	E	8,090	2,022	F	8,487	2,122	F

Key:

LOS	Per-Lane Volume (VPL)*
A-C	Up to 1,460
D	1,461 - 1,740
E	1,741 - 1,880 (Capacity = 1880)
F	1,881 and above

/a/ For US 101 & I-280, A.M. Peak Hour Volumes shown are for northbound traffic only. Northbound is generally the heavier direction of traffic flow on US 101 and & I-280 during the A.M. Peak Hour and therefore represents the worst-case traffic condition.

/b/ For US 101 & I-280, P.M. Peak Hour Volumes shown are for southbound traffic only. Southbound is generally the heavier direction of traffic flow on US 101 & I-280 during the P.M. Peak Hour and therefore represents the worst-case traffic condition.

SOURCE: DKS Associates

with forecast-growth and project traffic. List-added-growth traffic is not added for basic freeway sections; it is assumed to be subsumed in forecast growth, for the mainline freeway segments.

1996 Project

The project would cause one freeway section to degrade from LOS D to LOS E during the a.m. peak hour in 1996: US 101 northbound between Whipple Avenue and Holly Street. US 101 northbound between Oyster Point Boulevard and Army Street would degrade from LOS E to LOS F during the a.m. peak hour.

During the p.m. peak hour, two freeway mainline sections would degrade from LOS D to LOS E: US 101 southbound, from Third Street to Candlestick Park and from Candlestick Park to Oyster Point Boulevard. Three freeway mainline sections would degrade from LOS E to LOS F with the addition of 1996 project traffic: US 101 southbound, from Grand Avenue to I-380 and from Army Street to I-280, and I-280 southbound from Sneath Lane to I-380.

2006 Project

Table 41, p. 310 includes freeway mainline LOS for the 2006-with-project conditions.

With the addition of 2006 project traffic, three freeway mainline sections would degrade from LOS D to LOS E during the a.m. peak period: US 101 northbound from Willow Road (SR 84) to Marsh Road; I-280 northbound from I-380 to Sneath Lane; and I-280 northbound from Sneath Lane to Avalon Drive. US 101 northbound between Whipple Avenue and Holly Street would degrade from LOS E to LOS F during the a.m. peak hour. The forecast-growth-traffic alone would have caused two sections of freeway to degrade from LOS D to LOS E: I-280 northbound between St. Mary's and the US 101 interchange; and U.S. 101 northbound between Whipple Avenue and Holly Street.

During the p.m. peak hour, 2006 project traffic would cause the section on I-280 southbound between SR 1 northbound and Alemany Boulevard to degrade from LOS D to LOS E. Forecast growth traffic on U.S. 101 southbound would have caused two sections to degrade from LOS D to LOS E: from Candlestick Park to Oyster Point

Boulevard and from Third Street to Candlestick Park. Both of these sections would degrade to LOS F with the addition of 2006 project traffic. The section of US 101 southbound between Holly Street and Whipple Avenue would degrade from LOS D to LOS F during the p.m. peak hour. The section of U.S. 101 southbound between Army Street and I-280 (Alemany Interchange) would degrade from LOS E to LOS F.

Freeway Ramps

Table 42 presents the freeway ramps' levels of service for existing conditions, and Table 43, p. 315 shows the freeway ramps' levels of service in 1996 and 2006 with forecast-growth-plus-project traffic. The impact of list-added-growth traffic on freeway ramps is shown in Table 44, p. 317. This analysis assumed that the proposed new ramps at the SFIA / US 101 interchange would be constructed as part of the project, as shown in the SFIA Final Draft Master Plan.

1996 Project

In the a.m. peak hour, 1996 project traffic would cause two ramps to degrade from the 1990 existing LOS C to E: I-380 eastbound / San Bruno Avenue off to SFIA Road 1-S, and US 101 northbound off to SFIA Road 1-S. During the p.m. peak hour, 1996 project traffic would cause the ramp from SFIA Road 1-N on to US 101 northbound to degrade from the 1990 existing LOS C to E.

1996 Project + List-Added Growth

For both a.m. and p.m. peak hours in 1996, the only freeway ramp level of service degradation to unsatisfactory conditions due to list-added growth traffic would be during the p.m. peak hour on the South Airport Boulevard on ramp to I-380 WB, which would degrade from LOS D to LOS F. As indicated in Table 44, p. 317, there would be little change in ramp volumes due to list-added-growth traffic, as many of the ramps shown do not serve directions of travel to which list-added-growth traffic was distributed. The ramps' locations were chosen to illustrate project traffic impacts.

2006 Project

In 2006, the project would cause the following level of service degradations to unsatisfactory conditions from 1990 existing levels during the a.m. peak hour:

TABLE 42: EXISTING LEVELS OF SERVICE - FREEWAY RAMPS

	A.M. Peak Hour/a/			P.M. Peak Hour		
Ramp	Total Volume	Per Lane Vol.	LOS/a/	Total Volume	Per Lane Vol.	LOS
US 101 SB off to SFIA Rd. 1-S	900	900	C	862	862	C
I-380 EB/San Bruno Ave. off to SFIA Rd. 1-S	851	851	C	816	816	C
US 101 SB/I-380 EB off to SFIA Rd. 1-S	1,751	876	C	1,678	839	C
US 101 NB off to SFIA Rd. 1-S	986	986	C	849	849	C
Rd. 1-N onto US 101 NB	854	854	B	1,060	1,060	C
Rd. 1-N onto I-380 viaduct WB	355	355	A	653	653	B
Rd. 1-N onto US 101 SB	717	359	A	901	451	A
US 101 NB C/D /b/ off to Millbrae Ave.	793	793	C	936	936	C
US 101 SB C/D off to Millbrae Ave.	1,372	1,372	E	1,139	1,139	D
US 101 SB C/D off to Millbrae Ave. EB; onto US 101 SB	796	398	C	866	433	C
US 101 SB off to Broadway	1,009	1,009	C	994	994	C
Broadway onto US 101 NB	933	933	C	675	675	C
US 101 SB off to San Bruno Ave. extension	241	241	A	187	187	A
San Bruno Ave. extension onto US 101 NB	154	154	A	227	227	A
North Access Rd. onto I-380 WB	159	159	A	166	166	A
US 101 NB off to S. Airport Blvd./Radisson Hotel	1,093	1,093	D	605	605	D
S. Airport Blvd./Radisson Hotel onto US 101 NB	217	217	D	488	488	D
S. Airport Blvd. onto US 101 NB	33	33	A	88	88	A
S. Airport Blvd. onto I-380 WB	158	158	A	1,017	1,017	C
US 101 NB off to San Bruno Ave. Extension	797	797	B	453	453	B
San Bruno Ave. Extension to US 101 SB	351	351	B	711	711	B
N. Access Rd. on to US 101 NB	131	131	B	212	212	B
US 101 SB off to N. Access Rd.	218	218	C	205	205	C
US 101 NB off to N. Access Rd.	518	518	A	406	406	A
I-380 EB off to N. Access Rd.	428	428	A	286	286	A
I-380 EB off to S. Airport Blvd.	886	886	A	569	569	A
I-380 EB off to US 101 SB	3,663	1,832	F	2,225	1,113	B
I-380 WB off to I-280 SB	787	394	A	1,699	850	B
I-380 WB off to I-280 NB	2,046	1,023	B	5,003	2,502	F
I-280 NB on to I-380 EB	2,047	1,024	B	709	355	A
I-280 SB on to I-380 EB	4,305	2,153	F	2,532	1,266	C

NOTE: On freeway ramps, LOS depends not only on volume per lane, but also on design speed. For sharply curving ramps, where design speed is low, LOS can be poor even if volumes per lane are relatively low.

/a/ Defined in the Highway Capacity Manual, Special Report 209, Table 5-5, Transportation Research Board, Washington DC, 1985: indicates capacities based on ramp design speed.

/b/ C/D = Collector/Distributor Road.

SOURCE: DKS Associates.

TABLE 43: 1996 AND 2006 PROJECT IMPACTS ON FREEWAY RAMP LEVELS OF SERVICE

	A.M. Peak Hour						P.M. Peak Hour					
YEAR 1996	Forecast Growth			Plus Project			Forecast Growth			Plus Project		
Ramp	Vol	Per Lane Vol	LOS/a/	Vol	Per Lane Vol	LOS	Vol	Per Lane Vol	LOS	Vol	Per Lane Vol	LOS
US 101 SB off to SFIA Rd 1-S	900	900	C	1,203	1,203	D	862	862	C	1,125	1,125	D
I-380 EB/San Bruno Ave off to SFIA Rd 1-S	851	851	C	1,400	1,400	E	816	816	C	1,304	1,304	D
US 101 SB/I-380 EB off to SFIA Rd 1-S	1,751	876	C	2,603	1,302	D	1,678	839	C	2,429	1,215	D
US 101 NB off to SFIA Rd 1-S	986	986	C	1,432	1,432	E	849	849	C	1,269	1,269	D
Rd 1-N on to US 101 NB	854	854	B	1,263	1,263	C	1,060	1,060	C	1,663	1,663	E
Rd 1-N on to I-380 viaduct WB	355	355	A	548	548	A	653	653	B	936	936	C
Rd 1-N on to US 101 SB	717	359	A	1,052	526	A	901	451	A	1,355	678	B
US 101 NB C/D off to Millbrae Ave	832	832	D	832	832	D	981	981	D	981	981	D
US 101 SB C/D off to Millbrae Ave WB	1,439	1,439	E	1,439	1,439	E	1,195	1,195	D	1,195	1,195	D
US 101 SB C/D off to Millbrae Ave EB; on to US 101 SB	835	418	D	835	418	D	908	454	D	908	454	D
US 101 SB off to Broadway	1,059	1,059	D	1,059	1,059	D	1,043	1,043	D	1,043	1,043	D
Broadway on to US 101 NB	979	979	D	979	979	D	708	708	D	708	708	D
US 101 SB off to San Bruno Ave. Extension	241	241	A	258	258	A	187	187	A	202	202	A
San Bruno Ave. Extension on to US 101 NB	167	167	A	167	167	A	244	244	A	244	244	A
North Access Rd on to I-380 WB	159	159	A	162	162	A	166	166	A	169	169	A
US 101 NB off to S. Airport Blvd/Radisson Hotel	1,114	1,114	D	1,114	1,114	D	618	618	D	618	618	D
S. Airport Blvd/Radisson Hotel on to US 101 NB	228	228	D	221	221	D	498	498	D	498	498	D
S. Airport Blvd on to US 101 NB	33	33	A	47	47	A	88	88	A	304	304	A
S. Airport Blvd on to I-380 WB	158	158	A	224	224	A	1,017	1,017	C	1,555	1,555	D
US 101 NB off to San Bruno Ave. Extension	829	829	B	836	836	B	471	471	B	479	479	B
San Bruno Ave. Extension to US 101 SB	365	365	B	372	372	B	739	739	B	747	747	B
N. Access Rd. on to US 101 NB	136	136	B	143	143	B	220	220	B	228	228	B
US 101 SB off to N. Access Rd.	227	227	C	234	234	C	213	213	C	221	221	C
US 101 NB off to N. Access Rd.	539	539	A	546	546	A	422	422	A	430	430	A
I-380 EB off to N. Access Rd.	445	445	A	452	452	A	297	297	A	305	305	A
I-380 EB off to S. Airport Blvd.	921	921	B	928	928	B	592	592	A	600	600	B
I-380 EB off to US 101 SB	3810	1905	F	3817	1908	F	2314	1157	B	2322	1161	B
I-380 WB off to I-280 SB	818	409	A	928	464	A	1767	883	B	2103	1051	B
I-380 WB off to I-280 NB	2128	1064	B	2269	1134	B	5203	2602	F	5495	2748	F
I-280 NB on to I-380 EB	2129	1064	B	2446	1223	B	737	369	A	864	432	A
I-280 SB on to I-380 EB	4477	2239	F	4756	2378	F	2633	1317	C	2797	1399	C

(Continued)

TABLE 43: 1996 AND 2006 PROJECT IMPACTS ON FREEWAY RAMP LEVELS OF SERVICE (Continued)

YEAR 2006	A.M. Peak Hour						P.M. Peak Hour					
	Forecast Growth			Plus Project			Forecast Growth			Plus Project		
Ramp	Vol	Per Lane Vol	LOS/a/	Vol	Per Lane Vol	LOS	Vol	Per Lane Vol	LOS	Vol	Per Lane Vol	LOS
US 101 SB off to SFIA Rd 1-S	900	900	C	1,475	1,475	E	862	862	C	1,381	1,381	E
I-380 EB/San Bruno Ave off to SFIA Rd 1-S	851	851	C	1,893	1,893	F	816	816	C	1,778	1,778	F
US 101 SB/I-380 EB off to SFIA Rd 1-S	1,751	876	C	3,368	1,684	F	1,678	839	C	3,159	1,580	F
US 101 NB off to SFIA Rd 1-S	986	986	C	1,835	1,835	F	849	849	C	1,678	1,678	F
Rd 1-N on to US 101 NB	854	854	B	1,661	1,661	E	1,060	1,060	C	2,198	2,198	F
Rd 1-N on to I-380 viaduct WB	355	355	A	733	733	B	653	653	B	1,164	1,164	C
Rd 1-N on to US 101 SB	717	359	A	1,378	689	B	901	451	A	1,761	881	B
US 101 NB C/D off to Millbrae Ave	888	888	D	888	888	D	1,048	1,048	D	1,048	1,048	D
US 101 SB C/D off to Millbrae Ave WB	1,536	1,536	F	1,536	1,536	F	1,275	1,275	D	1,275	1,275	D
US 101 SB C/D off to Millbrae Ave EB; on to US 101 SB	891	446	D	891	446	D	756	378	D	756	378	D
US 101 SB off to Broadway	1,130	1,130	D	1,130	1,130	D	1,113	1,113	D	1,113	1,113	D
Broadway on to US 101 NB	1,045	1,045	D	1,045	1,045	D	756	756	D	756	756	D
US 101 SB off to San Bruno Ave. Extension	241	241	A	276	276	A	187	187	A	217	217	A
San Bruno Ave. Extension on to US 101 NB	179	179	A	179	179	A	261	261	A	261	261	A
North Access Rd on to I-380 WB	159	159	A	167	167	A	166	166	A	172	172	A
US 101 NB off to S. Airport Blvd/Radisson Hotel	1,147	1,147	D	1,147	1,147	D	634	634	D	634	634	D
S. Airport Blvd/Radisson Hotel on to US 101	227	227	D	227	227	D	507	507	D	507	507	D
S. Airport Blvd on to US 101 NB	33	33	A	50	50	A	88	88	A	349	349	A
S. Airport Blvd on to I-380 WB	158	158	A	246	246	A	1,017	1,017	C	1,705	1,705	F
US 101 NB off to San Bruno Ave. Extension	885	885	B	893	893	B	503	503	B	512	512	B
San Bruno Ave. Extension to US 101 SB	390	390	B	398	398	B	789	789	B	798	798	B
N. Access Rd. on to US 101 NB	145	145	B	153	153	B	235	235	B	244	244	B
US 101 SB off to N. Access Rd.	242	242	C	250	250	C	228	228	C	237	237	C
US 101 NB off to N. Access Rd.	575	575	A	583	583	A	451	451	A	460	460	A
I-380 EB off to N. Access Rd.	475	475	A	483	483	A	317	317	A	326	326	A
I-380 EB off to S. Airport Blvd.	983	983	C	991	991	C	632	632	B	641	641	B
I-380 EB off to US 101 SB	4066	2033	F	4074	2037	F	2470	1235	B	2479	1239	B
I-380 WB off to I-280 SB	874	437	A	1048	524	A	1886	943	B	2398	1199	B
I-380 WB off to I-280 NB	2271	1136	B	2504	1252	B	5553	2777	F	6017	3009	F
I-280 NB on to I-380 EB	2272	1136	B	2718	1359	C	787	393	A	986	493	A
I-280 SB on to I-380 EB	4779	2389	F	5201	2600	F	2811	1405	C	3081	1540	C

/a/ As defined in the *Highway Capacity Manual*, Special Report 209, Table 5-5, Transportation Research Board, Washington DC, 1985.

SOURCE: DKS Associates

TABLE 44: 1996 AND 2006 LIST-ADDED-GROWTH TRAFFIC IMPACTS ON FREEWAY RAMP LEVELS OF SERVICE

	A.M. Peak Hour						P.M. Peak Hour					
	Forecast Growth + Project			Plus List-Added Growth			Forecast Growth + Project			Plus List-Added Growth		
YEAR 1996 Ramp	Vol	Per Lane Vol	LOS/a/	Vol	Per Lane Vol	LOS	Vol	Per Lane Vol	LOS	Vol	Per Lane Vol	LOS
US 101 SB off to SFIA Rd 1-S	1,203	1,203	D	1,207	1,207	D	1,125	1,125	D	1,134	1,134	D
I-380 EB/San Bruno Ave off to SFIA Rd 1-S	1,400	1,400	E	1,412	1,412	E	1,304	1,304	D	1,337	1,337	D
US 101 SB/I-380 EB off to SFIA Rd 1-S	2,603	1,302	D	2,619	1,310	D	2,429	1,215	D	2,471	1,236	D
US 101 NB off to SFIA Rd 1-S	1,432	1,432	E	1,432	1,432	E	1,269	1,269	D	1,269	1,269	D
Rd 1-N on to US 101 NB	1,263	1,263	C	1,279	1,279	C	1,663	1,663	E	1,670	1,670	E
Rd 1-N on to I-380 viaduct WB	548	548	A	561	561	A	936	936	C	959	959	C
Rd 1-N on to US 101 SB	1,052	526	A	1,052	526	A	1,355	678	B	1,355	678	B
US 101 NB C/D off to Millbrae Ave	832	832	D	832	832	D	981	981	D	981	981	D
US 101 SB C/D off to Millbrae Ave WB	1,439	1,439	E	1,439	1,439	E	1,195	1,195	D	1,195	1,195	D
US 101 SB C/D off to Millbrae Ave EB; on to US 101 SB	835	418	D	835	418	D	908	454	D	908	454	D
US 101 SB off to Broadway	1,059	1,059	D	1,059	1,059	D	1,043	1,043	D	1,043	1,043	D
Broadway on to US 101 NB	979	979	D	979	979	D	708	708	D	708	708	D
US 101 SB off to San Bruno Ave. Extension	258	258	A	258	258	A	202	202	A	202	202	A
San Bruno Ave. Extension on to US 101 NB	167	167	A	167	167	A	244	244	A	244	244	A
North Access Rd on to I-380 WB	162	162	A	162	162	A	169	169	A	169	169	A
US 101 NB off to S. Airport Blvd/Radisson Hotel	1,114	1,114	D	1,163	1,163	D	618	618	D	654	654	D
S. Airport Blvd/Radisson Hotel on to US 101 NB	221	221	A	253	253	D	498	498	D	527	527	D
S. Airport Blvd on to US 101 NB	47	47	A	72	72	A	304	304	A	337	337	A
S. Airport Blvd on to I-380 WB	224	224	A	353	353	A	1,555	1,555	D	1,722	1,722	F
US 101 NB off to San Bruno Ave. Extension	836	836	B	917	917	C	479	479	B	564	564	B
San Bruno Ave. Extension to US 101 SB	372	372	B	417	417	B	747	747	B	866	866	B
N. Access Rd. on to US 101 NB	143	143	B	143	143	B	228	228	B	228	228	B
US 101 SB off to N. Access Rd.	234	234	C	234	234	C	221	221	C	221	221	C
US 101 NB off to N. Access Rd.	546	546	A	546	546	A	430	430	A	430	430	A
I-380 EB off to N. Access Rd.	452	452	A	452	452	A	305	305	A	305	305	A
I-380 EB off to S. Airport Blvd.	928	928	C	926	926	C	600	600	B	600	600	B
I-380 EB off to US 101 SB	3817	1908	F	3817	1908	F	2322	1161	B	2322	1161	B
I-380 WB off to I-280 SB	928	464	A	934	467	A	2103	1051	B	2119	1059	B
I-380 WB off to I-280 NB	2269	1134	B	2277	1138	B	5495	2748	F	5516	2758	F
I-280 NB on to I-380 EB	2446	1223	B	2461	1230	B	864	432	A	879	440	A
I-280 SB on to I-380 EB	4756	2378	F	4767	2384	F	2797	1399	C	2809	1405	C

Continued

TABLE 44: 1996 AND 2006 LIST-ADDED-GROWTH TRAFFIC IMPACTS ON FREEWAY RAMP LEVELS OF SERVICE (Continued)

YEAR 2006	A.M. Peak Hour						P.M. Peak Hour					
	Forecast Growth + Project			Plus List-Added Growth			Forecast Growth + Project			Plus List-Added Growth		
Ramp	Vol	Per Lane Vol	LOS/a/	Vol	Per Lane Vol	LOS	Vol	Per Lane Vol	LOS	Vol	Per Lane Vol	LOS
US 101 SB off to SFIA Rd 1-S	1,475	1,475	E	1,478	1,478	E	1,381	1,381	E	1,390	1,390	E
I-380 EB/San Bruno Ave off to SFIA Rd 1-S	1,893	1,893	F	1,897	1,897	F	1,778	1,778	F	1,811	1,811	F
US 101 SB/I-380 EB off to SFIA Rd 1-S	3,368	1,684	F	3,375	1,688	F	3,159	1,580	E	3,201	1,601	E
US 101 NB off to SFIA Rd 1-S	1,835	1,835	F	1,835	1,835	F	1,678	1,678	F	1,678	1,678	F
Rd 1-N on to US 101 NB	1,661	1,661	E	1,676	1,676	E	2,198	2,198	F	2,206	2,206	F
Rd 1-N on to I-380 viaduct WB	733	733	B	746	746	B	1,164	1,164	C	1,187	1,187	C
Rd 1-N on to US 101 SB	1,378	689	B	1,378	689	B	1,761	881	B	1,761	881	B
US 101 NB C/D off to Millbrae Ave	888	888	D	888	888	D	1,048	1,048	D	1,048	1,048	D
US 101 SB C/D off to Millbrae Ave WB	1,536	1,536	F	1,536	1,536	F	1,275	1,275	D	1,275	1,275	D
US 101 SB C/D off to Millbrae Ave EB; on to US 101 SB	891	445	D	891	445	D	756	378	D	756	378	D
US 101 SB off to Broadway	1,130	1,130	D	1,130	1,130	D	1,113	1,113	D	1,113	1,113	D
Broadway on to US 101 NB	1,045	1,045	D	1,045	1,045	D	756	756	D	756	756	D
US 101 SB off to San Bruno Ave. Extension	276	276	A	276	276	A	217	217	A	217	217	A
San Bruno Ave. Extension on to US 101 NB	179	179	A	179	179	A	261	261	A	261	261	A
North Access Rd on to I-380 WB	167	167	A	167	167	A	172	172	A	172	172	A
US 101 NB off to S. Airport Blvd/Radisson Hotel	1,147	1,147	D	1,196	1,196	D	634	634	D	672	672	D
S. Airport Blvd/Radisson Hotel on to US 101	227	227	D	259	259	A	507	507	D	542	542	D
S. Airport Blvd on to US 101 NB	50	50	A	97	97	A	349	349	A	483	483	A
S. Airport Blvd on to I-380 WB	246	246	A	478	478	A	1,705	1,705	F	1,879	1,879	F
US 101 NB off to San Bruno Ave. Extension	893	893	B	974	974	C	512	512	B	597	597	B
San Bruno Ave. Extension to US 101 SB	398	398	B	443	443	B	798	798	B	917	917	C
N. Access Rd. on to US 101 NB	153	153	B	153	153	B	244	244	B	244	244	B
US 101 SB off to N. Access Rd.	250	250	C	250	250	C	237	237	C	237	237	C
US 101 NB off to N. Access Rd.	583	583	A	583	583	A	460	460	A	460	460	A
I-380 EB off to N. Access Rd.	483	483	A	483	483	A	326	326	A	326	326	A
I-380 EB off to S. Airport Blvd.	991	991	C	991	991	C	641	641	B	641	641	B
I-380 EB off to US 101 SB	4074	2037	F	4074	2037	F	2479	1239	B	2479	1239	B
I-380 WB off to I-280 SB	1048	524	A	1054	527	A	2398	1199	B	2414	1207	B
I-380 WB off to I-280 NB	2504	1252	B	2512	1256	B	6017	3009	F	6038	3019	F
I-280 NB on to I-380 EB	2718	1359	C	2733	1367	C	986	493	A	1001	500	A
I-280 SB on to I-380 EB	5201	2600	F	5212	2606	F	3081	1540	C	3093	1546	C

/a/ As defined in the *Highway Capacity Manual*, Special Report 209, Table 5-5, Transportation Research Board, Washington DC, 1985.

SOURCE: DKS Associates

- US 101 southbound off to SFIA Road 1-S, LOS C to E
- I-380 eastbound / San Bruno Avenue off to SFIA Road 1-S, LOS C to F
- US 101 southbound / I-380 eastbound off to SFIA Road 1-S, LOS C to F
- US 101 northbound off to SFIA Road 1-S, LOS C to F
- Road 1-N on to US 101 northbound, LOS B to E

In 2006, the project would cause the following level of service degradations to unsatisfactory conditions from 1990 existing levels during the p.m. peak hour:

- US 101 southbound off to SFIA Road 1-S, LOS C to E
- I-380 eastbound / San Bruno Avenue off to SFIA Road 1-S, LOS C to F
- US 101 southbound / I-380 eastbound off to SFIA Road 1-S, LOS C to F
- US 101 northbound off to SFIA Road 1-S, LOS C to F
- Road 1-N on to US 101 northbound, LOS C to F
- South Airport Blvd. on to I-380 westbound, LOS C to F

2006 Project + List-Added Growth

Table 44, p. 317 includes freeway ramp LOS for both the 2006-with-project and the 2006-with-project-and-list-added-growth conditions.

No ramp level of service reductions to unsatisfactory conditions would be expected with the addition of list-added-growth traffic in 2006. Although there would be additional volumes on the subject ramps, the LOS for most ramps analyzed would be the same as for the 2006-with-project scenario. The exceptions would be:

A.M. peak hour

- US 101 northbound off to San Bruno Ave. Extension, LOS B to C.

P.M. peak hour

- San Bruno Ave. Extension to US 101 southbound, LOS B to C.

Public Transit Impacts

The proposed project would add to transit loadings on SamTrans in 1996 and 2006. For 1996, it was assumed that the mode split of air passengers would remain constant (see "Mode Split" section above and its associated tables). However, employee travel behavior was assumed to change. A one-percent increase (as percent of total employees) in the percentage of employees who take transit was applied. Although no major significant increase in SamTrans service is planned for 1996, increased highway congestion levels throughout the Bay Area are currently causing the shift of more suburban commuters to mass transit./17/ For 2006, an additional 1.5 percent employee shift from auto to SamTrans was assumed in this analysis. Table 45 summarizes public transit use by person trips in 1990, 1996 and 2006.

If BART were to extend to SFIA by 2006, the project would add to transit loadings on BART, CalTrain and SamTrans. With the completion of BART to the area of SFIA and a transit center west of the Bayshore Freeway providing direct rail service to the terminal / Ground Transportation Center, it would be possible to access SFIA from downtown San Francisco in approximately 34 minutes via BART or 25 minutes via CalTrain./18/ It is projected that these BART and CalTrain linkages would reduce vehicular travel by approximately 11,250 daily, 520 a.m.-peak-hour and 560 p.m.-peak-hour vehicle trips. These vehicle-trip reductions include those by rental cars, taxis/limousines, shuttle vans, and shuttle buses. A portion of the projected BART ridership to SFIA would come from existing SamTrans bus service (Routes 3B, 7B, and 7F). If the BART terminal were inside SFIA, the transect times and vehicle-trip reductions would probably be more favorable than those shown.

A fundamental assumption for the "With BART / Without BART" analysis is that BART could attract six percent of air passenger trips and eleven percent of employee trips on both a daily and peak hour basis. These percentages include the additional CalTrain passengers who would be attracted to SFIA from San Jose and the South Bay, as well as San Francisco and Peninsula cities, via the assumed multi-modal (BART, CalTrain, SamTrans) transit center west of US 101./19/ This level of patronage is reasonable, considering the attractiveness of BART to San Francisco and East Bay business travelers and the opportunity to attract more CalTrain riders via the transit center west of US 101. A 1985 Peninsula Mass Transit Study concluded:

TABLE 45: PUBLIC TRANSIT USE SUMMARY

Year	Mode	% Employee Person Trips	# Daily Employee Person Trips	% Air Passenger Person Trips	# Daily Air Passenger Person Trips
1990	Auto Park	83.7%	51,900	20.1%	22,404
	SamTrans	3.5%	2,170	2.6%	2,889
1996	Auto Park	82.7%	62,852	20.1%	32,875
	SamTrans	4.5%	3,420	2.6%	4,302
2006	Auto Park	81.2%	68,695	20.1%	40,926
	SamTrans	6.0%	5,076	2.6%	5,356
2006/a/ w/BART	Auto Park	74.2%	62,773	18.8%	38,287
	SamTrans	3.3%	2,792	1.0%	2,037
	BART/b/	11.0%	9,306	6.0%	12,219

NOTES:

/a/ Entries for 2006 w/BART do not show associated reductions in person trips in rental cars, taxis/limousines, shuttle vans, or shuttle busses. The discussion in the text does take those reductions into account.

/b/ Includes additional CalTrain ridership.

SOURCE: DKS Associates.

- Attraction of air passenger trips to San Francisco Airport is estimated in the range of 3,000 to 9,000 passengers a day by transit. This represents four to ten percent of all air passengers. Experience elsewhere suggests that 15 percent or 10,000 air passengers would be the maximum potential. Many of these new patrons would be attracted from existing Airport bus service./20/

The transit assumptions made in this analysis are consistent with these conclusions.

The project would also increase the number of persons who arrive at SFIA by the variety of shuttles that serve Bay Area and other Northern California cities. This analysis has assumed that the occupancy of shuttles (average number of riders per shuttle) would not increase beyond 1990 occupancy levels, but the number of shuttle vehicles would increase from 3,340 to 4,884 in 1996, and from 4,884 to 6,056 in 2006 (see Tables 27-30, Section IV.B. Transportation Impacts, pp. 283-286, for mode split and vehicle occupancy analysis). The analysis assumed a worst-case scenario, whereby occupancy levels remained the same and the total number of shuttle vehicle trips to SFIA increased. In order to remain competitive, shuttle operators are likely to convert to larger-capacity vehicles as demand increases, thereby reducing project impacts compared to those projected in this document.

Pedestrian Impacts

The proposed project would change pedestrian circulation at SFIA in 1996 with the opening and operation of the Ground Transportation Center and Automated People Mover. In 2006, the Automated People Mover would be extended north to serve long term parking areas and employment sites.

Air passengers or employees who arrive at the Ground Transportation Center (1996 and 2006) and long-term parking (2006 only) would access the terminals in the following manner:

- walk from parking or transit to the Automated People Mover stop. (APM stops would be provided at all major parking areas and near several SFIA employment sites, as well as the GTC and terminal buildings.)
- make one or more level changes to board the Automated People Mover. (No tickets or fare would be required.)
- ride the Automated People Mover to the appropriate terminal and airline stop. (Skycaps would be necessary to handle baggage at one or several Automated People Mover stops, similar to service provided by the airlines for passengers who are dropped off by car, taxi or shuttle today.)
- make a level change to the departures deck.

The current SFIA proposal is for the Automated People Mover to be routed in front of the terminal buildings at both the upper (departures) and lower (arrivals) levels.

Air passengers and employees who park at the existing short-term lot or who are dropped off at the departures deck would walk to the terminal buildings in the same manner as they do today.

As noted in "Construction Impacts" above, detailed plans for the construction and layout of proposed SFIA facilities have not been developed at this stage. With the projected increase in air passenger activity and employment, and the projected increase in persons taking mass transit to SFIA, there will be a noticeable increase in pedestrian activity at existing areas at SFIA, and at certain new areas at the Airport. Generally, pedestrian impacts may occur at the following locations:

Existing Facilities

- Enplaning/Deplaning Roadway and Terminal

1996 Additions

- Ground Transportation Center (GTC)
- Automated People Mover Stops at the GTC and the Terminal

2006 Additions

- Automated People Mover Stops at the Multi-Modal Station and Lots D/DD
- The Multi-Modal Station, or any BART Station in the vicinity of SFIA

Design review should focus on minimizing any adverse impacts to pedestrians. Since the proposed APM (and BART) will require grade changes (such as escalators), departing air passengers should be afforded the convenience of baggage deposit, or other baggage-handling facility, at the BART station (if not at other BART stations), and at parking areas, prior to their boarding the APM to the terminal. This would increase the efficiency of moving high volumes of pedestrians from the Multi-Modal station or parking areas, via the APM, to the terminal.

Bicycling Impacts

Since the 1983 employee transportation survey did not break out bicyclists as a separate percentage, it is not possible to quantify the number of additional bicycle trips that would be attributed to the project. It is not anticipated that the relative percentage of air passengers and employees using bicycles would increase in future years. Some additional bicycle trips would be generated by the project in 2006, most likely proportional to employment growth at SFIA. The bicycle trips would access SFIA via Old Bayshore Highway and Road R-2 from Millbrae/Burlingame or via McDonnell Road (Road R-3) / North Access Road from San Bruno.

Parking Impacts

There are five proposals to increase on-site parking in the near-term (1996) SFIA Master Plan. These are:

- Expansion and restriping to provide about 2,200 additional spaces in long-term parking Lot D, of which about 2,170 would be for public long-term parking and 30 would be for City employees.
- Development of a multi-story, 3,950-space structure on Lot DD for long-term public parking, City employee parking and tenant parking.
- Dedication of the fifth level of the GTC to accommodate public short-term and airport employee parking, approximately 850 spaces.
- North Terminal roof parking would provide an additional 420 short-term spaces./21/
- Restriping and converting permit and valet parking to public parking would increase the number of public short-term spaces in the (central) garage to about 7,080 (for a net change of about 270 additional spaces). There is no provision for a relocated valet lot in the SFIA Master Plan.

Table 46 summarizes the existing space supply and demand as well as the future supply and demand for the near-term (1996) SFIA Master Plan development scenario. The proposed project would create an additional parking demand for about 11,300 stalls in 1996, giving SFIA a total demand for approximately 35,230 stalls in 1996. With a supply of about 37,480 stalls, there would thus be a surplus of 2,250 spaces in 1996 with SFIA Master Plan near-term development./22/

Other parking additions and changes are included in the long-term (2006) SFIA Final Draft Master Plan, including:

- Expansion of Lot D by 230 spaces, along with the conversion of 708 City employee spaces to long-term public spaces, which would bring the total number of public long-term spaces in Lot D to 6,587 spaces.
- Construction of a five-story, 1,200-space parking structure on Lots C and CC for tenants and employees to help offset the loss of 692 spaces due to construction of the 100,000 sq. ft. office building on Lot C.
- Conversion of the Automated People Mover interim maintenance facility in the GTC to 150 additional short-term public parking spaces, and relocation of the proposed maintenance facility to Lot D.

TABLE 46: NEAR-TERM PARKING SUPPLY AND DEMAND

		1990			1996	
Daily Enplanements/a,b,c,d/		57,700			81,651	
Employees		31,000			38,000	
	1990			1996		
	Supply	Demand/d/	Diff.	Supply	Demand/d/	Diff.
Public Spaces						
Garage						
Public Short-Term	6,294	4,128	2,166	7,082	6,803	279
Permit/Valet	492	124	368	Included in public short term		
Lot D						
Public Long-Term	3,559	2,801	758	5,649	3,584	2,065
Ground Transportation Center						
Public Short-Term	N/A	N/A	N/A	850	808	43
Lot DD Structure						
Public Long-Term	N/A	N/A	N/A	400	380	20
North Terminal Roof						
(Short-Term)	N/A	N/A	N/A	420	399	21
Off-Airport	5,170	6,168	(998)	5,170	8,729	(3,559)
Subtotal	15,515	13,221	2,294	19,571	20,702	(1,131)
Employee Spaces						
Garage		See public spaces			Moved to Lot DD	
Lot D	971	794	177	760	737	23
Lot DD Structure	N/A	N/A	N/A	3,554	3,447	107
Other	11,963	8,685	3,278	12,324	9,115	3,209
Subtotal	12,934	9,479	3,455	16,638	13,300	3,338
Other Spaces						
Rental Cars	2,011	965	1,046	1,085	1,047	38
Courtyard	183	186	(3)	0	0	0
Taxi Staging	86	57	29	185	178	7
Subtotal	2,280	1,208	1,072	1,270	1,225	45
TOTAL	30,729	23,908	6,821	37,479	35,227	2,252

NOTES:

/a/ August enplanements are used in this table as August represents the highest month for enplanements of SFIA, and is therefore the peak month for parking demand. August 1996 enplanements based on August 1989 data.

/b/ This table assumes 95 percent occupancy for passengers and 97 percent occupancy for employees and that off-site long-term parking supply remains constant.

/c/ Excess demand represents demand for public spaces that cannot be met off-airport.

/d/ Demand rates based on May 1991 enplanements and May 1991 parking occupancy survey: Public short-term = 0.0981 spaces/enplanement; public long-term = 0.048 5spaces/ enplanement; offsite parking = 0.1069 spaces/enplanement; employee = 0.3500 spaces/ employee.

SOURCE: DKS Associates

TABLE 47: LONG-TERM PARKING SUPPLY AND DEMAND

	1990			2006		
Daily Enplanements/a,b,c,d/		57,700			99,129	
Employees		31,000			42,300	
	1990			2006		
	Supply	Demand/d/	Diff.	Supply	Demand/d/	Diff.
Public Spaces						
Garage						
Public Short-Term	6,294	4,128	2,166	7,082	8,518	(1,436)
Permit/Valet	492	124	368	Included in public short term		
Lot D						
Public Long-Term	3,559	2,801	758	6,587	4,432	2,155
Ground Transportation Center						
Public Short-Term	N/A	N/A	N/A	1,000	950	50
Lot DD Structure						
Public Long-Term	N/A	N/A	N/A	400	380	20
North Terminal						
Roof (Short-Term)	N/A	N/A	N/A	420	399	21
Off Site	5,170	6,168	(998)	5,170	10,597	(5,427)
Subtotal	15,515	13,221	2,294	20,659	25,275	(4,616)
Employee Spaces						
Garage		See public spaces			Moved to Lot DD	
Lot D	971	794	177	52	50	2
Lot DD Structure	N/A	N/A	N/A	3,554	3,447	107
Lot C/CC Structure	N/A	N/A	N/A	600	582	18
Other	11,963	8,685	3,278	11,460	11,307	153
Subtotal	12,934	9,479	3,455	15,666	15,387	279
Other Spaces						
Rental Cars	2,011	965	1,046	1,271	1,317	(46)
Courtyard	183	186	(3)	0	0	0
Taxi Staging	86	57	29	216	224	(8)
Subtotal	2,280	1,208	1,072	1,487	1,541	(54)
TOTAL	30,729	23,908	6,821	37,812	42,203	(4,391)

NOTES:

/a/ August enplanements are used in this table as August represents the highest month for enplanements of SFIA, and is therefore the peak month for parking demand. August 1996 enplanements based on August 1989 data.

/b/ This table assumes 95 percent occupancy for passengers and 97 percent occupancy for employees and that off-site long-term parking supply remains constant.

/c/ Excess demand represents demand for public spaces that exists for parking at the short-term garage but which must find alternative locations as the garage cannot accommodate this demand. It includes also demand that cannot be met off-airport.

/d/ Demand rates based on May 1991 enplanements and May 1991 parking occupancy survey: Public short-term = 0.0981 spaces/enplanement; public long-term = 0.0485 spaces/enplanement; offsite parking = 0.1069 spaces/enplanement; employee = 0.3500 spaces/employee.

SOURCE: DKS Associates

A new vehicular bridge is proposed over San Bruno Avenue that would connect Lots D and DD. The parking structure on Lots C and CC would be constructed in joint development with the proposed new office building on the same parcel. Table 47, p. 326, summarizes the existing and future (2006) parking spaces that would be provided, as well as parking demand.

In 2006, the parking demand from employees and air passengers would be about 42,200 spaces. The total number of spaces provided by the project in 2006 would be about 37,800, a deficit of approximately 4,400 parking spaces./22/

The 2006 deficit could be reduced by about 3,220 spaces with the extension of BART to SFIA (see Table 30, Section IV.B. Transportation Impacts, p. 286 for BART mode split analysis).

As noted in the Setting section, SFIA currently experiences a deficit of parking on many days during peak months of air travel. As garage parking spaces are more difficult to monitor than Lot D parking spaces, SFIA will allow vehicles to circulate in the garage until a space becomes available. In the long-term parking Lot D, closures occur for a period of time and motorists are instructed to find parking at one of the offsite parking facilities. In August, 1990, Lot D was closed 5 times for a total of just over 22 hours./23/

Construction Impacts

Detailed plans for construction of the proposed SFIA facilities have not been developed at this stage. In general, construction of the land uses proposed would generate increases in truck and auto travel to and from SFIA. Additional truck travel would be associated with removal and redistribution of excavation spoils and delivery of construction materials. An associated increase in auto travel by construction workers would also occur. Because of the long-term time frame for buildout and the master plan level of detail, projection of the quantity and nature of transportation effects from construction traffic at a refined level of detail is not feasible.

The intensity and scale of truck travel would depend upon the amount of construction occurring at a given time, as construction of the project would occur on a continuous basis over the next 16 years. Primary effects of truck traffic would be a lessening of the capacities of access streets and haul routes because of the slower movement and larger turning radii of trucks. Historically, SFIA has provided on-site parking and separate haul routes off SFIA roadways for construction vehicles. Construction work hours are typically 7:00 a.m. to 3:30 p.m., which would minimize the impact on p.m. peak hour traffic occurring later in the day.

US 101 would be the primary haul and access routes, with truck traffic entering SFIA via Millbrae Avenue, the Terminal ramps and I-380 / San Bruno Avenue. Temporary parking demand from vehicles used by construction workers, and the impact on local intersections from construction worker traffic, would occur in proportion to the number of construction workers who would use automobiles to reach their work sites.

Impacts on Adjacent Cities

Because of the projected forced-flow traffic conditions on US 101, there is potential for traffic to divert from the freeways to local streets, especially in Millbrae and San Bruno. The proposed four-laning of McDonnell Road (Road R-3) in 1996 and Road R-2 in 2006 would make these reliever routes for employees and air passengers who know the local roadway system. However, use of the alternative routes (Millbrae Avenue to Old Bayshore Highway / Road R-2 to SFIA, and San Bruno Avenue to McDonnell Road (Road R-3) to SFIA) would be constrained by the limited capacity of two intersections, Millbrae Avenue / Old Bayshore Highway and San Bruno Avenue / South Airport Boulevard. Furthermore, these routes would not be signed (except for long-term-parking signage on US 101 southbound, directing motorists to San Bruno Avenue) so the routes through adjacent cities would not serve as attractive alternatives to US 101 for air passengers unfamiliar with the area.

- Effects of Potential Aircraft Delays

- It is possible that because of operational constraints and future delays, there would be changes in the forecast ground traffic using the Airport. Tables J-1 and J-2, in Appendix J, pp. A.179-180, show the existing number of flights per hour in 1990, and the forecast number of flights per hour in 1996 and 2006.

- Using the information on Tables J-1 and J-2, in 1996 and 2006 there would be no more than one hour of delay for any flight under optimum visual flight rules (61 percent of the time). Under less-than-optimum visual flight rules (25 percent of the time), there would be no more than one hour of delay for any flight in 1996, and there would be more than one hour of delay for only five flights in 2006. Under more adverse weather conditions there could be additional delays to flights.

During instrument flight rules (IFR) conditions, which occur about 5.6 percent of the time, the existing SFIA airfield would not accommodate the number of flights forecast per hour in 1996 and 2006 with implementation of the SFIA Master Plan, if such conditions were to persist throughout a 24-hour period. (IFR conditions at SFIA generally occur over shorter periods; a review of SFIA weather summaries for 1990 showed that in the summer, IFR conditions generally occurred only in the early morning and late evening hours.) Even if the forecast flights were spread throughout the entire 24-hour period to maximize use of the airfield, the airfield could not accommodate the total number of daily flights forecast, even assuming that the airfield were to operate at capacity every hour. (Although Appendix J does not include an analysis of the airfield's ability to accommodate flights forecast for 2006 without the SFIA Master Plan, it is likely that the result would be similar to that described here.)

The effects of these delays on surface transportation impacts at or near SFIA cannot be estimated quantitatively. The delays could affect the hourly distribution of trips made by passengers, people going to the Airport to pick up passengers, and employees. It is possible that passengers aware of substantial flight delays would delay their trips to the airport; alternatively, these passengers would experience the aircraft delay in the SFIA terminal building. People travelling to the Airport to pick up arriving or drop off departing passengers might also delay their trips to the Airport, or wait longer in the terminal building for the flight to arrive or depart. The number of airline or airline support employees working during a particular shift might change to accommodate the services needed by delayed aircraft.

The potential change in the hourly distribution of trips could result in the spreading out of peak forecast travel. The estimates of aircraft delay in Appendix J were developed assuming that the 1990 pattern of peak flight schedules would increase proportionally over the next 15 years. If the airlines were to reschedule flights to off- peak hours, such rescheduling would have a similar effect on the hourly distribution of forecast surface vehicle traffic.

The effects of this redistribution of trips on traffic impacts near the Airport would depend on the change in the number of trips during the peak hours on the surrounding roadway network. As noted on p. 280, the peak hours studied in the analysis of traffic impacts represent the peak hours on the network, not the air traffic peak hours. There

- could be more or fewer vehicle trips during the peak hours on the surrounding network, depending on when the aircraft delays occur and how long the delays are.

- If people travelling to the Airport to pick up or drop off passengers wait at the Airport, the demand for parking spaces during certain hours could increase. The turnover of short-term parking spaces in the parking garage and the GTC would be affected by flight delays. Vehicles could be required to circulate for longer periods of time before finding an available space.

- Because the impacts of aircraft delays on surface traffic impacts are not known, no mitigation for such impacts is identified in the EIR.

NOTES - Transportation

/1/ July 18, 1990 phone conversation with Ron Castillo of SFIA Bureau of Planning and Construction indicates that SFIA is considering a possible sixth and seventh level of the GTC, as well as possible reconfiguration of the fourth and fifth level floor plans, primarily related to the amount of rental car facilities. These additions would not result in additional trips to SFIA, since the trip-generation methodology bases future-year trips on air passenger enplanements and additional air cargo and airline service space.

/2/ Development of the "West of Bayshore" site for a BART station is speculative at this time. It is an environmentally sensitive area and lengthy debate may follow if the site is proposed for a BART station. However, a BART-Airport station could be located further to the west in an already developed area of San Bruno, or BART tracks could be brought directly into the terminal area. This transportation analysis identifies the number of employees and air passengers who would take BART given a station west of US 101, which is worst-case, as direct BART terminal service would increase BART ridership and further reduce impacts on the surrounding roadway network.

/3/ BART - San Francisco Airport Extension AA/DEIS/EIR Detailed Definition of Alternatives, Parsons Brinckerhoff Quade and Douglas, March 1991. Available for review in libraries in affected Peninsula cities.

/4/ Letter from John Costas, SFIA Assistant Administrator Planning and Construction, to Barbara Sahm, City and County of San Francisco Environmental Review Officer, May 3, 1991.

/5/ Caltrans, District 4 Adopted 1990 State Transportation Improvement Program (STIP), November, 1990.

/6/ On March 1, 1990, BART and SamTrans signed a comprehensive agreement concerning an extension of BART to Colma and beyond to SFIA. A combined Alternatives Analysis, Draft Environmental Impact Statement and Draft Environmental Impact Report on the SFIA (aka "SFO") extension is underway.

/7/ Presentation, Frank Wilson, BART General Manager, August 8, 1990. Extending BART beyond SFIA to San Jose would entail acquiring land (presumably the Southern Pacific (SP) right-of-way) along a 34-mile alignment and constructing 16 stations, at a cost of $1.53 billion (1987$). The Joint Powers Board (JPB) that is working on the proposed CalTrain downtown San Francisco Extension and on the purchase of the SP right-of-way for CalTrain is also working on this possible acquisition for BART.

/8/ SFIA, *San Francisco International Airport Final Draft Master Plan*, November 1989, p. 10.19, Table 10.4, modified to reflect employees' BART modal share.

/9/ Telephone conversation with Linda Rhine, SamTrans Associate Planner, April 23, 1990.

/10/ City of San Bruno, *North San Bruno Areawide Traffic Study Final Report*, December 1986. The traffic model developed for this study was for an area bounded by SR 92 on the south, Daly City on the north, San Francisco Bay to the east, and the Pacific Ocean to the west.

/11/ SFIA, *San Francisco International Airport Final Draft Master Plan*, November 1989.

/12/ SFIA Office of Community Affairs, Monthly Air Traffic Reports.

/13/ SFIA, *San Francisco International Airport Final Draft Master Plan*, November 1989, p. 7.6, Fig. 7.8.

/14/ Greiner Engineering, Orlando International Airport Development of Regional Impact Application for Development Approval, January 1990.

/15/ SFIA Office of Landside Operations, U.S. 101 Terminal Ramp Tube Counts, August 1989.

/16/ Institute of Transportation Engineers, Trip Generation, 4th Edition, 1988.

/17/ Several news articles in the San Francisco Chronicle in September, 1990 focused on transit patronage.

/18/ An extension of CalTrain from its current terminus at Fourth Street / Townsend Street in San Francisco's South of Market district to Second Street / Market Street in the Financial District is shown in Caltrans' current Short Range Transit Plan. This extension, which is the subject of a separate environmental review, could make CalTrain service to SFIA competitive with BART for those transit patrons familiar with CalTrain's less-frequent schedule.

/19/ Kaiser Engineers and Barton-Aschman Associates, Peninsula Mass Transit Study, March 1985.

/20/ Kaiser Engineers and Barton-Aschman Associates, Peninsula Mass Transit Study, March 1985, p. 96.

/21/ SFIA, SFIA Capital Projects Plan, 1989.

/22/ The demand rates for parking analysis are based on enplanements (based on the May 1991 parking occupancy survey): For public short-term parking, the rate is 0.0981 spaces/ enplanement; for public long-term parking, the rate is 0.0485 spaces/enplanement; for off-site parking, the rate is 0.1069 spaces/enplanement. Employee parking demand is based on the total number of employees; the demand rate for employees is 0.3500 spaces/employee, which reflects the shifting of employees throughout the day. While the 1996 and 2006 tables appear to indicate a net surplus of parking spaces for employees and a net deficit for air passengers, the situation for employees is complicated by the fact that they have fewer options for places to park than do the passengers.

/23/ SFIA Office of Landside Operations, Lot D Closure Reports for 1990, and telephone conversation with Oscar Cabangis, SFIA Office of Landside Operations, February 4, 1991.

C. NOISE

Noise impacts from a project can be categorized as those resulting from construction and those from operational activities. Construction noise would have a short-term effect, while operational noise, primarily from motor-vehicle and air traffic, would continue throughout the lifetime of the project.

CONSTRUCTION

Typical composite noise levels for construction activities, and distances from construction of various noise contours, are presented in Table 48, below. Noise-sensitive areas including the Airport Hilton Hotel exist near the proposed construction and demolition sites. The proposed activities that potentially would have an effect on these sensitive receptors are the demolition and reconstruction of the Pan Am Maintenance Hangar and Pan Am Administrative office, and the construtiton of the service station and Automated People Mover (APM) Superbay Facility. The Airport Hilton Hotel, Lomita Park Elementary School, and Lomita Park residential area are, respectively, 200 feet, 2,200 feet, and 800 feet from the proposed site of the Pan Am Maintenance Hangar and Administrative office. The Lomita Park Elementary School is 1,600 feet from the proposed site of the new service station and Automated People Mover Maintenance Facility.

On the assumption that pile-driving would be needed for construction, exterior noise levels at the Airport Hilton during demolition and construction of buildings in the vicinity would be approximately 89 dBA; interior noise levels at the hotel would be about 74 to 79 dBA with windows open, and about 57 to 64 dBA with windows closed. Sleeping quarters are usually designed for an approximate noise level range of 34 to 47 dBA./1/ Although construction activities would be likely to occur only during daytime hours, construction noise would still be disruptive to hotel guests; pile-driving activities could preclude sleeping in hotel rooms on the near side of the construction site./1/

The exterior noise level at Lomita Park Elementary School of Millbrae, during construction of buildings at SFIA would be approximately 53 dBA without pile-driving, and about 71 dBA in the presence of pile-driving activities. This

TABLE 48: TYPICAL NOISE LEVELS DURING CONSTRUCTION OF LARGE BUILDINGS

Construction Activity	Noise Level at 50 feet (dBA, Leq)	Approximate Distance (ft.) to Reduce Noise to Given Level (dBA, Leq) 60	65	70
Ground Clearing	84	790	450	250
Excavation	89	1,400	800	450
Foundations	78	400	220	130
Erection	85	890	500	280
Finishing (exterior)	89	1,400	800	450

SOURCE: Environmental Science Associates, Inc.

is an increase over the existing noise at the school from US 101, estimated at 49 dBA. Interior noise levels at the school would be below 50 dBA in the absence of pile-driving activities, and about 51 dBA in the presence of pile-driving activities. At 50 dBA, conversations can be maintained in normal speaking levels at a distance of 20 feet./2/

In the Lomita Park residential area, noise from US 101 is about 52 dBA, not accounting for the effect of noise barriers. Noise from project construction would increase the exterior noise level in this area to about 60 dBA without pile-driving and 77 dBA with pile-driving. In the latter case, indoor noise levels would be about 62 to 67 dBA with windows open and 52 to 57 dBA with windows closed.

State Noise Guidelines

The City of Milbrae has no quantative applicable noise ordinances or standards, although the Milbrae General Plan states that "The City should make sure that noise from construction, refuse collection and street sweeping is reduced to the lowest possible level." In lieu of quantitative guidelines for the City of Milbrae, construction noise impacts in Milbrae are assessed using the State Department of Health Services' Recommended Land Use Compatibility Guidelines for Community noise. Under these guidelines, noise levels at Lomita Park Elementary School (71 dBA with pile-driving) would be considered "normally unacceptable," and noise levels in the Lomita Park residential area (77 dBA with pile driving) would be considered "clearly unacceptable." Residential land uses closer to the Airport than the Lomita Park residential area, such as Airport Park, Marina Vista and North Millbrae, would be exposed to higher noise levels during pile driving, which would be considered "clearly unacceptable."

(See Section III.A. Land Use, beginning on p. 82, for a discussion of applicable noise policies.)

FUTURE NOISE ENVIRONMENT

Surface Traffic

Forecast growth levels represent future noise levels including traffic volumes based on MTC growth factors in the project areas. Project noise levels incorporate project-generated traffic into the forecast growth baseline analysis. List-added growth noise levels include additional cumulative traffic due to specific listed-added growth that is reasonably forseeable. See the Introduction to Chapter IV. Environmental Impacts, p. 245 for additional explanation of these terms.

Estimated future afternoon peak-hour noise levels on US 101 and on local roads serving the Airport are presented in Table 49. Traffic volumes which increase noise by 3 dBA or more are noticed by most people./3/ An increase in ambient noise levels of 5 dBA or more is generally considered to be significant. Forecast growth noise levels in 1996 would be at most one decibel greater than existing noise levels; 1996 Project noise levels would exceed forecast growth 1996 noise levels by a maximum of one decibel. The net increase of two decibels would generally not be perceptible. Forecast growth noise levels in 2006 represent a one decibel increase over 1996 forecast growth noise levels; again, 2006 Project noise levels would be a maximum of one decibel greater than the 2006 forecast growth noise levels. This two decibel noise level increase would not be perceptible.

Air Traffic

Operations by Aircraft Type and Time of Day

For aircraft noise, the FAA's threshold of significance is an increase of 1.5 dBA, L_{dn} (L_{dn} is roughly equivalent to CNEL) over any noise-sensitive area within the L_{dn} 65

TABLE 49: PEAK-HOUR NOISE LEVELS ON SELECTED ROAD SEGMENTS

	Noise Levels (dBA, Leq)/a/						
		1996			2006		
Road Segment	1990 Existing	Forecast Growth	Project/b/	List-added Growth/c/	Forecast Growth	Project/b/	List-added Growth/c/
San Bruno Ave. between El Camino Real and San Mateo Ave.	69	69	70	71	69	70	71
Millbrae Ave. between Rollins Road and US 101	74	74	74	75	74	75	75
San Bruno Ave. between San Mateo Ave. and US 101	70	70	70	72	70	70	72
US 101 between San Bruno Ave. and SFIA ramps	81	82	82	83	82	82	83
US 101 between SFIA and Millbrae Ave.	79	79	79	79	79	79	80

/a/ Noise levels are estimated for a receptor at a distance of approximately 50 feet from the road centerline. Vehicle traffic is assumed to be 93 percent automobiles and seven percent trucks on both streets and freeways. Calculations are based on vehicle volume estimates provided by DKS Associates, 1990.
/b/ Includes forecast growth.
/c/ Includes forecast growth plus the project.

SOURCE: Environmental Science Associates, Inc.

contour./4/ As discussed in Section III.C. Noise Setting, p. 153, designated California airports with CNEL 65 contours extending over noise-sensitive areas cannot operate without a variance granted by the California Department of Transportation. For the areas around SFIA, the San Mateo County ALUC has adopted noise compatibility standards that reflect use of the CNEL 65 contour as the threshold of significant adverse impacts.

Tables 50 and 51, pp. 336 - 337, show the forecast number of aircraft operations, by type of operation, time of day, and aircraft type, for an average day of the year in 1996 and 2006. (The estimated number of aircraft operations for an average day in 1990 is shown in Table 18, p. 157.) The forecasts of operations were developed using the SFIA Master Plan unconstrained passenger forecasts (42.3 million in 1996 and 51.3 million in 2006), Master Plan forecasts of load factors, and the FAA forecast to Congress regarding the future national commercial aircraft fleet./5/

As shown by comparing Tables 50, 51, and 18, total average daily aircraft operations are forecast to increase 24% from 1990 to 1996 and 10% from 1996 to 2006. Total passengers (shown in Table 1, p. 24) are forecast to increase 41% from 1990 to 1996 and 21% from 1996 to 2006. Operations are forecast to increase less than passengers because it is assumed that larger aircraft will be serving SFIA in the future and that more passengers would be on each aircraft. These assumptions are made in the SFIA Master Plan "to reflect a potential capacity constrained environment of the future."

As shown in Tables 50 and 51, about 177 aircraft arrivals, or about 34%, are forecast to occur during evening or nighttime hours in 1996, and about 197 arrivals, or about 35%, are forecast to occur during those hours in 2006. About 141 aircraft departures in 1996, or about 27%, and 155 departures in 2006, or about 28%, are forecast to occur during evening or nighttime hours. The percentages of operations occurring during evening and nighttime hours in 1996 and 2006 are assumed to be about the same as in 1990. This analysis assumes that there would be no airfield capacity constraints during any hour in either 1996 or 2006.

It is possible that because of operational constraints and future delays during adverse weather conditions, the percentage of operations during the more sensitive evening and nighttime hours would be higher than forecast for optimum weather conditions by this EIR. Tables J-1 and J-2, in Appendix J, pp. A.179-180 show the existing number of flights per hour in 1990, and the forecast number of flights per hour in 1996 and 2006. According to Tables J-1 and J-2, in 1996 and 2006 there would be no more than one hour of delay for any flight under optimum visual flight rules (86 percent of the time).

From Table J-1 (which reflects conditions 61 percent of the time) there would be an increase of two flights during the 7:00 - 10:00 p.m. evening period (an imperceptible change) and no increase during the nighttime period. From Table J-2 (which

TABLE 50: FORECAST AVERAGE DAILY AIR CARRIER AIRCRAFT OPERATONS BY TYPE OF OPERATION, TIME OF DAY, AND AIRCRAFT TYPE, 1996 /a/

Type of Aircraft/b/	Number of Arrivals				Number of Departures				Total
	Day/c/	Evening/c/	Night/c/	Total	Day/c/	Evening/c/	Night/c/	Total	Operations
Stage 2/d/									
B-727 (all)	40	13	5	58	41	10	7	58	116
B-737(-100,-200)/e/	25	8	3	36	26	6	4	36	72
B-747/f/	3	2	1	6	4	0 /g/	1	5	11
Stage 3/d/									
B-737-300	75	23	9	107	77	18	13	108	215
B-747	16	9	4	29	22	2	5	29	58
B-757 (all)	28	9	3	40	29	7	5	41	81
B-767 (all)	23	13	6	42	32	3	7	42	84
B-7J7/h/	1	0 /g/	0 /g/	1	1	0 /g/	0 /g/	1	2
DC-8-71	4	2	1	7	5	1	1	7	14
DC-10,L-1011(all)	23	14	6	43	32	3	7	42	85
MD-11	3	2	1	6	4	0 /g/	1	5	11
MD-80,-90 series	46	14	6	66	47	11	8	66	132
A-300,A-310	6	2	1	9	6	1	1	8	17
A-320	12	4	1	17	12	3	2	17	34
A-330,A-340	1	1	0 /g/	2	2	0 /g/	1	3	5
BAe-146	30	9	4	43	31	7	5	43	86
F-100	2	1	0 /g/	3	2	1	0 /g/	3	6
Total	338	126	51	515	373	73	68	514	1029

/a/ Average daily aircraft operations are equal to annual operations (takeoffs and landings) divided by 365 and rounded to the nearest whole number. Forecast operations for 1996 were prepared by Ken Eldred Engineering on the basis of *SFIA Master Plan* passenger and FAA national fleet mix forecasts. Air carrier operations, as defined by SFIA, are scheduled commercial jet operations.

/b/ Aircraft types listed in this table are representative, and are not meant to constitute the full range of aircraft that will use SFIA in 1996.

/c/ Day = 7:00 a.m. to 7:00 p.m.; evening = 7:00 p.m. to 10:00 p.m.; night = 10:00 p.m. to 7:00 a.m.

/d/ Classification of aircraft as "Stage 2" and "Stage 3" refers to noise standards established by Federal Aviation Regulations Part 36. Stage 3 aircraft are generally quieter than Stage 2 aircraft.

/e/ Includes operations by DC-9 aircraft.

/f/ Earlier models of the B-747 are classified as Stage 2 aircraft.

/g/ Fewer than 0.5 operations per day (183 operations per year).

/h/ Included to represent a 150-seat, Stage 3 aircraft.

SOURCES: Ken Eldred Engineering; Environmental Science Associates, Inc.

TABLE 51: FORECAST AVERAGE DAILY AIR CARRIER AIRCRAFT OPERATIONS BY TYPE OF OPERATION, TIME OF DAY, AND AIRCRAFT TYPE, 2006 /a/

	Number of Arrivals				Number of Departures				Total
Type of Aircraft/b/	Day/c/	Evening/c/	Night/c/	Total	Day/c/	Evening/c/	Night/c/	Total	Operations
Stage 2/d/									
B-727 (all)	9	3	1	13	9	2	1	12	25
B-737(-100,-200)/e/	5	2	1	8	5	1	1	7	15
B-747/f/	0	0	0	0	0	0	0	0	0
Stage 3/d/									
B-737-300	77	24	9	110	78	19	13	110	220
B-747	20	12	5	37	27	3	6	36	73
B-757 (all)	30	9	4	43	31	7	5	43	86
B-767 (all)	32	19	9	60	45	5	10	60	120
B-7J7 /g/	32	10	4	46	32	8	5	45	91
DC-8-71	1	1	0 /h/	2	1	0 /h/	0 /h/	1	3
DC-10,L-1011(all)	19	11	5	35	27	3	6	36	71
MD-11	5	3	1	9	7	1	2	10	19
MD-80,-90 series	80	25	10	115	81	20	13	114	229
A-300,A-310	5	2	1	8	5	1	1	7	15
A-320	21	6	3	30	21	5	3	29	59
A-330,A-340	4	2	1	7	5	1	1	7	14
BAe-146	30	9	4	43	31	7	5	43	86
F-100	2	1	0 /h/	3	2	0 /h/	0 /h/	2	5
Total	372	139	58	569	407	83	72	562	1131

/a/ Average daily aircraft operations are equal to annual operations (takeoffs and landings) divided by 365 and rounded to the nearest whole number. Forecast operations for 1996 were prepared by Ken Eldred Engineering on the basis of SFIA Master Plan passenger and FAA national fleet mix forecasts. Air carrier operations, as defined by SFIA, are scheduled commercial jet operations.

/b/ Aircraft types listed in this table are representative, and are not meant to constitute the full range of aircraft that will use SFIA in 2006.

/c/ Day = 7:00 a.m. to 7:00 p.m.; evening = 7:00 p.m. to 10:00 p.m.; night = 10:00 p.m. to 7:00 a.m.

/d/ Classification of aircraft as "Stage 2" and "Stage 3" refers to noise standards established by Federal Aviation Regulations Part 36. Stage 3 aircraft are generally quieter than Stage 2 aircraft.

/e/ Includes operations by DC-9 aircraft.

/f/ Earlier models of the B-747 are classified as Stage 2 aircraft.

/g/ Included to represent a 150-seat, Stage 3 aircraft.

/h/ Fewer than 0.5 operations per day (183 operations per year).

SOURCES: Ken Eldred Engineering; Environmental Science Associates, Inc.

reflects conditions 25 percent of the time) flights during the 7:00 - 10:00 p.m. evening hours would increase by about 10 percent in 1996 and by about 12 percent in 2006, and flights during the 10:00 p.m. - 7:00 a.m. nighttime period would increase by about 31 percent in 2006. Overall noise levels would increase on average about one half decibel during the evening hours in both 1996 and 2006. Noise levels would increase about 1.2 decibels during the nighttime hours in 2006. These increases are not perceptible, and are less than the FAA threshold of significance for noise increases. During the evening periods in both 1996 and in 2006, and during the nighttime period in 2006, there would be an increase in the number of single event noise disturbances.

Under more adverse weather conditions, there could be additional delays to flights. During instrument flight rules (IFR) conditions, which occur about 5.6 percent of the time, the existing SFIA airfield would not accommodate the number of flights forecast per hour in 1996 and 2006 with implementation of the SFIA Master Plan, if such conditions were to persist throughout a 24-hour period. Even if the forecast flights were spread throughout the entire day to maximize use of the airfield, the airfield could not accommodate the total number of daily flights forecast, even assuming that the airfield would be operating at capacity every hour). Under such conditions, it is likely that the number of flights occurring during evening and nighttime hours would increase. Under adverse weather conditions, if aircraft delays were to increase due to capacity constraints, noise contours could be somewhat greater than calculated in this EIR.

Operations by aircraft meeting FAA Part 36 Stage 3 noise standards are forecast to account for about 81% of total average daily operations in 1996 and about 96% in 2006 (compared to 64% in 1990). The number of noisier, Stage 2 aircraft serving SFIA has an influence on the size of the Airport CNEL contours. The percentage of operations by these older, noisier jet aircraft is forecast to decrease as the airlines gradually replace them with newer, quieter (Stage 3) aircraft. In addition, the SFIA Noise Regulation (described in Chapter V. Mitigation Measures, p. 411) provides for a gradual phaseout of Stage 2 aircraft.

Since the preparation of the FAA national fleet forecasts and the adoption of the SFIA Noise Regulation, Congress has passed legislation providing for the phasing out of Stage 2 aircraft nationwide./5/ The legislation includes a final deadline of December 31, 1999, for the operation of Stage 2 aircraft, with a possible extension through December 2003 if certain conditions are met. On September 24, 1991, the FAA issued regulations to implement the noise policy. The regulations include the deadlines established by the legislation, with interim deadlines of 55 percent (of an airline's fleet) by 1994, 65 percent by 1996, and 75 percent by 1998./5a/

- As discussed on p. 168, the Airport Noise Abatement Regulation was amended in June 1991 to include a requirement for 100 percent Stage 3 operations as of January 1, 2000. Assuming that aircraft operators serving SFIA comply with the SFIA and federal regulations, there would be no Stage 2 aircraft serving SFIA in 2006. With a 100 percent Stage 3 fleet in 2006, the CNEL contours shown in this section would probably be about one dBA smaller than forecast.

Operational Assumptions

Runway use, the locations of generalized flight tracks, and flight track use are assumed to be the same in 1996 and 2006 as in 1990 (see Section III.C. Noise, p. 153).

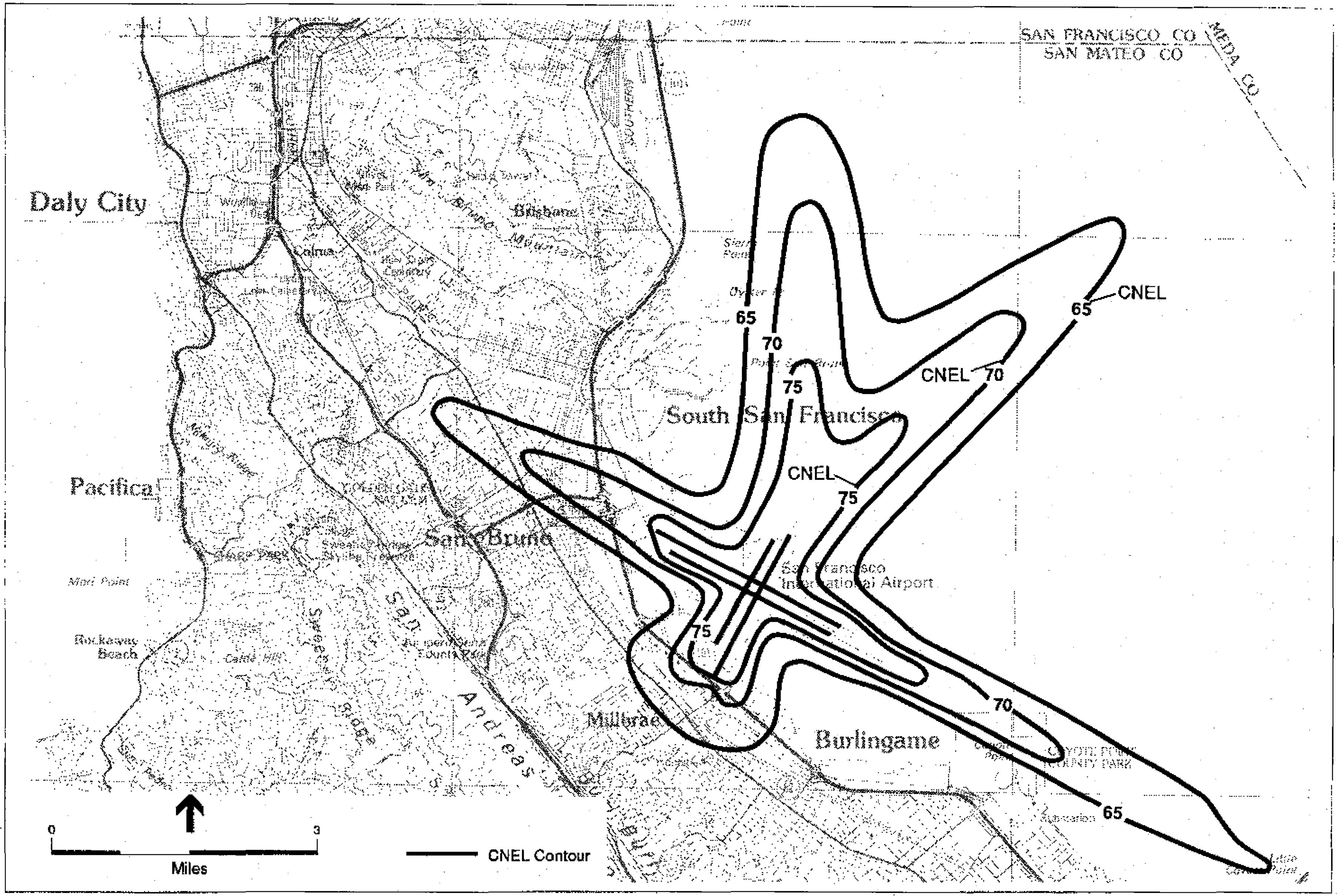
SFIA Aircraft Noise Contours -- 1996

The CNEL contours for 1996 with implementation of the SFIA Master Plan are presented in Figure 32./7/ A comparison of Figure 32 with the 1990 CNEL contours in Figure 20, Section III.C. Noise Setting, p. 161 shows that smaller areas of South San Francisco, San Bruno, Millbrae, and Burlingame would be exposed to aircraft noise of 65 dBA, CNEL and above in 1996 than in 1990.

Noise levels in South San Francisco, San Bruno, Millbrae, and Burlingame, which are affected primarily by the noise from departing aircraft, would decrease due to the phasing out of Stage 2 aircraft and their replacement with Stage 3 aircraft (which produce less noise during takeoff). Noise levels in areas southeast of the Airport, which are affected primarily by the noise from arriving aircraft, would have a relatively minor change from 1990 because Stage 2 and 3 aircraft produce similar levels of noise on landing.

On the basis of ABAG growth projections for 1996, there would be about 5,500 people, about 1,500 people, and zero people living in areas of 65-70 dBA, 70-75 dBA, and 75+ dBA, CNEL, respectively. The total number of people living within the 65 dBA, CNEL noise contour would decrease from 14,980 people in 1990 to 7,000 people in 1996.

Table 52, p. 341, includes a summary of the number of people exposed to aircraft noise of CNEL 65 and above in 1990, and in 1996 and 2006 with implementation of the SFIA Master Plan.



SOURCE: Ken Eldred Engineering and Environmental Science Associates, Inc.

San Francisco International Airport ■

Figure 32
1996 Aircraft Noise Contours

●TABLE 52: ESTIMATED RESIDENT POPULATION/HOUSEHOLDS EXPOSED TO AIRCRAFT NOISE CNEL 65 AND ABOVE, 1990, 1996, AND 2006/a/

	Resident Population/Households Exposed/b,c/					
	Estimated1990		Forecast/e/			
Noise Exposure Range (CNEL)/d/	Population	Households	1996 Pop.	Households	2006 Pop.	Households
CNEL 75+	340	133	0	0	0	0
CNEL 70-75	1,980	777	1,500	618	760	321
CNEL 65-70	12,660	4,939	5,500	2,129	5,840	2,242
Total CNEL 65+	14,980	5,849	7,000	2,747	6,600	2,563

NOTE: Numbers shown reflect only the homes within the CNEL 65 contour. Some homes included in totals may no longer be "impacted" because they have been sound insulated.

/a/ Estimated on the basis of the CNEL contours shown in Figures 20, 32, and 33, pp. 161, 340, and 345.
/b/ Estimated on the basis of 1980 U.S. Census block data, and ABAG population growth factors by census tract. Some of the population growth would occur in new dwelling units with sound insulation installed according to local regulations.
/c/ Estimated on the basis of ABAG Persons Per Household (PPH) statistic for 1990, and projections for 1995 and 2005.
/d/ CNEL= community noise equivalent level.
/e/ Assuming implementation of the SFIA Master Plan.

SOURCE: Environmental Science Associates, Inc.

Comparison of Calculated CNEL Values

Calculated CNEL values at the 27 remote monitoring stations and 20 additional sites selected for this study are presented in Tables 53 and 54, pp. 342-343. (Locations of the stations and study sites are shown in Figure 21, Section III.C. Noise Setting, p. 162.) The tables include CNEL values for 1990, and for 1996 and 2006 with implementation of the SFIA Master Plan. The CNEL values were calculated on the basis of aircraft operations at SFIA only, and do not reflect the noise from aircraft using Metropolitan Oakland International Airport. As explained in Section III.C., Noise Setting, p. 153 and in Appendix C, "Description of Noise and Its Effect on

People," p. A.59, CNEL values are averages of noise over time, and therefore represent the general noise levels in a given area; individual aircraft fly-overs would be louder than the CNEL values and would continue to be noticed. See below for a discussion of single-event noise.

A comparison of CNEL values at the remote monitoring stations shows that:

TABLE 53: COMPARISON OF CALCULATED ANNUAL CNEL VALUES IN DECIBELS AT REMOTE MONITORING STATIONS, 1990, 1996, 2006

		Calculated CNEL Values (dBA)/a/			Increase (Decrease) From 1990	
		Estimated	Forecast			
Station/b/	City Location	1990	1996/c/	2006/c/	1996	2006
1	San Bruno	71.7	71.5	71.7	(0.2)	0.0
2	San Bruno	55.5	53.7	52.9	(1.8)	(2.6)
3	South San Francisco	56.2	53.8	52.1	(2.4)	(4.1)
4	South San Francisco	68.8	68.5	68.9	(0.3)	0.1
5	San Bruno	63.7	62.6	62.3	(1.1)	(1.4)
6	South San Francisco	65.8	64.0	64.3	(1.8)	(1.5)
7	Brisbane	55.3	52.0	49.4	(3.3)	(5.9)
8	Millbrae	71.2	67.9	65.1	(3.3)	(6.1)
9	Millbrae	63.6	60.3	57.1	(3.3)	(6.5)
10	Burlingame	59.8	56.3	53.0	(3.5)	(6.8)
11	Burlingame	63.9	60.5	57.3	(3.4)	(6.6)
12	Foster City	62.5	63.1	63.4	0.6	0.9
13	Hillsborough	50.3	46.8	43.6	(3.5)	(6.7)
14	South San Francisco	54.2	52.3	51.6	(1.9)	(2.6)
15	South San Francisco	62.2	59.1	55.4	(3.1)	(6.8)
16	South San Francisco	57.4	55.6	55.3	(1.8)	(2.1)
17	South San Francisco	60.3	58.8	58.9	(1.5)	(1.4)
18	Daly City	63.1	61.6	61.3	(1.5)	(1.8)
19	Pacifica	58.7	57.1	56.8	(1.6)	(1.9)
20	Daly City	55.7	52.8	51.0	(2.9)	(4.7)
21	San Francisco	53.7	50.9	49.3	(2.8)	(4.4)
22	San Bruno	63.9	60.6	58.5	(3.3)	(5.4)
23	San Francisco	60.9	57.8	55.8	(3.1)	(5.1)
24	San Francisco	59.5	56.3	54.2	(3.2)	(5.3)
25	San Francisco	54.9	51.9	50.0	(3.0)	(4.9)
26	San Francisco	52.9	49.9	48.0	(3.0)	(4.9)
27	San Francisco	40.5	37.9	36.4	(2.6)	(4.1)

/a/ CNEL values calculated using the Integrated Noise Model, and reflect aircraft operations at SFIA only.
/b/ Remote monitoring stations are shown in Figure 23, Section III.C. Noise Setting, p. 195.
/c/ Assuming unconstrained forecasts and implementation of the SFIA Master Plan.

SOURCE: Ken Eldred Engineering.

TABLE 54: COMPARISON OF CALCULATED ANNUAL CNEL VALUES IN DECIBELS AT SELECTED STUDY LOCATIONS, 1990, 1996, 2006

		Calculated CNEL Values (dBA)/a/			Increase (Decrease) From 1990	
		Estimated	Forecast			
Location/b/	City Location	1990	1996/c/	2006/c/	1996	2006
A	SF-Visitacion Valley	59.1	56.2	54.3	(2.9)	(4.8)
B	SF-Mt. Davidson	52.8	50.0	48.3	(2.8)	(4.5)
C	SF-Ingleside	53.7	50.9	49.1	(2.8)	(4.6)
D	Albany	49.6	46.2	43.8	(3.4)	(5.8)
E	Kensington	46.9	43.8	41.5	(3.1)	(5.4)
F	Berkeley	48.7	45.5	43.3	(3.2)	(5.4)
G	Berkeley	41.7	39.1	37.4	(2.6)	(4.3)
H	Oakland	46.0	43.2	41.5	(2.8)	(4.5)
I	Berkeley	42.4	39.9	38.3	(2.5)	(4.1)
J	Orinda Village	40.2	39.8	39.8	(0.4)	(0.4)
K	Berkeley/Oakland	41.5	40.8	40.6	(0.7)	(0.9)
L	Oakland	40.5	39.0	38.3	(1.5)	(2.2)
M	Orinda	39.4	37.0	35.5	(2.4)	(3.9)
N	Walnut Creek	47.2	44.0	41.6	(3.2)	(5.6)
O	Richmond	40.5	37.6	35.5	(2.9)	(5.0)
P	Moraga	52.8	49.4	46.9	(3.4)	(5.9)
Q	Danville	41.1	38.3	36.3	(2.8)	(4.8)
R	Pacifica	49.8	46.8	44.7	(3.0)	(5.1)
S	Pacifica	49.4	46.3	44.2	(3.1)	(5.2)
T	Pacifica	49.8	46.7	44.6	(3.1)	(5.2)

/a/ CNEL values calculated using Integrated Noise Model, and reflect aircraft operations at SFIA only.
/b/ Study locations are shown in Figure 23, Section III.C. Noise Setting, p. 195.
/c/ Assuming unconstrained forecasts and implementation of the SFIA Master Plan.

SOURCE: Ken Eldred Engineering.

- At stations 1-6 and 14-19, located near the departure tracks for Runways 1L and 1R and Runways 28L and 28R, noise levels are forecast to decrease (on average) 1.6 dBA, CNEL from 1990 to 1996 and 2.2 dBA, CNEL from 1990 to 2006. Such decreases would not be perceptible to most people. (At station 4 in South San Francisco, noise levels are forecast to increase 0.1 dBA, CNEL from 1990 to 2006. Such an increase would not be perceptible.)

- At station 7 in Brisbane, located near the "Shoreline Departure" flight path for Runway 28R, noise levels are forecast to decrease 3.3 dBA, CNEL from 1990 to 1996, and 5.9 dBA, CNEL from 1990 to 2006. Such decreases would be perceptible to most people.

- At stations 8-11, located in Millbrae and Burlingame and affected by the back-blast of aircraft taking off on Runways 1L and 1R, noise levels are forecast to decrease (on average) 3.4 dBA, CNEL from 1990 to 1996 and 6.5 dBA, CNEL from 1990 to 2006. Such decreases would be perceptible to most people.

- At station 12 in Foster City, located near the arrival paths for Runways 28, noise levels are forecast to increase 0.6 dBA, CNEL from 1990 to 1996, and 0.9 dBA, CNEL from 1990 to 2006. Such increases would not be perceptible to most people. Noise levels would not decrease in Foster City because the reduction in the noise produced by Stage 3 aircraft as compared to Stage 2 aircraft is much less for landing than for takeoff.

- At stations 20-21 and 23-26, located in Daly City and San Francisco, noise levels are forecast to decrease (on average) 3.0 dBA, CNEL from 1990 to 1996 and 4.9 dBA, CNEL from 1990 to 2006. Such decreases would be perceptible to most people.

A comparison of CNEL values at the selected study locations shows that CNEL values at all locations are forecast to decrease from 1990 to 1996 and 2006. The decrease is caused by the FAA-required phasing out of Stage 2 aircraft at SFIA and greater use of Stage 3 aircraft, which more than offsets the noise from increased numbers of aircraft operations. The average decrease at the study locations is 2.6 dBA, CNEL from 1990 to 1996, and 4.4 dBA, CNEL from 1990 to 2006. In the East Bay communities studied, forecast noise levels in 2006 would all be below 45 dBA, CNEL (except for site P in Moraga; see Table 54, p. 343). As stated previously, the calculated CNEL values reflect noise only from aircraft using SFIA.

Single-Event Noise

As shown in Tables 50 and 51 (pp. 336-337) and Table 18 (p. 157), average daily aircraft operations are forecast to increase from 833 in 1990 to 1,029 in 1996 and 1,131 in 2006. In areas with overflights by aircraft serving SFIA, the number of times single-event noise occurs would increase. However, there would be a decrease in the number of overflights by noisier, low-bypass-engine aircraft such as the B-727. These aircraft are currently present on almost all arrival and departure flight paths at SFIA. In the future the noisiest aircraft overflights to/from SFIA would likely be by B-747 aircraft (about 5 dBA quieter than the B-727). In areas with no overflights by B-747 aircraft, the noisiest aircraft overflights would likely be 10-15 dBA quieter than the B-727 overflights.

A discussion of typical single-event noise levels in the vicinity of SFIA is presented in Appendix C.

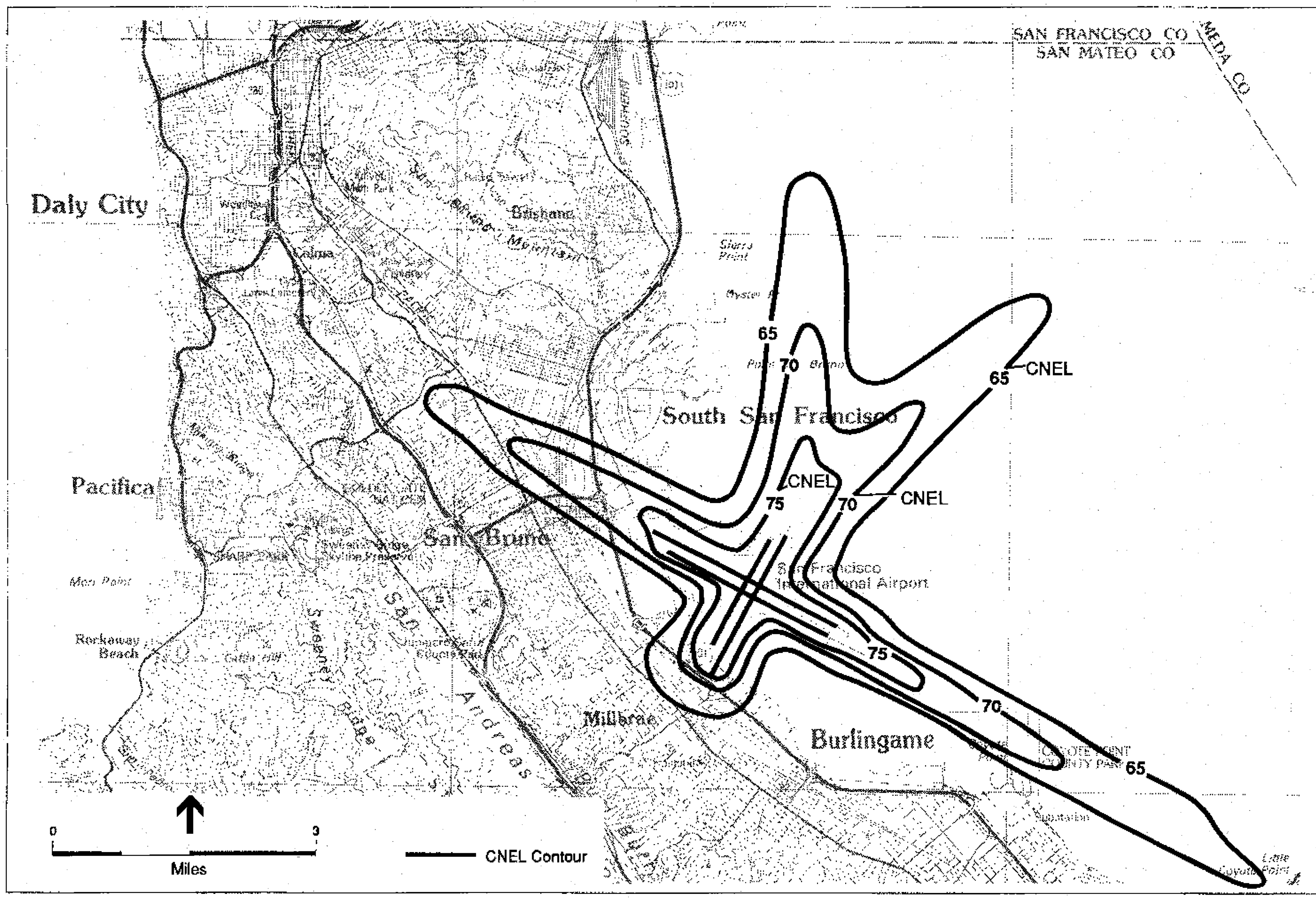
Backblast Noise

The principal change in backblast noise from 1990 to 1996 and 2006 is an average reduction of 3.4 dBA in 1996 and 6.5 dBA in 2006, as shown in Table 53, p. 342 (for Stations 8-11). This reduction is due to the reduction in the number of takeoffs by Stage 2 aircraft, in particular the Boeing 727 and 737-100 and -200. Their contribution to the total backblast noise at SFIA is greater than that of any other aircraft type.

<u>SFIA Aircraft Noise Contours -- 2006</u>

The CNEL contours for 2006 with implementation of the SFIA Master Plan are

345



SOURCE: Ken Eldred Engineering and Environmental Science Associates, Inc.

San Francisco International Airport ■

Figure 33

2006 Aircraft Noise Contours

presented in Figure 33. A comparison of Figure 33 with the 1990 CNEL contours in Figure 20, Section III.C. Noise Setting, p. 161 and the 1996 CNEL contours in Figure 32, p. 340 shows further reductions in the total area exposed to aircraft noise of 65 dBA, CNEL and above in 2006. In areas of Burlingame and Millbrae there is over a 5 dBA, CNEL reduction from 1990 to 2006. Noise levels in those areas would continue to decrease from 1996 due to the phasing out of Stage 2 aircraft at SFIA.

In areas of South San Francisco there is an increase (0.1 dBA, CNEL for site 4 in Table 53, p. 342) in noise levels from 1996 to 2006. The increase may be due to the forecast increase in flights by relatively large (widebody) aircraft, which usually depart from Runway 28R and fly through the San Bruno gap. The forecast increase in noise levels would not be perceptible.

With or without implementation of the SFIA Master Plan, the number of aircraft takeoffs and landings would increase from 1990 through 2006. The noise from those flights would continue to be noticed by some of the people who live or work within the SFIA "flight corridors," although on average, the noise levels would be noticeably lower in 1996 and 2006 than in 1990.

On the basis of ABAG growth projections for 2006, there would be about 5,840 people, about 760 people, and zero people in areas of 65-70 dBA, 70-75 dBA, and 75+ dBA, CNEL, respectively. The total number of people living within the 65 dBA, CNEL noise contour would decrease from 7,000 people in 1996 (and 14,980 people in 1990) to 6,600 people in 2006.

Summary of Aircraft Impacts

As shown in the CNEL contours for 1990, and for 1996 and 2006 with implementation of the SFIA Master Plan (Figures 20, 32, and 33, pp. 161, 340, and 345), noise levels from aircraft operations at SFIA are forecast to decrease from 1990 through 2006. The number of people exposed to aircraft noise of 65 dBA, CNEL and above is forecast to decrease from 14,980 in 1990 to 6,600 in 2006. Noise levels and single-event noise at almost all remote monitoring stations and study locations are forecast to decrease.

However, noise levels would also decrease in the future without the proposed project because of the phasing out of the noisier, Stage 2 aircraft using SFIA. The effect of the SFIA Master Plan on aircraft noise exposure cannot be determined without comparing forecast aircraft noise levels in 1996 and 2006 with and without implementation of the SFIA Master Plan. (The No-Project Alternative is evaluated in Chapter IX. Alternatives, beginning on p. 439.)

As discussed in Chapter IX. Alternatives, p. 439, implementation of the SFIA Master Plan would remove constraints on capacity imposed by the existing terminal facilities, and allow SFIA to serve an increased number of passengers and aircraft operations. However, the increase in operations allowed by the proposed project would have virtually no effect on cumulative noise levels because the additional operations would all be performed by quieter, Stage 3 aircraft.

CNEL noise contours are "dominated" by the noise produced by Stage 2 aircraft. That is, the calculation of the CNEL values starts with the noisiest aircraft flights that occurred, and adds the noise of the quieter aircraft flights to the noisiest ones. It takes a number of quieter aircraft flights to increase the overall noise level (generally similar to how loud a person's radio would have to play to be heard over the vacuum cleaner). Thus, if there are flights by Stage 2 aircraft at an airport, the noise produced by those flights makes a larger contribution to the CNEL contours than the noise from the Stage 3 aircraft using that airport.

For the forecasts of aircraft operations at SFIA, it was assumed that the airlines serving SFIA will be essentially the same aircraft they are using today, will retire those aircraft at a certain rate, and will add new aircraft as required to serve the remaining unmet demand. On the basis of those assumptions, it is forecast that the same number of Stage 2 aircraft operations will occur at SFIA with or without the SFIA Master Plan, and that with the SFIA Master Plan, the additional operations would all be performed by quieter, Stage 3 aircraft. Because the CNEL noise contours at SFIA will be dominated by Stage 2 aircraft noise, the additional operations by Stage 3 aircraft will not affect the size of the contours (or cumulative noise levels).

Even with the forecast decreases in aircraft noise levels, there still would be people exposed to 65 dBA, CNEL and above in 1996 and 2006. These people would continue to be adversely affected by operation of the Airport. Under the state noise standards, SFIA would continue to be required to operate under a variance granted by the Department of Transportation.

Summary of Combined Traffic and Aircraft Noise Impacts

Both aircraft noise and traffic noise would contribute to overall noise levels in the Airport vicinity, although along major roadways in the Airport vicinity ambient noise levels would be determined primarily by traffic-generated noise. Noise from aircraft overflight would lead to intermittent, short-term increases in ambient noise levels, and would partially determine long-term average noise levels (CNEL) in areas close to major thoroughfares. In urban environments where traffic noise plays a major role in determining ambient noise levels, daytime average (traffic) noise levels, Leq, are roughly equivalent to 24-hour (traffic) noise levels, CNEL.

As shown in Table 49, p. 334, peak-hour traffic noise levels 50 feet from US 101 would be greater than 80 dBA, L_{eq}, for most (project and no-project) scenarios. Thus, the CNEL from traffic noise would also exceed 80 dBA. Currently, parts of US 101 lie inside the 75 dBA, CNEL aircraft noise contour. Noise from aircraft overflights, although noticeable and possibly intrusive, does not constitute the primary component of average ambient noise levels in the vicinity of US 101. The addition of 75 dBA, CNEL from aircraft would raise the (greater than) 80 dBA, CNEL from traffic by about 1 dBA.

Under the 1996 project and no-project scenarios, US 101 would be within the 70-75 dBA, CNEL aircraft noise contour; thus aircraft noise would have less of an effect on ambient noise levels in the highway vicinity than under existing conditions. Under the 2006 project and no-project scenarios, peak-hour noise levels 50 feet from US 101 would be greater than 80 dBA, L_{eq} (as would traffic CNEL) in areas where the aircraft noise level is in the 70-75 dBA, CNEL range.

Along other roads in the airport vicinity, calculated peak-hour traffic-generated noise levels (and therefore CNEL) would be less than or approximately equal to average daily aircraft noise levels. In areas such as these, traffic noise would still be a major component of average ambient noise levels, but noise from aircraft overflights would have a greater role in determining the average ambient noise level. As distance from the roadways increased, traffic-generated noise would become less noticeable, and the primary noise source would then be the intrusive aircraft overflights. Calculated existing, and 1996-project- and no-project traffic-generated noise levels along San Bruno Avenue are approximately 70 dBA; parts of this road lie within the 75 dBA, CNEL aircraft noise contours. Under these circumstances, the 75 dBA aircraft CNEL would be increased by about 1 dBA to 76 dBA.

On San Bruno Avenue near US 101, noise from aircraft overflight would have an impact in determining ambient noise levels; farther west along San Bruno Avenue, noise impacts from aircraft overflight would diminish, and traffic-generated noise would dominate. By 2006, calculated traffic-generated noise levels would equal or exceed aircraft noise, thus playing the major role in determining ambient noise levels.

Along Millbrae Avenue, calculated existing and 1996-project and no-project-traffic-generated noise levels are approximately equal to aircraft noise. Under the 2006-project and no-project scenarios, calculated traffic-generated noise would exceed aircraft noise by 4 dBA or more, so that the traffic CNEL would be increased by less than 1 dBA.

Along all of these roads in all of these locations, however, single aircraft overflights would be noticed over ambient traffic noise.

Noise Impacts Under FAA and *CASP* Scenarios Compared to the Project

As discussed in Section III.C. Noise Setting, p. 153, future activity at SFIA could be different than forecast in the SFIA Master Plan. The following paragraphs include a summary of projected noise impacts under the *California Aviation System Plan* (*CASP*) forecasts (1989) and Federal Aviation Administration Terminal Area Forecasts (FAA) (1989). A more detailed analysis of the impacts is presented in Appendix C, beginning on p. A.110.

The *CASP* and FAA unconstrained forecasts of annual operations for 1996 and 2006 are shown together with the SFIA Master Plan forecasts in Section III.C. Table 10, p. 64. As shown in Table 10, the SFIA Master Plan forecasts are lower than the *CASP* forecasts, and higher than the FAA forecasts.

If future activity at SFIA is as forecast in the *CASP*, there would be more operations in 1996 and 2006 than forecast in the SFIA Master Plan. Most of the additional operations would be conducted by medium and small aircraft such as the B-757, MD-80, and B-737.

All of the additional operations under the *CASP* scenario would be conducted by quieter, Stage 3 aircraft. It is assumed that Stage 2 aircraft will be phased out at SFIA regardless of future demand for service, because the airlines will retire Stage 2 aircraft as they get older, and the SFIA Noise Abatement Regulation will require the airlines to phase in Stage 3 aircraft at the Airport. The airlines would meet additional demands for service by adding new, Stage 3 aircraft.

The percentages of operations occurring during the more sensitive evening and nighttime hours in 1996 and 2006 are forecast to be the same under the *CASP* as under the SFIA Master Plan forecasts. It is possible that under adverse weather conditions operational constraints and future delays would increase such that operations during the evening and nighttime hours under both *CASP* and SFIA Master Plan would be higher. Thus under adverse weather conditions noise impacts could be greater than analyzed by this EIR.

If future activity is as forecast in the FAA study, there would be fewer operations in 1996 and 2006 than forecast in the SFIA Master Plan and there would be fewer noise impacts.

Runway use, the locations of generalized flight tracks, and flight track use in 1996 and 2006 would be the same under the *CASP* and FAA scenarios as under the SFIA Master Plan forecasts.

The CNEL contours for 1996 and 2006 under the *CASP* forecasts are shown in Appendix C, pp. A.134-136. If future activity is as forecast in the *CASP*, noise levels over the day (as reflected in the contours) would be the same or slightly higher than forecast under the SFIA Master Plan. The difference appears to be less than one dBA, and would not be perceived by people living near the Airport.

If future activity is as forecast by the FAA, noise levels over the day would be the same or slightly lower than forecast under the SFIA Master Plan.

As discussed above, a complete phaseout of Stage 2 aircraft may be implemented as specified in national legislation, or the San Francisco Airports Commission may adopt a date for the elimination of Stage 2 Aircraft prior to 2006. In either case, the CNEL contour values for 2006 under the *CASP* and FAA forecasts would be about one dBA smaller than estimated.

Under the *CASP* scenario, the calculated CNEL values at the 27 remote monitoring stations and the 20 selected study sites would be similar to the CNEL values under the SFIA Master Plan forecasts. Any increases in CNEL values would be one dBA or less.

As discussed above, single-event noise levels would decrease in the future, because of the decrease in the number of overflights by noisier, low-bypass-engine aircraft. This decrease would occur regardless of the future number of operations at SFIA. If future activity is as forecast in the *CASP*, however, aircraft noise from SFIA would be heard more frequently, because the number of flights would be higher than forecast in the SFIA Master Plan.

The *CASP* includes, in addition to the unconstrained forecasts discussed above, a "recommended" set of forecasts. These forecasts reflect the implementation of the following recommendations:

- The redistribution of aircraft operations from SFIA to San Jose International Airport, an expanded Metropolitan Oakland International Airport, and a new air carrier airport.
- The construction of a new runway at Metropolitan Oakland International Airport.
- The relocation of General Aviation (mostly small propeller aircraft) operations from air carrier to General Aviation airports.
- The addition of terminal capacity at air carrier airports.

The number of operations at SFIA under the recommended scenario would be similar to the "constrained" forecast in the SFIA Master Plan (discussed in Chapter IX. Alternatives, p. 439). The types of aircraft serving SFIA would also be similar. Because of the similarities in activity, the noise impacts under the recommended scenario in the *CASP* would be similar to the impacts under the "constrained" forecast in the SFIA Master Plan.

NOTES - Noise

/1/ Cunniff, Patrick E., John Wiley & Sons, *Environmental Noise Pollution*, 1977.

/2/ United States Environmental Protection Agency, *Community Noise*, December 31, 1971.

/3/ San Francisco Department of City Planning, *Downtown Plan Environmental Impact Report (EIR)*, EE81.3, certified October 18, 1984, Vol. 1, pp. IV.J. 1-19, particularly Table IV.J.2, pp. IV.J.9-10.

/4/ United States Department of Transportation, Federal Aviation Administration, Order 5050.4A, "Excerpts From Airport Environmental Handbook," October 8, 1985.

/5/ Federal Aviation Administration, "Report to Congress on Status of the U.S. Stage 2 Commercial Aircraft Fleet," August 1989.

● /5a/ "FAA Eases Plan to Phase Out Noisy Jets Amid Strong Pressure," *The New York Times*, September 25, 1991.

/6/ Federal "Airport Noise and Capacity Act of 1990".

/7/ The CNEL contours reflect noise produced during aircraft takeoff, landing, and flight. Noise produced by aircraft waiting to takeoff (such as aircraft idling on a taxiway) is not reflected in the CNEL contours. Noise from idling aircraft would have a negligible effect on the cumulative totals.

D. AIR QUALITY

CONSTRUCTION

Particulate matter, in the form of fugitive dust, would be generated through building demolition, land clearing, excavation, and grading activities and through movement of trucks and heavy equipment. Fugitive dust emissions would vary according to the level and type of activity, silt content of the soil, and prevailing weather. Construction-related fugitive dust consists of larger-sized particles (greater than ten microns in diameter) as well as the finer particles that account for ambient PM_{10} levels.

The larger-sized particles would be more of a nuisance than a health hazard, except to persons with respiratory problems, and would settle out of the atmosphere close to the project site. The finer particles raised by construction would contribute to background PM_{10} levels to the extent that the State 24-hour average ambient standard, 50 micrograms per cubic meter, could be violated on occasion in the vicinity of construction.

Hydrocarbons (HC), a precursor pollutant for ozone (O_3), would be emitted from asphalt in paving materials. These temporary HC emissions would contribute incrementally to local O_3 levels and, because background O_3 levels in the Bay Area already approach the State one-hour ozone standard, could potentially lead to violations of that standard.

Construction would also involve emissions of criteria air pollutants from construction vehicles and equipment. These emissions would be temporary and would only incrementally contribute to local and regional air quality.

OPERATION

Because of the diverse nature of pollutant sources, air quality studies analyzing the expansion of both landside facilities and airside operations such as those at San Francisco International Airport focus on three main areas: landside vehicular traffic, including employee and passenger traffic and aircraft ground-support equipment operation; airside operations, including aircraft operations and aircraft fueling; and building emissions resulting from the burning of natural gas and the consumption of electricity.

The analysis in this section provides information that could be used to assess the SFIA Master Plan in relation to the thresholds of significance recommended by the Bay Area Air Quality Management District's *Guidelines for Assessing Impacts of Projects and Plans*, revised April 1988. According to these *Guidelines*, "any project or plan which would generate carbon monoxide (CO) concentrations above the State or national carbon monoxide (CO) standards would be of significant effect by definition." A second test of significance states that the level of emissions from a total of direct and indirect sources would be considered significant if emissions of HC, NO_X, SO_X, or PM_{10} equalled or exceeded 150 lb/day. For mobile sources curbside CO concentrations are normally modeled; this second test indicates that 550 lb/day of CO would be considered significant only if it leads to a violation of State standards under Test 1 modeling. Finally, "any project or plan should be considered of significant effect if emission of any criteria contaminant for combined direct and indirect sources reaches or exceeds one percent of county emissions of the contaminant." There are two other tests of significance: one applies only to stationary sources and the other applies to projects that would generate population or employment exceeding regional projections.

<u>Landside Emissions</u>

Vehicular Traffic

Carbon monoxide concentrations normally consist of an area-wide background level, with micro-scale peaks superimposed on local sources. The background concentration is a function of area-wide traffic characteristics, topography, and climatology, while the local concentration is a function of traffic characteristics at the point of interest, such as heavily travelled roads and intersections. For this analysis, worst-case estimates of local CO concentrations were added to background CO concentrations.

Roadside CO concentrations at selected intersections and road segments in the project vicinity were estimated under worst-case atmospheric conditions for both existing traffic levels and future anticipated levels. The results are shown in Table 55.

● TABLE 55: ESTIMATED WORST-CASE EXISTING AND FUTURE CO CONCENTRATIONS IN THE PROJECT VICINITY

	Concentration by Year (ppm)/a,b/						
	1990	1996	1996	1996	2006	2006	2006
Location	Existing	Forecast Growth	+ Project/c/	+List-added Growth/d/	Forecast Growth	+ Project/c/	+List-added Growth/d/
Intersections							
El Camino Real & Millbrae							
1-hour	20.7/e/	16.8	16.8	17.6	13.5	13.5	15.9
8-hour	13.4	10.8	10.8	11.3	8.7	8.7	9.7
El Camino Real & San Bruno							
1-hour	15.2	12.4	12.6	15.7	10.6	10.7	13.0
8-hour	9.5	7.7	7.8	10.0	6.7	6.7	8.3
South Airport & Utah							
1-hour	14.8	11.7	11.7	12.8	9.3	9.4	10.3
8-hour	9.2	7.2	7.2	8.0	5.8	5.8	6.5
Rollins & Millbrae							
1-hour	14.7	12.4	12.6	15.4	10.7	12.3	12.9
8-hour	9.2	7.7	7.8	9.8	6.7	7.9	8.3
Segment							
Bayshore Freeway/f/							
1-hour	10.6	8.7	8.8	9.2	7.5	7.5	7.9
8-hour	6.3	5.1	5.2	5.5	4.5	4.5	4.8

/a/ Estimates were calculated using CALINE4, a computer-based air pollution dispersion model developed by the California Department of Transportation. The eight-hour CO concentrations were assumed to be about 70 percent of the modeled one-hour values. One-hour background CO concentrations used were 5.6 ppm for 1990, 4.7 ppm for 1996, and 3.8 ppm for 2006. Eight-hour background CO concentrations used were 2.8 ppm for 1990, 2.3 ppm for 1996, and 1.9 ppm for 2006. Intersection concentrations correspond to a location approximately 15 feet from the corner of the intersection. Bayshore Freeway concentrations correspond to a point about 250 feet from the center of the northbound lanes.

/b/ ppm = parts per million

/c/ Includes forecast growth, as shown in Table 22, p. 248 and explained on p. 246.

/d/ Includes forecast growth plus project growth.

/e/ Underlined values are in violation of the applicable standard.

/f/ In the p.m. peak hour, northbound Bayshore Freeway between San Bruno Avenue and I-380 volumes were assumed to be 45% of southbound volumes.

NOTE: The State 1-hour CO standard is 20 ppm and the State 8-hour standard is 9 ppm.

SOURCE: Environmental Science Associates, Inc.

- The results indicate that existing CO levels already violate State eight-hour CO standards for the intersections analyzed, but that by 2006, the CO standard would be violated at only one intersection. The eight-hour standard would be violated at three intersections under 1996 traffic conditions. At El Camino Real & Millbrae Avenue, 1996 baseline (without the project) traffic conditions would violate the ambient eight-hour CO standard, and the project would contribute to an increase in the frequency of standard violations. At the other two intersections, El Camino Real & San Bruno Avenue and Rollins Road & Millbrae Avenue, the project on its own would not cause the violation of the standards in 1996, but the project together with projected growth would result in the violation of the eight-hour standard. Cumulative traffic conditions in 2006, including traffic from the project, would cause a violation of the eight-hour standard at El Camino Real & Millbrae Avenue. No other analyzed intersection would exceed ambient standards under cumulative traffic conditions. CO emissions are projected to decrease in the future because of improved engine efficiencies and cleaner burning fuels. The decline in CO concentrations over time apparent at some of the intersections is a result of the expected decline of future emission rates as cleaner new vehicles enter the vehicle mix, and is not an indication that the number of vehicles through the intersection is dropping.

The proposed project at SFIA would generate additional motor vehicle trips which would result in the emission of criteria pollutants. Total vehicular traffic emissions are presented in Table 56.

Ground Support Vehicles

Ground support vehicles are motorized equipment which operate in the gate areas to load and unload aircraft and otherwise prepare aircraft for their next departures. The mix of equipment and duration of service are dependent on the type of aircraft being serviced. Ground support vehicle emissions are shown in Table 57, p. 358.

<u>Airside Emissions/1/</u>

Aircraft Operations

An aircraft's air pollutant emissions are a function of three factors - the various engine emission rates during the different phases of the landing/takeoff operation (LTO) cycle, the amount of time spent in each phase of the LTO cycle, and the number of engines on the aircraft. The LTO cycle is broken down into four distinct phases based on engine speed, including taxi/idle, takeoff, climbout, and approach. The approach and climbout phases begin and end, respectively, when the aircraft reaches a height of approximately 3,000 feet. Three thousand feet is considered the average inversion level in the United States, and it is assumed that aircraft emissions above this mixing

● TABLE 56: ESTIMATED VEHICULAR TRAFFIC EMISSIONS

	Emissions (lb/day)/a/				
Pollutant	1990 Existing	1996 Forecast Growth/b/	1996 Forecast Growth + Project	2006 Forecast Growth/b/	2006 Forecast Growth + Project
CO	83,500	87,800	89,300	77,200	94,500
NO_X	8,000	8,300	9,000	7,400	9,100
HC	4,100	3,600	3,900	2,700	3,200
SO_X	1,000	1,300	1,400	1,400	1,700
PM_{10}	11,300	14,100	15,200	14,700	17,900

/a/ Based on EMFAC7D emission rates, an estimated average speed of 30 miles per hour, and an average trip length of 20 miles, as suggested by the BAAQMD's (revised April 1988) *Guidelines for Assessing the Impacts of Projects and Plans*.
/b/ Forecast growth is shown in Table 22, p. 248 and explained on p. 246.

SOURCE: Environmental Science Associates, Inc.

depth are not pertinent to local air quality./2,3/ The time-in-mode for each LTO cycle depends on the type of aircraft and the amount of congestion at the airport at the time of the aircraft operation. The Environmental Protection Agency has published time-in-mode estimates for large congested metropolitan airports, and SFIA-specific delay estimates were made from the San Francisco Bay Area Airports Capacity Task Force's (1987) "Task Force Capacity Study of SFO, SJC, and OAK International Airports." The time-in-mode assumptions used to calculate aircraft emissions at SFIA are shown in Table 58, p. 359. Delayed aircraft are conservatively assumed to have their engines running throughout this estimated delay period under the SFIA Master Plan future analysis.

It is possible that because of operational constraints and future delays there would be further delays of aircraft with additional engine idling, resulting in additional aircraft emissions. Tables J-1 and J-2, in Appendix J, pp. A.179-180, show the existing number of flights per hour in 1990, and the forecast number of flights per hour in 1996 and 2006.

TABLE 57: ESTIMATED GROUND-SUPPORT VEHICLE EMISSIONS

	Emissions (lb/day)/a,b,c/				
Pollutant	1990 Existing	1996 Forecast Growth	1996 Forecast Growth + Project	2006 Forecast Growth	2006 Forecast Growth + Project
CO	4,500	5,300	6,000	4,800	6,100
NO_X	300	400	400	300	400
HC	500	500	600	500	600

/a/ Ground-support vehicle emissions for existing and future scenarios were quantified using service duration factors from the EPA's AP-42. Factors were not available for all types of aircraft, so similar aircraft were grouped by their approximate passenger capacity. According to Melvin Leong of SFIA, approximately half of the ground-support vehicles use diesel fuel and half use gasoline at SFIA.

/b/ Estimates assume an engine speed (not vehicular speed) of 10 mph and EMFAC7D "heavy truck" diesel and gasoline emission rates, as suggested in the EPA's (1973) *An Air Pollution Impact Methodology For Airports*. Year 2000 emission rates were used for 2006 calculations because no 2006 "heavy truck" emission rates are available.

/c/ Emissions rounded to the nearest 100 lb/day.

SOURCE: Environmental Science Associates, Inc.

According to Tables J-1 and J-2, in 1996 and 2006 there would be no more than one hour of delay for any flight under optimum visual flight rules (86 percent of the time). Under more adverse weather conditions there could be additional delays to flights.

During instrument flight rules (IFR) conditions which occur about 5.6 percent of the time, the existing SFIA airfield would not accommodate the number of flights forecast per hour in 1996 and 2006 with implementation of the SFIA Master Plan, if such conditions were to persist throughout a 24-hour period. Even if the forecast flights were spread throughout the entire 24-hour period to maximize use of the airfield, the airfield could not accommodate the total number of daily flights forecast, even assuming that the airfield were to operate at capacity every hour.

TABLE 58: TIME-IN-MODE ASSUMPTIONS FOR SFIA

Phase of LTO Cycle	Time-In-Mode (minutes): Commercial Carrier, General Aviation	Time-In-Mode (minutes): Military Helicopter
Taxi / Idle/a/		
1990 Existing	21.5	15
1996 Forecast Growth	32.0	15
1996 Forecast Growth + Project	37.0	15
2006 Forecast Growth	29.0	15
2006 Forecast Growth + Project	55.0	15
Takeoff/b/	0.5	--
Climbout (to 3,000 feet)	2.2	6.8
Approach (from 3,000 feet)	4.0	6.8

/a/ Time-in-mode estimates for the Commercial Carrier and General Aviation categories during the taxi/idle phase were calculated on the basis of projected annual operations under each scenario and operational delay estimates contained in San Francisco Bay Area Airports Capacity Task Force's (1987) "Task Force Capacity Study of SFO, SJC, and OAK International Airports." The remaining time-in-mode estimates were taken from the Environmental Protection Agency (September 1985) *Compilation of Air Pollutant Emission Factors, Volume II: Mobile Sources* (AP-42).

/b/ Helicopters do not have a takeoff mode.

SOURCE: Environmental Science Associates, Inc., San Francisco Bay Area Airports Capacity Task Force, 1987, "Task Force Capacity Study of SFO, SJC, and OAK International Airports," and Environmental Protection Agency, September 1985, *Compilation of Air Pollutant Emission Factors, Volume II: Mobile Sources* (AP-42).

Under adverse weather conditions, if aircraft delays were to further increase over delays predicted in this EIR, air quality impacts could be somewhat greater than calculated in this EIR, depending on the length of time over which delayed aircraft kept engines idling. A mitigation measure to reduce aircraft idling has been identified in Chapter V. Mitigation Measures, p. 411. In any case, the increase in emissions due to idling aircraft would be minimal, because of the relatively small amount of emissions from idling compared to emissions from landings and takeoffs, and in comparison to all other air-emission sources at the SFIA. In addition, the percentage of time that adverse weather conditions occur is relatively small.

Total existing and projected aircraft operations emissions at San Francisco International Airport are presented in Table 59. Because aircraft engines are maintained constantly, it is assumed that emission rates would be constant over time. Particulate emission rates are not available for most aircraft engines, so particulate emissions are not estimated. Similarly, SO_X emissions are not presented because they are proportionally related to the amount of SO_X present in the aviation fuel (and to the amount of fuel consumed), and are not closely linked to a particular engine type.

The results shown in Table 59 indicate that, in the short-term, CO and HC emissions from aircraft would increase by about 80%, and NO_X emissions would increase by about 40%. In the long-term, aircraft emissions of CO and HC would increase approximately 125% over 1990 levels, and NO_X emissions would increase by about 60%. Although older aircraft with higher emission rates will gradually be replaced by new, "cleaner" aircraft with lower emission rates, the expected increase in delays at SFIA would offset the anticipated decrease in air pollutant emissions brought about by cleaner aircraft./4/

Aircraft emissions are tied to the time-in-mode for each operation. In general, CO and HC emissions are greatest during the low-power phase of the LTO cycle, the taxi/idle phase. For the particular fleet mix at SFIA, a hypothetical increase of one minute in the taxi/idle phase would result in an increase in CO emissions of about 1,200 pounds per day and an increase of about 400 pounds of HC per day. However, NO_X emissions would be relatively unaffected by an increase in taxi/idle time because NO_X emissions are greatest during the high-thrust takeoff and climbout portions.

Fuel Handling and Storage

Emissions from fuel-handling and storage come from the evaporation of liquid from storage tanks during the daily temperature fluctuations and from the displacement of fuel vapors when aircraft tanks are filled. The first is called "breathing loss" and the second is called "working loss." Breathing loss is a function of the type of storage tank, the daily temperature cycle, the wind speed, the fuel vapor pressure, and a number of other variables. Working losses are associated with the refueling of aircraft

TABLE 59: ESTIMATED DAILY AIRCRAFT EMISSIONS AT SFIA, 1990-2006

		Emissions by Year (lb/day)/a,b/		
Pollutant	LTO Phase	1990 Existing	1996 Project	2006 Project
CO	Taxi/Idle	23,600	44,600	57,600
	Takeoff	100	100	100
	Climbout	400	400	400
	Approach	1,900	2,000	1,600
	TOTAL/c/	26,000	47,100	59,800
NO_X	Taxi/Idle	1,800	3,700	6,200
	Takeoff	3,300	4,400	4,200
	Climbout	6,600	8,800	8,700
	Approach	1,900	2,500	2,600
	TOTAL/c/	13,600	19,400	21,700
HC	Taxi/Idle	8,800	16,000	19,700
	Takeoff/d/	--	--	--
	Climbout	100	100	100
	Approach	200	300	300
	TOTAL/c/	9,200	16,300	20,100

/a/ The existing and future air carrier fleet mix was determined by Ken Eldred Engineering, Inc., and the commuter, General Aviation, and military fleet mixes were estimated by Environmental Science Associates, Inc. No data on the 1990 SFIA is available yet, so the 1990 fleet mix is based on 1989 operations data. Emission rates and engine types for each aircraft were obtained from one of two sources. The EPA's AP-42 contained emission rates for older aircraft (pre-1985) such as the DC10, and Nick Krull of the Federal Aviation Administration (FAA) provided the remaining factors for the more recent and under-construction aircraft that were not supplied in AP-42, such as the MD11 and the A330/340. Data supplied by Mr. Krull were originally provided to the International Civil Aviation Organization by the engine manufacturer and have not been validated by the FAA. When no data for a particular engine were available, emission rates from a similar engine were assumed.

/b/ Estimates rounded to the nearest 100 lb/day.

/c/ Estimates may not add due to rounding.

/d/ Each of these amounts was less than 50 lb/day.

SOURCE: Environmental Science Associates, Inc.

and appear as density waves around the fueling ports. Both types of emissions are controlled at SFIA through the use of a "closed" fuel distribution system. Fuel is distributed from the storage tanks via pipelines to refueling hydrants located throughout the Airport. A hose joins the hydrant system directly to the aircraft. Since the pathway from the storage tank to the aircraft fuel tank is continuous, there are no links from which vapors can escape. A vapor recovery device, effectively similar to those used at automobile service stations, captures fuel vapors from the hose-aircraft exchange.

There is also the possibility of evaporation of fuel that is spilled during aircraft refueling operations. This loss is assumed to be negligible because the spilled fuel is generally cleaned up promptly by ground crews to prevent fire hazards. For smaller spills, absorbent material is used to recapture the fuel and then is disposed of as hazardous waste. Two large-scale fuel leaks have occurred at the airport in the last few years. Both of these spills were contained through the manipulation of the water drainage system (see the discussion on "Spills" in Section III.H. Hazardous Materials, pp. 211-214). Once in the system, the fuel can be skimmed off before it reaches the Bay.

Building Energy Emissions

Estimated existing and future air pollutant emissions from building natural gas consumption at San Francisco International Airport are shown in Table 60.

Total Air Pollutants

Estimated total existing and future emissions generated at SFIA are shown in Table 61, p. 364. Project-generated emissions would be over the BAAQMD threshold of 150 lb/day for HC, NO_x, SO_x, and PM_{10}. In addition, because CO concentrations were calculated to be in violation of State standards in the future, the BAAQMD threshold of 550 lb/day for CO is applicable; project-generated emissions would be over the BAAQMD threshold for CO./5/

Total air-pollutant emissions at SFIA constitute a relatively large portion of the total emissions in San Mateo County, and implementation of the proposed project at SFIA would generate a net increase in emissions above the BAAQMD threshold of one percent (of Countywide emissions) for all criteria pollutants for both study years.

TABLE 60: ESTIMATED ANNUAL BUILDING ENERGY AIR POLLUTANT EMISSIONS, 1990-2006

	Emissions (lb/year)/a,b/		
Pollutant	1990 Existing	1996 Project	2006 Project
CO	4,000	6,000	6,400
NO_X	23,900	36,000	38,400
HC	1,100	1,600	1,700
SO_X	--	--	--
Particulates	30	50	50

/a/ Only natural gas combustion emissions are included here. Calculations are based on the following existing and future annual natural gas consumption rates:

1990	2.1 million therms
1996	3.1 million therms
2006	3.3 million therms

1990 natural gas usage has been supplied by SFIA. 1996 and 2006 natural gas usage estimated from weighted energy consumption factors and proposed square footages of project facilities.

/b/ Emission rates for the combustion of natural gas were supplied in the South Coast Air Quality Management District's (April 1987) *Air Quality Handbook.*

SOURCE: Environmental Science Associates, Inc.

By 1996, project-generated emissions from all sources would constitute approximately 3.8 percent of the total San Mateo County CO emissions and about 4.7 percent of the total NO_X emissions. By 2006, project emissions would account for a larger percentage of the total County emissions, with CO emissions at 11.7 percent, NO_X emissions at 9.8 percent, HC emissions at 11.6 percent, SO_X emissions at 1.8 percent, and PM_{10} emissions at 4.4 percent of the total County CO, NO_X, HC, SO_X, and PM_{10} emissions, respectively. The BAAQMD one-percent significance threshold is not meant to predict excesses of ambient standards; rather, it is meant to underscore the need for local government to consider incorporation of mitigation measures to reduce the projected emissions.

TABLE 61: TOTAL DAILY AIR POLLUTANT EMISSIONS

Pollutant	Emissions (tons/day) Base	Base + Project	San Mateo County/a/	Net Increase of Project as Percent ofCounty Emissions
1996				
CO	63.2	72.0	232.1	3.8
NO_x	12.5	14.5	42.6	4.7
HC	8.8	10.7	50.0	3.8
SO_x/b/	0.7	0.7	5.7	0.0
PM_{10}/b/	7.0	7.6	49.0	1.2
2006				
CO	55.6	79.9	208.1	11.7
NO_x	11.5	15.7	43.0	9.8
HC	6.5	12.0	47.6	11.6
SO_x/b/	0.7	0.8	5.7	1.8
PM_{10}/b/	7.3	9.0	52.6	4.4

NOTE: N/A - Not Applicable

/a/ California Air Resources Board, *Emission Inventory* (base year 1987) preliminary data.

/b/ Estimate does not include aircraft or ground support vehicle emissions of SO_x and PM_{10}.

SOURCE: Environmental Science Associates, Inc.

Air Emissions Under FAA and *CASP* Scenarios Compared to the Project

There would be fewer aircraft operations assumed under the FAA scenario compared to the SFIA Master Plan in both 1996 and 2006. The fleet mix (under the FAA scenario) would indicate the same number of operations by older aircraft with higher emission rates, and fewer operations by newer aircraft with lower emission rates. Thus, under the FAA scenario, future aircraft emissions would be less than emissions under the SFIA Master Plan.

Because of increased operations under the *CASP* scenario compared to the SFIA Master Plan, estimated aircraft ground-support vehicle emissions would increase over those of the SFIA Master Plan./6/ Aircraft emissions were calculated based on the number of operations and the different fleet mix of the *CASP* scenario. Airside emissions under the *CASP* scenario in 1996 would increase levels of CO, NO_X, and HC by about 93,300 lb/day, 9,200 lb/day and 32,200 lb/day, respectively, over 1996 emissions under the SFIA Master Plan. Airside emissions under the CASP scenario in 2006 would increase levels of CO, NO_X, and HC, by about 99,300 lb/day, 13,500 lb/day, and 28,800 lb/day, respectively, over 2006 emissions under the SFIA Master Plan./3/ Traffic-related air emissions would increase by less than two percent, because while passenger related-traffic would increase by about two percent, terminal-employee-related and United Airline Maintenance Center employee-related traffic would not change.

NOTES - Air Quality

/1/ Unless otherwise indicated, information and methodology on aircraft emissions was derived from the Environmental Protection Agency's *An Air Pollution Impact Methodology For Airports, Phase 1*, January 1973. Data presented in the EPA report was collected by survey from the O'Hare International Airport and the St. Louis Airport, among others.

/2/ Bay Area Air Quality Management District, March 1982, "A Methodology for Estimating Emissions from Aircraft Operations."

/3/ Environmental Protection Agency, September 1985, *Compilation of Air Pollutant Emission Factors, Volume II: Mobile Sources* (AP-42).

/4/ Krull, Nick, Manager of Technology Division, Office of Environment & Energy, Federal Aviation Administration, telephone conversation, August 2, 1990.

/5/ 1996 and 2006 cumulative and cumulative plus project emission inventories were not calculated because the two emission inventory tests of significance address only project-generated emissions and do not assess the significance of cumulative emissions. CO concentrations from project-generated and cumulative traffic at nearby intersections are discussed and presented on pages 345-347.

/6/ The analysis in the EIR assumes up to a maximum average of two hours per landing/takeoff (LTO) cycle that aircraft engines would remain running. This maximum average does not limit the emissions estimates under the SFIA Master Plan future analysis; it does limit the estimated aircraft emissions under the CASP scenario future analysis.

E. ENERGY

CONSTRUCTION

Project construction would consume energy that would be derived primarily from non-renewable sources. Site clearing, building demolition, grading, and excavation would require a relatively large, but unknown, expenditure of gasoline and diesel fuel. Building construction for both the near- and long-term projects would require an additional 3.9 trillion British thermal units (Btu), or the equivalent of about 670,000 barrels of oil./1,2/

OPERATION

Transportation Energy

Surface Traffic

In 1996, Airport operations with the project would generate approximately 44 million passenger, employee, and tenant vehicle trips per year, about a 41% increase over future vehicle trips without the project. On the assumption of an average trip length of 20 miles, these trips would generate about 870 million vehicle miles of travel in 1996. In addition, aircraft servicing and maintenance would generate an unknown number of vehicle miles of travel. On the assumptions of an average fuel economy in 1996 for the California vehicle fleet of about 27.4 miles per gallon and a distribution of 90 percent gasoline-powered vehicles and ten percent diesel-fuel-powered vehicles, surface traffic (not including ground maintenance) would consume annually about 4.5 trillion Btu of energy, an increase of about 1.1 trillion Btu, or the equivalent of about 190,000 barrels of oil.

Air Traffic

On a proportional basis, aviation fuel consumption at SFIA would increase from about 50,000 barrels a day to about 58,000 barrels a day in the near-term and to about 63,000 barrels a day in the long-term. According to the SFIA Master Plan, SFIA's existing fuel distribution system would be capable of handling the increase in demand, though modifications and improvements may be necessary to enhance system efficiency.

Currently, the Airport is in negotiations with existing fuel companies and alternative sources in order to develop specific recommendations for modifications and upgrades to the distribution system.

Fuel consumption is relatively low when aircraft are idling. Most fuel is used during the acceleration/deceleration cycle and during aircraft flight. Thus any energy increase due to increased operational delays in the future would be relatively minor in comparison to the total additional flight operations.

Building and Facilities Energy

Natural Gas

In 1996, natural gas demand at SFIA would be about 3.1 million therms, an increase of about 48 percent over 1990 consumption. This increase in consumption would be about 310 billion Btu of thermal energy, or the equivalent of about 53,000 barrels of oil. Peak consumption, and the month in which natural gas use peaks, are not expected to change. The increase in natural gas use at SFIA from new construction alone would be higher than the figure reported here, but would be partially offset by the proposed demolition of existing structures, leading to the net increase above./3/

In 2006, natural gas demand at SFIA would be about 3.3 million therms, an increase of about 57 percent over 1990 consumption. This increase in consumption would be about 330 billion Btu of thermal energy, or the equivalent of about 56,000 barrels of oil. Peak consumption, and the month in which natural gas use peaks, are not expected to change. The increase in natural gas use at SFIA from new construction alone would be higher than the figure reported here, but would be partially offset by the proposed demolition of existing structures, leading to the net increase above.

The SFIA Master Plan analyzed the existing natural gas distribution system and found that service is adequate throughout the Airport complex for both the near- and long-term SFIA Master Plan projects. The proposed project is not expected to affect the current distribution system nor the quantity of gas used. Energy consumption over the past ten years has been increasingly efficient, especially in space and domestic water heating./3/

New buildings and facilities would generally be more efficient than older buildings in their use of natural gas. Future consumption reported herein was estimated on the basis of past use, to yield a conservative estimate. Actual consumption of natural gas at SFIA in the future probably would be less than the figures presented.

Electricity

The SFIA Master Plan analyzed the effect of the near- and long-term development on the existing airport electrical distribution system, by categorizing each of the proposed new projects by its function and estimating the wattage per square foot for each category. Based on historical data from the Facilities, Operations, and Maintenance Division at SFIA, the total electrical load, for all existing facilities to be demolished, was calculated./4/ The net increase in electrical load was calculated by subtracting the electrical load of demolished facilities from the total estimated electrical load of new facilities.

In the near-term, the decrease in electrical load would be about 4.2 MW, and the increase in electrical load from new facilities would be about 17.7 MW. Therefore, the forecast net near-term electrical load increase would be approximately 13.5 MW. Because less additional construction would be undertaken as part of the long-term plan, the further increase in electrical load would not be as great. The long-term additional decrease in electrical load would be 2.2 MW, and the additional increase would be 3.8 MW, for a net long-term additional increase of 1.6 MW. The total increase in electrical load for both the near- and long-term forecasts would therefore be about 15.1 MW./3/

SFIA has requested an increase in the amount of electrical power from PG&E. SFIA requested an increase of 15 MW to be provided by 1994 and an additional 10 MW to be provided by 2006./5,6/ The requested increase in energy supply would be sufficient to meet the forecast short- and long-term energy requirements of project facilities.

As noted in the SFIA Master Plan, SFIA's current system capacity is about 46.3 MW and the forecast total maximum demand (electrical load) from all proposed facilities is 52.6 MW. Several capital improvement projects not part of the proposed project are planned or have already been started. For example, SFIA is currently in the process of converting all 4 kilovolt (kV) distribution systems into more efficient 12 kV systems./7/ However, these planned and completed projects will not enhance the distribution system's existing total capacity of 46.3 MW.

The increased electrical capacity requested by SFIA in both the near- and long-term exceeds current airport load capacity of 46.3 MW and would require expansion of the existing PG&E substations to meet future demand. PG&E has indicated that an additional transformer bank would be required to handle the increased demand requested by the Airport./5/

Energy Use Under FAA and *CASP* Scenarios Compared to the Project

There would be fewer passengers and aircraft operations assumed under the FAA scenario compared to the SFIA Master Plan in both 1996 and 2006. Estimated transportation and aircraft energy use would decrease compared to energy use under the SFIA Master Plan. If all facilities proposed under the SFIA Master Plan were still built under the FAA scenario, natural gas and electric use would remain the same as under the SFIA Master Plan.

Because of an increase in the number of passengers and an increase in operations under the *CASP* scenario compared to the SFIA Master Plan, estimated transportation and aircraft energy use would increase compared to energy use under the SFIA Master Plan. Traffic-related energy would increase by less than two percent, because while passenger-related traffic would increase by about two percent, non-terminal-employee-related and United Airline Maintenance Center employee-related traffic would not change. Total aircraft energy use under the *CASP* scenario would be the equivalent of about 71,000 barrels of oil a day in 1996 and about 93,000 barrels a day in 2006. Aircraft energy use would increase the equivalent of about 13,000 barrels a day in 1996 and about 30,000 barrels a day in 2006 compared to energy use under the SFIA Master Plan.

NOTES - Energy

/1/ A British thermal unit is the amount of heat required to raise the temperature of one pound of water one degree Fahrenheit at sea level. Btu values reported herein are at-source values, meaning that they include the energy required for production and transmission of the energy to the point of use.

/2/ Construction energy consumption was estimated from average energy costs in Hannon, et al., 1978, "Energy and Labor in the Construction Sector," *Science*, Volume 202.

/3/ SFIA, *Final Draft Master Plan*, November 1989.

/4/ "Electrical Load" refers to the peak electrical demand averaged over a period of 15 minutes during which that peak occurs.

/5/ Yazdi, Mohammed, Major Account Representative, Pacific Gas and Electric, telephone conversations, August 15, 21, 22 and 27, 1990.

/6/ Jacobberger, Donald, Electrical Engineer, SFIA Bureau of Planning and Construction, letter to Mohammed Yazdi, October 11, 1989.

/7/ SFIA, *Five Year Capital Projects Plan*, September 18, 1989.

F. CULTURAL RESOURCES/1/

Major cultural history periods have been discussed in the Setting Chapter, Section III.F, on pp. 183-191.

Prehistoric Resources

Although prehistoric sites are recorded in the region, all of the known sites are upland from the former marsh and tidal lands that characterized the study area in prehistoric times. While high ground may have existed where prehistoric cultural activity could have occurred, such areas appear to have been altered by the history of reclamation and airport development. This does not preclude the possibility that unsuspected archaeological deposits could be discovered by excavations associated with expansion and improvement projects that would extend beneath the artificial fill that covers the site. The thickness of the artificial fill at SFIA varies widely across the site, and on average ranges from about 8 to 16 feet.

Historic Resources

As discussed in the Setting Chapter, remnants of late nineteenth-century / early-twentieth-century Chinese shrimp camps and commercial oyster businesses were likely obliterated by 1930s dredging of the area by the Pacific Portland Cement Company and by early reclamation activities associated with Airport development. According to archival research, the Sanchez Rancho buildings grist mill and wharf all appear to have been removed or disassembled. A review of late-nineteenth- and early-twentieth-century maps indicates that the levee and wharf have long since disappeared; field inspection confirms these findings. There would be relatively little potential that the project would affect historic resources.

Historic Structures

Historic buildings constructed prior to 1946 were identified by referring to early maps and photographs and by conversation with SFIA personnel./2, 3/

Implementation of the SFIA Master Plan would include construction of an Automated People Mover System and parking lot in the vicinity of the original 1927 terminal building. There is currently a parking lot on this site.

None of the buildings United Airlines erected during the war years are currently slated for demolition and the "series of gray wooden buildings and hangars" which Pan Am built "are now gone"./4/ However, Pan Am's Flying Tiger hangar, built in 1943, still stands near the Seaplane Harbor and is scheduled to be leveled during the near-term demolition projects./3,5/

The Coast Guard Station buildings were also constructed during World War II and it appears that most are scheduled for demolition during near-term projects./16/ While some of the structures are modern buildings erected over the past two decades, the main hangar and administration building both date from the early 1940s.

In addition to the structures discussed in the Setting Chapter, two pre-1946 metal structures, Building 1000 adjacent to the Flying Tiger hangar, and the UAL Boiler House across from the Seaplane Harbor, are also slated for destruction during the near-term demolition projects./5/

According to research:

> ". . . The Flying Tiger hangar has no architecturally distinct features or unusual construction systems and was built in a common style, using standard plans. Likewise, the Coast Guard facilities have no unique architectural style and were built in an industrial vernacular fashion using routine plans of the 1940s. The two metal maintenance buildings are also typical of wartime industrial structures and have no singular architectural features. The early 1940s airport hangars and support buildings are representative of common building types throughout the state and county, lack architectural distinction, are not the work of a master architect nor are they associated with important people or significant historical events"./6/

The remaining SFIA buildings are post-1946 structures, most of which were constructed over the past three decades and appear to have no historical significance or importance. Some existing buildings may have elements that pre-date 1946, but have been so extensively altered through additions and renovations they are no longer recognizable as potential historic structures.

NOTES - Cultural Resources

/1/ Chavez, David, Archaeologist, and Jan M. Hupman, historian, David Chavez & Associates, conducted archival research for the Master Plan area and the surrounding vicinity. The report entitled *Cultural Resources Evaluation for the San Francisco Airport Master Plan EIR*, August, 1990, is on file at the Office of Environmental Review, Department of City Planning, 450 McAllister Street.

/2/ Maps

1931 Proposed San Francisco Municipal Airport Map (Baccari 1975).

1937 San Francisco Airport Proposed Ultimate Development Landplane and Seaplane Port Map (Baccari 1975).

1945 San Francisco International Airport Master Plan Map (Baccari 1975).

1945 Sketch of the San Francisco Municipal Airport including extension of filled land areas and extension of pavements (Baccari 1975).

1948 Sketch of the San Francisco Municipal Airport including extension of filled land areas and extension of pavements (Baccari 1975).

1928 Aerial photography of Mills Field (Flynn 1954).

1930s Aerial photography of Mills Field (*The Times* 1967:11A).

1947 Aerial photography of San Francisco Municipal Airport (Golding 1982:33).

/3/ Costas, John, Assistant Administrator of Planning and Construction, San Francisco International Airport, telephone conversation, June 20, 1990.

/4/ Golding, George, "Retiree Recalls SF Airport's Growth," *The Times* (San Mateo newspaper), September 7, 1982, Peninsula Section, 33.

/5/ DMJM, *San Francisco International Airport Final Draft Master Plan*, prepared for the City and County of San Francisco.

/6/ Chavez, David, archaeologist, and Jan M. Hupman, historian, David Chavez & Associates, *Cultural Resources Evaluation for the San Francisco Airport Master Plan EIR*, August, 1990: Sally Woodbridge, architectural historian, was consulted for analysis of the historic structures in this Cultural Resources evaluation report.

G. GEOLOGY AND SEISMICITY

INTRODUCTION TO THE ANALYSIS

This analysis is based, in part, on previous geotechnical investigations conducted for previously proposed or constructed airport projects /1,2,3/. These reports, by PSC Associates, Inc., include:

- *Geotechnical Engineering Investigation for Proposed Additions to Continental Airlines Facilities at Boarding Area "B"*, May 1989.
- *Soils Engineering Investigation, South Terminal Complex Modernization Program (South Terminal West Entrance Building), San Francisco International Airport, City and County of San Francisco*, October 1983.
- *Soils Engineering Investigation, South Terminal Complex Modernization Program (Boarding Area C), San Francisco International Airport, City and County of San Francisco*, October 1983.

These geotechnical investigations included a literature review, study of aerial photographs, drilling and sampling of test borings and laboratory analysis of soil and rock material. Reports contain project-specific estimates of settlement rates and recommendations regarding site preparation, foundation design, basement excavation, dewatering, and drainage.

The project area contains geotechnical and engineering constraints such as relatively high rates of settlement, weak bay mud and high groundwater. Despite these conditions, modern engineering practices and prudent construction methods would be employed to allow construction of the proposed buildings with minimal geological impacts to the project.

GEOLOGY

The settlement of artificial fill over bay mud at SFIA is an ongoing process. Differential settlement can result from different fill thicknesses and differences in the underlying soils. Differential settlement can affect the structural integrity of buildings and utility lines.

The main factors to be considered for foundation design for proposed facilities at SFIA are structural loads, depth of fill, depth of underlying bay mud, bottom elevations of the proposed structure and whether the facility's bottom elevation would extend below the water table. Facilities that require excavation below the water table would require special design and construction techniques. Seepage from adjacent saturated soils can result in hydrostatic uplift and cracking of building foundations.

Prior to project construction, a general soil survey of the terminal area, where the bulk of new construction is planned, would be conducted. This survey may be expanded to include the cargo area. The survey would provide general subsurface soil profiles and recommendations for building and foundation design. Prior to any building construction, a site-specific soils or geotechnical investigation would be conducted to provide detailed soils information and specify design and construction guidelines. The location and scope of these studies would be based on detailed site plans for each building, or group of buildings, and would evaluate the geotechnical feasibility of specific projects.

Construction at the airport could be affected by several subsurface conditions. Variable fill thickness can lead to structural instability if adequate support is not provided by the foundation. Likewise, settlement could damage buildings and infrastructure connections.

Although some older buildings at the airport are supported on shallow foundations, most structures built after 1970 are supported on pile foundations./4/ All substantial, load-bearing structures proposed by the SFIA Master Plan would probably be supported on pile foundations due to soil limitations at the project site./4/ Individual buildings would be engineered on a project specific basis to conform to state and local building requirements. Pile-supported structures would not settle appreciably, but the surrounding pavement and vacant areas would continue to settle. This could cause pavement to sink away from buildings. The changing relative elevations of building and the surrounding land can break utility connections. However, the airport has installed flexible utility connections to allow for settlement in the past, and would continue to do so in the future. Most settlement is expected to occur within 30 years after construction.

Construction excavation at the airport would be affected by high groundwater and weak soils. Dewatering would be required for excavation of basements or other structures below the water table. Excavations in thick, unconsolidated bay mud, such as that at the site, tend to be unstable./2/ Even with shoring, soft sediments in the bottom of excavations may deform. This could cause movement of piles and cracking or failure in adjacent structures. Project construction would comply with all OSHA safety requirements. Adequate shoring would be provided to ensure worker safety and prevent damage to adjacent structures.

During construction, soil would be temporarily exposed to erosion. If dewatering were required, the effluent could contain substantial sediment loads. Sediments from these sources could enter storm drains and/or the Bay.

Construction-related excavation may encounter subsurface pipelines or tanks. Settlement in the project area has caused many subsurface utility lines to move away from their original position. Excavation in the vicinity of known pipelines may be hazardous. A large fuel spill was caused when excavation operations ruptured a fuel pipeline in 1988. Subsurface obstructions could, in many cases, be located with geophysical surveys prior to excavation.

SEISMICITY

Because no active or potentially active faults are known to cross the project area, the risk of fault rupture is relatively low. While the airport is situated on artificial fill that is underlain by weak bay mud, subsurface investigations have not discovered soil conditions particularly susceptible to liquefaction./1/ While seismically induced ground settlement has occurred at the airport, major liquefaction-induced ground failure has not been reported during past earthquakes. However, the project area has not been subject to the maximum expected ground shaking intensity or a long-duration earthquake since airport construction began in 1927 and the possibility of liquefaction in future earthquakes exists.

Effects of the Loma Prieta earthquake, discussed in the Setting section above, provide a general picture of the potential impact of future earthquakes. While this earthquake did not generate the maximum ground shaking expected at the site, the types of impacts are expected to be similar. A larger magnitude earthquake could cause more severe and widespread damage.

Buildings proposed by the SFIA Master Plan would be built according to more stringent seismic requirements than older, existing buildings have been. Buildings designed according to standards of the 1988 edition of the Uniform Building Code (UBC) should perform better than older structures. In addition, proposed buildings would be supported on relatively deep pile foundations./4/ This would greatly reduce the likelihood of damage due to earthquake-induced ground failure or ground settlement.

Existing terminal buildings are built of steel-frame and concrete construction. Most of these structures were remodeled in the 1970's and early 1980's, and all except the South Terminal Boarding Areas 'A' and 'B' are supported on relatively deep pile foundations./5/ They are likely to remain structurally sound during and after a large earthquake.

Existing non-terminal airport facilities range in age, height and type of construction. A review of a building inventory of non-terminal buildings revealed two groups of structures that would be at risk in an earthquake. The first group consists of relatively old buildings, 45 to 55 years old. Many of these structures were constructed of concrete and steel-frame. While most are in good condition, some were classified as being in "poor" condition in a 1978 Land Use Study./6/ All buildings identified as being in poor condition have either been removed or would be removed under the near-term plan.

The second group of buildings at risk in an earthquake are reinforced concrete structures built prior to 1973 (when improved seismic standards were incorporated into the Uniform Building Code). All five of these structures would be removed under the near-term plan.

The major source of seismic hazards at the site would likely be from non-structural building elements. Potential damage and casualties may be caused by falling hazards including non-structural building elements such as suspended ceilings and light fixtures. Other hazards include toppling furniture; overturned shelving; broken glass; falling plaster, ceiling tiles, and light fixtures; and rupture of overhead water pipes.

The project would result in an increase in the amounts of hazardous materials present because of the increased use of fuel and other industrial chemicals. Section III.H, Hazardous Materials Setting describes the nature, location and amount of hazardous materials used and stored on-site. The release of hazardous materials was not a major problem during the Loma Prieta earthquake./7/ A larger earthquake could, however, cause ground failure that could rupture fuel and natural gas pipelines, resulting in leaks and spills and fire hazards.

In addition, airport expansion would attract more employees, passengers and visitors to a potentially hazardous area.

On the basis of estimated total employees, passengers and visitors (excluding passengers who use the airport but never leave the airplane), the number of minor injuries, serious injuries and deaths resulting from an earthquake would increase incrementally with development of the near-term and long-term SFIA Master Plan. Assuming a worst-case scenario, that is an earthquake that occurs at the peak hour, and assuming heavy-construction-type buildings that experience between 10 and 30 percent damage, the Applied Technology Council's/8/ formula estimates the increased risk in the event of a damaging earthquake, presented in Table 62, below.

TABLE 62: ESTIMATED RISK IN A DAMAGING EARTHQUAKE/a/

Year	No. of Minor Injuries	No. of Serious Injuries	No. of Dead
1990 (existing)	141	19	5
1996	177	24	6
2006	201	28	7

/a/ Worst-case scenario, assuming an earthquake that occurs at the peak hour and heavy-construction-type buildings that experience 10 to 30 percent damage.

SOURCE: Environmental Science Associates, Inc.

Therefore, implementation of the project could place up to 60 additional people at risk of minor injury, nine additional people at risk of major injury and two additional people at risk of death during a future major earthquake. These estimates are based on the worst-case incident and may be overestimates. Improved construction techniques in new buildings should, in part, offset the impact of increased people exposed. If improved building design and employee earthquake-response training are incorporated as part of the project, estimated earthquake damage could be lowered to zero to ten percent and would result in a lower increase by 2006 of six additional minor injuries, one additional serious injury and no additional deaths.

The earthquake hazards discussed above currently exist at the site and will continue to exist to some degree following airport expansion. The effectiveness of mitigation measures aimed at reducing earthquake hazards would depend primarily on implementation of safety policies, facility and equipment maintenance, proper training of workers in safety procedures, and the degree to which facility users respect the need for safe use, storage and disposal of hazardous materials. Most of the potential seismic hazards could be mitigated through sound structural design and construction techniques and ongoing inspection and employee training programs.

NOTES - Geology and Seismicity

/1/ PSC Associates, Inc., *Geotechnical Engineering Investigation for Proposed Additions to Continental Airlines Facilities at Boarding Area "B"*, May 1989.

/2/ PSC Associates, Inc., *Soils Engineering Investigation, South Terminal Complex Modernization Program (South Terminal West Entrance Building), San Francisco International Airport, City and County of San Francisco*, October 1983.

/3/ PSC Associates, Inc., *Soils Engineering Investigation, South Terminal Complex Modernization Program (Boarding Area C), San Francisco International Airport, City and County of San Francisco*, October 1983.

/4/ Costas, John, Assistant Administrator, Planning and Construction, San Francisco International Airport, telephone conversation, July 13, 1990.

/5/ Costas, John, Assistant Administrator, Planning and Construction, San Francisco International Airport, telephone conversation, August 9, 1990.

/6/ Joint Land Use Study San Francisco International Airport/San Mateo County Environs Area, working paper IB.1, May 1978.

/7/ Leong, Melvin, Assistant Deputy Director, Environmental Control Branch, Facilities Operations and Maintenance, SFIA, conversation, July 12, 1990.

/8/ Association of Bay Area Governments, *Building Stock and Earthquake Losses - The San Francisco Bay Area Example*, May 1986.

H. HAZARDOUS MATERIALS

CONSTRUCTION

Development at the Airport could result in excavation that exposes workers, the public, and/or the environment to soils, soil gases or groundwater contaminated with hazardous materials. Activities that could lead to the discovery of contaminated soils and/or groundwater include building demolition/ renovation, excavation (grading), dewatering and underground storage tank removal. Each of these activities could involve exposure of workers, the public and/or the environment to contaminated soil, soil gases or hazardous building materials. Depending on the specific site being developed, the chemical compounds that could be encountered would vary, although petroleum fuels are the primary soil and groundwater contaminants at the Airport. (See Table 63, Potential Impacts of Project Activities.)

The general potential impacts associated with construction or demolition included in the Master Plan are identified below. An identification of which of these impacts is specific to each proposed development area is included in the next section.

Exposure to hazardous materials has the potential to cause various short-term or long-term health effects. For particular substances, such effects are described in *Patty's Industrial Hygiene and Toxicology*./1/ In any site remediation, worker and public health and safety requirements must be considered.

Building Demolition or Renovation

Buildings at the Airport may contain two sources of hazards: PCB-containing electrical equipment and asbestos. Both of these are common in older structures. No comprehensive asbestos survey of Airport-owned and tenant-owned structures has been performed. SFIA has maintained a list of those areas in which asbestos has been identified and has distributed this list to all employees. SFIA has a general idea of where asbestos would be expected on the basis of the age of the structures. The SFIA Facilities, Operations and Maintenance Division, removed all PCB-containing equipment in Airport-owned facilities as of 1987./2/ In addition, SFIA maintains records of all tenant-owned PCB-containing equipment./2/ Without development of a

TABLE 63: POTENTIAL IMPACTS OF PROJECT ACTIVITIES

Project Activity	Potentially Contaminated Media/Structures	Potential Impacts
Building demolition or renovation	Soil, building materials, transformers	Health of workers and/or public
Underground storage tank closure	Tank, vapor, soil	Health and safety of workers and/or public
Excavation for development	Soil gases, soil, groundwater, transformers and other electrical equipment	Health of workers, public and/or environment

SOURCE: Environmental Science Associates, Inc.

site, no building-material impacts would be anticipated (other than on-going potential exposure to a hazard). With development at any site that currently has a structure, temporary impacts in the area near building demolition or renovation could occur. Because asbestos and PCBs are not used in modern construction, exposure to potential hazards from building materials would be reduced in the long term as a result of development activities in the area.

If PCB-containing electrical equipment is not handled properly during removal, workers (and possibly the public) could be exposed to PCBs, which are suspected carcinogens. Leaving PCB-containing equipment in renovated structures can cause an increase in the potential for PCB exposure in an accident or transformer fire. Because PCBs are wholly contained within electrical devices, the risk of exposure is relatively low in normal situations. Adherence to proper, legally required procedures for handling PCB-containing equipment during maintenance or replacement would assure that impacts are mitigated.

In accordance with BAAQMD Regulation 11, Rule 2, all asbestos-containing material must be removed prior to demolition of a building. If a structure is to be renovated, exposed asbestos must be sealed (encapsulated) or removed. Workers and the public could be exposed to asbestos fibers that become airborne during removal. If legally required procedures are followed, exposure of workers and the public to asbestos should be below applicable safety standards.

Underground Storage Tank Closure or Removal

Underground storage tanks (USTs) are currently located in several proposed development areas. Underground tanks can either be closed in place or removed. Closing underground storage tanks in place would mitigate exposure of workers and the public to potential hazards (however, the closed USTs may present a long-term source of potential contamination to the environment); removal of USTs may pose both health and safety risks (exposure of workers and the public to the tank contents and vapors is possible). If legally required procedures for UST cleaning and removal are followed, risks can be mitigated. At SFIA, both the Environmental Control Section of the Facilities, Operations and Maintenance Division and the SFIA Fire Department, in addition to the San Mateo Department of Environmental Health Services, supervise UST removals in order to enforce the use of appropriate safety procedures and minimize hazards.

Excavation

In several of the proposed development areas, it is possible that contaminated soil or groundwater would be encountered during excavation. Areas of contaminated soil and/or groundwater from previous fuel leaks, spills, or poor hazardous-material-management practices could be encountered during excavation. In addition, nearly half of the demolition and construction sites contained in the SFIA Master Plan are bayward of the former high tide line and located on artificial fill. However, no history of contamination due to fill materials at the airport has been reported to the appropriate local agencies (RWQCB and San Mateo County Department of Environmental Health) to date, making it unlikely that contamination from fill materials would be an impact in the future.

Site workers and/or the public could be exposed directly to unknown contaminants. Migration of gases and/or dust during construction activities could also affect the nearby public and the environment. Exposure of construction workers, other airport workers or the public to hazardous materials encountered during construction would require mitigation. (See Chapter V. Mitigation Measures, pp. 411-434.)

Dewatering

At most excavation areas at the Airport, dewatering would be required. If the groundwater is contaminated with volatile substances, construction workers could be exposed to vapors, possibly at hazardous levels. Because of the presence of areas of petroleum fuel contamination at the Airport, contamination of any dewatering discharge is likely through the drawing of groundwater to the dewatering area. Dewatering discharges, either through a wastewater treatment plant or directly to the Bay, could violate standards set for protection of surface waters.

SITE-SPECIFIC IMPACTS

Soil and/or groundwater in a given Airport development area may be affected by any of the following:

1. Known on-site sources of contamination. These sources have been detected during some types of site investigation. Information about such sites is presented (when reported) in Chapter III.H. Hazardous Materials Setting.

2. Potential on-site sources of contamination. Available information about potential contamination is described in the Chapter III.H. Hazardous Materials Setting. Contamination may already exist but may not have been discovered; or investigations may indicate that no contamination currently exists, but problems may occur in the future.

3. In relation to specific sites, an off-site potential source may be a reported or potential contamination source adjacent to or upgradient of the site in question. Hazardous materials may migrate via groundwater from other areas and may cause a site to become contaminated. Because groundwater flow at the Airport is assumed to be towards the Bay, sites bayward of a reported or potentially contaminated site are most likely to be contaminated by substance migration.

The following discussion describes known contamination at each proposed development site, potential contamination from current or past on-site land uses, and the potential for soil and groundwater contamination from off-site sources. For each site, it should be noted that chemical compounds may have been introduced by the fill material. Potential contamination at SFIA is described in general terms on the basis of available data from agency files.

Areas of Construction/Demolition - Near Term

Terminal Area

The construction of the new International Terminal Complex would involve demolition and relocation of the United Airlines Facilities and Pan Am Maintenance and Administration Facility. The International Terminal would consist of Boarding Areas A and G. The existing Boarding Area A would be demolished. The construction for the International Terminal would involve demolition and reconstruction of part of Boarding Area B to provide replacement gates during construction of Boarding Area A and, eventually, remodeling of Boarding Area D.

Routine groundwater monitoring performed by the Airport has revealed occasionally elevated levels of petroleum hydrocarbons in samples taken from wells in the area of the Central Plant fuel storage area./3/ The Central Plant is the operating base for the HVAC system and is located in the center of the terminal complex. Six underground tanks are located at the plant to store diesel fuel. No construction is proposed at the Central Plant. Thus there would not be project impacts related to fuel storage at the Plant.

The Pan Am Maintenance Facility, immediately west of proposed Boarding Area A, currently has two USTs and has a history of soil and groundwater contamination (see Area D on Figure 24, p. 219, Section III.H. Hazardous Materials). Boarding Area B is known to have contaminated asphalt due to a jet fuel leak. Remediation of this site is still in progress and the extent of contamination is yet unknown. The car rental agencies all have underground storage tanks and many, including Hertz, National and Avis, have reported tank leaks and groundwater contamination (see Areas A, B, and C respectively, on Figure 24, p. 219, Section III.H. Hazardous Materials Setting). Groundwater flow toward the Bay from the rental car area may carry contamination to the International Terminal Area.

Given the history of soil and groundwater contamination in the proposed International Terminal Complex area, therefore, it is likely that both contaminated soil and groundwater would be encountered during construction, leading to potentially hazardous excavation and dewatering impacts. In addition, portions of Boarding Areas A, B and G lie near or beyond the 1880 levee line in artificial fill. Impacts from excavation for development under the SFIA Master Plan may occur.

The United Airlines and Pan Am facilities may contain PCB-containing electrical equipment and asbestos. Asbestos has already been identified in Boarding Areas A and B. Impacts from building demolition or renovation would require mitigation measures.

Removal of the two Pan Am underground storage tanks would be necessary for demolition and construction of the new facility. If removal of these tanks is performed properly in accordance with applicable laws and regulations, impacts resulting from the removal of these tanks would be mitigated.

Transportation / Car Rental Areas

Construction of the Ground Transportation Center on both sides of the access road would involve demolition and excavation in the area of the existing car rental areas and service station. Underground storage tank leaks and soil and groundwater contamination have been reported in this area. (See areas A,B,C on Figure 24, p. 219.) Groundwater contamination has been reported at the Pan Am Maintenance Facility/3/, which could cause contamination of the adjacent car rental area. Impacts would result from excavation and dewatering in this area, given the history of soil and groundwater contamination.

Construction of the Ground Transportation Center would require the closure and removal of underground storage tanks. No impacts would result if removals were performed according to applicable laws and regulations.

Demolition of the existing car rental agencies could cause impacts from possible PCB-containing equipment and asbestos.

West Field

Master Plan projects in the West Field include demolition and construction of facilities. There are no reported cases of fuel tank leaks in this area. Results of groundwater samples from the Airport's wells in the area of the Airport's Maintenance Facility have indicated the presence of petroleum hydrocarbons. Most of the samples analyzed since 1987 were found to have no detectable levels of Total Petroleum Hydrocarbons (diesel), or levels under 1 part per million (ppm). A few, apparently anomalous, samples were found to have levels of Total Petroleum Hydrocarbon (diesel) up to 11,000 ppm./3/ The underground storage tanks in this area are located at the Airport Maintenance Facility, which is adjacent to the demolition/construction area. Groundwater in this area flows toward the Bay. Therefore, groundwater contamination from the Airport Maintenance Facility area could migrate to the proposed demolition/construction area in the West Field. Dewatering for construction of facilities in the West Field close to the Airport Maintenance Facility could create an impact.

Tenant-owned facilities that are to be demolished in the West Field area may have PCB-containing equipment and asbestos, leading to impacts from demolition.

North Field

Demolition of the U.S. Coast Guard Facilities, Flying Tigers facility and JAL facility, and construction of the new North Field Cargo/Maintenance building are part of the near-term Master Plan. Soil and groundwater contamination is reported at the U.S. Coast Guard facility. (See Area G on Figure 24, p. 219.) There would be impacts resulting from excavation and dewatering due to contaminated soil and groundwater in the immediate area.

No contamination has been reported at the other facilities. Contamination resulting from fuel leaks has occurred at the bulk fuel farm (see Area I on Figure 24, p. 219.) and the United Airlines Maintenance Center. Although these sites are somewhat separated from the demolition / construction area, contaminated groundwater may have migrated to the area, as it is downgradient from the known contaminated areas. Because soil and groundwater at the other facilities are unlikely to be contaminated, excavation and dewatering impacts would not warrant mitigation measures.

The North Field is also an area of artificial fill. Impacts from excavation of contaminated fill could result.

The possibility of PCB-containing electrical equipment or asbestos in those existing facilities could result in impacts from building demolition.

East Field

No reports of contamination in the East Field have been recorded. Contamination by groundwater flow from other sites to the west is a possibility, as the expected direction of flow is east toward the Bay. The past uses of the existing hangar for maintenance purposes could have resulted in some hazardous waste contamination of soil or groundwater. However, the groundwater-monitoring results from the well in this area do not suggest that contaminated groundwater or soil would be encountered. Contamination from construction could be mitigated.

The East Field is also an area of artificial fill. Impacts of development this area could potentially occur at this site from fill contamination.

The Master Plan calls for the demolition of a vacant hangar and the ASII/Evergreen facility in the East Field. Possible hazardous impacts could result from PCB-containing equipment and asbestos in these buildings.

South Field

The Master Plan proposes the construction of a new TWA cargo facility. The existing TWA hangar has a history of an underground storage tank leak. In addition, the 1988 jet fuel pipeline break occurred just to the south of the TWA site. Groundwater sampling results from a well immediately west of the TWA facility have revealed levels of petroleum hydrocarbons above the detection limit over the past three years./3/ Impacts resulting from soil and/or groundwater contamination could occur at this site if dewatering and excavation were to occur.

PCB-containing electrical equipment or asbestos-containing building materials in the existing TWA Hangar could result in demolition impacts.

Areas of Construction/Demolition - Long Term

Boarding Area B

Demolition and reconstruction of the existing "satellite" extension of Boarding Area B would occur in the long term. Soil contamination resulting from a recent jet fuel leak at the TWA terminal (see Area F on Figure 24, p. 219) could result in hazardous excavation impacts. Although all PCB-containing equipment has been removed from all Airport-owned facilities, including the terminal areas, impacts due to known asbestos-containing material could occur during building demolition.

West Field

In the long term, the West Field maintenance facility and the mail facility would be expanded. Long term development impacts in the West Field Area would be the same as those for the near term.

Ground Transportation Center / Car Rental Area

The Master Plan proposes a five-level parking structure and office space at the end of the Ground Transportation Center close to the Route 101 on-ramp. There is no known contamination in this area. In part of the near-term Master Plan, the Chevron service station would have been relocated to this site. The future presence of underground fuel storage tanks on-site would lead to the potential for soil or groundwater contamination. Impacts from excavation and dewatering could result.

PROJECT OPERATION

As discussed in Chapter III.H. Environmental Setting, most of the hazardous materials used at the Airport consist of maintenance materials, motor-vehicle fuel and aircraft fuel. An increase in air traffic and expansion of facilities may result in an increase in the use of hazardous materials. Additionally, an increase in airport activity level would increase number of people potentially exposed to hazardous materials on a day-to-day basis or in the event of an accident.

Hazardous Materials Use

Airport-Owned Facilities

Given the planned expansions, activity at Airport-owned facilities would be anticipated to increase. Functions employing hazardous materials, such as maintenance and wastewater treatment, would require the use of additional hazardous materials, of the same types as are currently in use. The operation of the solvent distillation system would reduce the impact of any increases in hazardous waste production resulting from implementation of the SFIA Master Plan. SFIA has no past citations from Cal/OSHA for improper handling of hazardous materials. With continued application of existing safety programs, and hazardous-waste recycling efforts, impacts could be mitigated.

Tenant Facilities

The United Airlines Maintenance Center, the largest hazardous-material-using tenant facility, currently operates at capacity as far as available hangar space./4/ United Airlines would not obtain new property to allow for expansion under the SFIA Master Plan. Since the SFIA Master Plan does not include expansion of the United Airlines Maintenance Center, operations are not expected to increase proportionally with Airport expansion, and hazardous material use would probably not increase as a direct result of the project.

However, line maintenance facilities would be expanding their operations given the changes proposed in the SFIA Master Plan. In order to accommodate an increase in air traffic, the working capacity would have to increase. Because of the predicted increase in passenger levels, car rental agency activity would be anticipated to increase. An increase in operations at the maintenance facilities and car rental agencies would cause a greater demand for hazardous materials (as well as other maintenance supplies). The amount of hazardous materials stored and used at these facilities would be small compared to the amount used at the United Airlines Maintenance Center. SFIA would continue to implement and enforce the policy in its *Tenant Improvement Guide* concerning the permitting and monitoring of hazardous materials. The Fire Department would continue monitoring the storage of flammable materials in all Airport facilities. An increase would not likely cause a threat to the health of the employees or affect the environment adversely, as long as hazardous materials continued to be handled according to appropriate federal, state and local regulations.

Fuels

Expansion of the Airport would result in an increased demand for aircraft fuel and fueling operations. Implementation of the SFIA Master Plan would require modifications and upgrades, but the current system appears adequate to sustain near- and long-term plans. (See Section IV.J. Utilities). While storage and transmission facilities would not be expanded, fuel use at the Airport would increase proportionally to the increase in air traffic, leading to increased potential for both small and large fuel spills. SFIA would continue to monitor the condition of the distribution pipeline by requiring pressure tests and inventory reconciliation on the distribution lines owned by the oil companies and the airlines. Spill-response measures would continue to be enforced.

Hazardous Waste Generation

As with hazardous materials use, hazardous waste generation would increase somewhat as a result of Master Plan implementation. While the types of waste generated by Airport operations would remain the same, waste from Airport-owned facilities, line maintenance facilities and car rental agencies would increase. With implementation of the new waste manifest collection program, manifested waste streams from the line maintenance facilities would also be monitored by the Airport, to ensure that these wastes would be properly disposed of. The recycling efforts at the Airport-owned maintenance shops would help to reduce the impact of increased hazardous waste.

Industrial Wastewater Treatment

The contribution of all line maintenance facilities to the industrial wastewater treatment plant is relatively small, less than 20 percent of the total volume processed at the plant, in comparison to that from the United Airlines Maintenance Center which contributes about 75 percent of the total./2/ Any substantial increases in operations at the United Airlines Maintenance Center probably would necessitate improvements of its pre-treatment facility./5/ Recent violations of heavy-metal National Pollutant Discharge Elimination System (NPDES) permit limits were assumed to originate from this facility because of its contribution percentage and operations. However, as no expansion of or increase in operations at this facility are proposed as part of the SFIA Master Plan, violations of heavy-metal NPDES permit limits are not expected to result from SFIA Master Plan implementation. In addition, as the treatment plant is currently working well below capacity, it would be able to handle an increase in waste volumes from the maintenance facilities. (See Section IV.J. Utilities, p. 400.)

CUMULATIVE IMPACTS

Disposal of solid wastes in general, and hazardous wastes in particular, is an issue of national importance. Federal and state legislation is attempting to address these issues. As discussed in Chapter III.H. Environmental Setting, the RCRA Hazardous and Solid Waste Amendments of 1984 (HSWA) prohibit the land disposal of untreated wastes as of May, 1990 (the "land ban"). EPA currently has promulgated treatment standards for the applicable hazardous wastes. Treated wastes that meet the standards are not subject to the prohibition and may be land disposed. The law states that if there is insufficient treatment capacity nationwide, the ban date may be extended for up to two years./6/ A number of extensions have been granted./6/

California law, the Hazardous Waste Management Act of 1986, is similar to Federal land ban law. It specifies that after May, 1990, hazardous wastes must be treated to adopted standards for disposal within the state. California law also encourages recycling and reuse, and allows shipment out of state for hazardous wastes that cannot meet treatment standards./7/

Landfill space for hazardous waste is limited. As of mid-1989, there were twenty-four hazardous-waste landfills in the United States that were open to commercial hazardous-waste generators. Of these, seven are located in Western states./8/ On a national level, hazardous-waste landfill space is limited and will grow even more limited as landfill capacities gradually become exhausted. The intent of the land-ban legislation is to address the fundamental error of reliance on land disposal, by forcing waste generators and handlers to seek alternatives.

Because hazardous-waste landfill space is limited, and efficient and environmentally acceptable hazardous-waste treatment and recycling technologies have yet to be fully developed, handling of hazardous waste is becoming an increasingly important problem. Some of the Airport's hazardous wastes can be recycled (oils and solvents), a portion can be treated (spent solvents can be incinerated), and the remainder would be taken to a hazardous waste landfill for disposal. Since the amount of hazardous waste generated by the Airport would increase as a result of the project, and this increased waste generation, along with increases from other development, would exacerbate an existing problematic situation, the SFIA Master Plan would contribute to cumulative hazardous-waste-disposal impacts.

NOTES - Hazardous Materials

/1/ Clayton, G.E. and F.E. Clayton, *Patty's Industrial Hygiene and Toxicology*, third edition, John Wiley & Sons, New York, 1982.

/2/ Leong, Melvin, Assistant Deputy Director, Environmental Control Branch, Facilities, Operations, and Maintenance Division, SFIA, telephone conversation, August 7, 1990, and written correspondence April 16, 1991.

/3/ SFIA Groundwater Monitoring Reports, 1987-1990.

/4/ Ogard, John, Safety Manager, United Airlines Airport Operations, telephone conversation, August 7, 1990.

/5/ Jang, John, Inspector, Regional Water Quality Control Board, telephone conversation, July 25, 1990.

/6/ U. S. Environmental Protection Agency, "Land Disposal Restrictions: Summary of Requirements," Solid Waste and Emergency Response, February 1991.

/7/ Department of Health Services, Toxic Substances Control Division, Alternative Technology Division, "Land Disposal Restriction Newsletter," January, 1988, and "Land Disposal Restrictions Bulletin," September, 1990.

/8/ EI Digest "Industrial Hazardous Waste Management, Environmental Information Limited", February 1989.

I. EMPLOYMENT AND HOUSING

1996

Factors that influence the number of persons directly employed by operations at SFIA include: number of flight operations (e.g., flight crews, ramp and support personnel, ramp maintenance personnel), number of passengers (e.g., ticket-counter personnel, skycaps, food-service workers, rental-car employees), number of international passengers (e.g., customs and agricultural inspectors), amount of domestic cargo (e.g., freight transportation employees), amount of international cargo (e.g., freight transportation employees), amount of U.S. mail (e.g., Postal Service employees), and the size of the terminal (e.g., janitorial services, landscaping). Some employment sectors would not be affected by these factors (e.g., UAL aircraft maintenance base employees, National Weather Service employees, SFIA management) and employment in these sectors is assumed not to change from 1990 levels.

Employment is expected to increase by about 4,600 jobs between 1990 and 1996 to about 38,000. This would represent about 11.6% of the 326,300 employees in San Mateo County./1,2/ The majority of these employees would be the flight-crew and passenger-service personnel employed by the airlines. The distribution for 1996 of jobs among the eight employment sectors is presented in Table 64.

Construction Employment /3/

Construction employment between 1991 and 1996 would generate an average of about 1,400 full-time construction jobs per year. Peak employment would occur in 1993, with approximately 2,400 construction workers employed.

Construction employment in the first two years, 1991 and 1992, would generally be associated with demolition work. The projects supporting the most jobs would be the construction of the people mover (1,600 person-years between 1991 and 1996), the boarding areas (1,500 person-years between 1991 and 1996), and the ramp and elevated roadways connecting to Highway 101 (600 person-years between 1991 and 1996).

●TABLE 64: SFIA EMPLOYMENT, 1996

Employment Sector	Number of Employees
Airlines	25,000
Government Agencies	2,700
Concessionaires and Caterers	3,400
General Aviation and Services	700
Freight Transportation	2,400
Ground Transportation	2,500
Hotel	300
Construction and Consulting	900
TOTAL/a/	38,000

/a/ Employment sector subtotals do not add due to rounding.

SOURCE: Environmental Science Associates, Inc.

Housing Demand

The largest number of the new employees are expected to reside in San Mateo County (37.1%), followed by San Francisco (25.4%) and Alameda (11.9%) counties./4/ The 1,220 housing units needed in San Mateo County represent about one-half of one percent of the 1990 housing stock and about four percent of ABAG's estimate of San Mateo County's potential for new housing units between 1990 and 2005./5/ The forecast distribution of 1990-1996 new employees' place of residence and demand for housing is presented in Table 65.

● TABLE 65: NEW SFIA EMPLOYEES, PLACE OF RESIDENCE, 1990-1996

County	Number of New Employees	Percent/a/	Demand for New Housing Units/b/	Percent of County's 1990 Housing Stock
San Mateo	1,710	37.1%	1,220	0.48%
San Francisco	1,170	25.4%	960	0.29%
Alameda	550	11.9%	420	0.08%
Santa Clara	420	9.1%	280	0.05%
Contra Costa	170	3.7%	130	0.04%
Marin	160	3.5%	120	0.12%
Solano	110	2.4%	80	0.07%
Sonoma	100	2.2%	80	0.05%
Napa	10	0.2%	10	0.02%
Other	210	4.6%	160	N/A
TOTAL	4,610	100.0%	3,460	N/A

NOTE: Percent total does not add due to rounding.

/a/ Percentages are based on 1987 Martin Associates Survey of SFIA employees and projected growth rates for each of the employment sectors found at SFIA.
/b/ Based on the ratio of employed residents to households from ABAG's *Projections-90*, and a four-percent vacancy rate.

SOURCE: Environmental Science Associates, Inc.

2006

Employment is expected to increase by about 9,000 jobs between 1990 and 2006, to ● 42,400. This would represent about 12.1 percent of the 349,900 jobs in San Mateo County in 2006./1,6/ The majority of these jobs would be the flight crews and passenger service personnel of the airlines. The distribution of jobs among the eight employment sectors for 2006 is presented in Table 66.

●TABLE 66: SFIA EMPLOYMENT, 2006

Employment Sector	Number of Employees
Airlines	27,200
Government Agencies	3,000
Concessionaires and Caterers	4,100
General Aviation and Services	700
Freight Transportation	3,000
Ground Transportation	3,100
Hotel	300
Construction and Consulting	900
TOTAL/a/	42,400

/a/ Employment sector subtotals do not add due to rounding.

SOURCE: Environmental Science Associates, Inc.

Construction Employment /3/

Construction employment between 1997 and 2006 would generate an average of about 200 full-time construction jobs per year. Peak employment would occur in 2000, with approximately 400 construction workers employed. The project supporting the most jobs would be the construction of the people mover (1,000 person-years between 1997 and 2006).

Housing Demand

The largest number of the new employees are expected to reside in San Mateo County (37.1%), followed by San Francisco (25.9%) and Alameda (11.8%) counties./4/ The 2,450 housing units needed in San Mateo County would represent about one percent of the county's 1990 housing stock and less than nine percent of ABAG's estimate of San Mateo County's potential for new housing units between 1990 and 2005./5/ The forecast distribution of 1990-2006 new employees' place of residence is presented in Table 67.

● TABLE 67: NEW SFIA EMPLOYEES, PLACE OF RESIDENCE, 1990-2006

County	Number of New Employees	Percent/a/	Demand for New Housing Units/b/	Percent of County's 1990 Housing Stock
San Mateo	3,320	37.1%	2,450	0.96%
San Francisco	2,330	25.9%	1,940	0.59%
Alameda	1,060	11.8%	810	0.16%
Santa Clara	780	8.7%	530	0.10%
Contra Costa	330	3.7%	250	0.08%
Marin	300	3.3%	230	0.22%
Solano	210	2.3%	150	0.13%
Sonoma	200	2.2%	160	0.10%
Napa	30	0.1%	20	0.05%
Other	410	4.6%	310	N/A
TOTAL	8,970	100.0%	6,850	N/A

NOTE: Percent total does not add due to rounding.

/a/ Percentages are based on 1987 Martin Associates Survey of SFIA employees and projected growth rates for each of the employment sectors found at SFIA.
/b/ Based on the ratio of employed residents to households from ABAG's *Projections-90*, and a four-percent vacancy rate.

SOURCE: Environmental Science Associates, Inc.

● <u>Housing Demand Impacts</u>

● The significance of the potential impacts on housing resulting from a project-generated increase in employment can be analyzed by comparing the project's share of the local labor force to the proportion of total local housing units used by the project's employees. If proportionally, the proposed project's use of local housing units would be substantially greater than its share of the local labor force, the impact could be considered significant

In order to evaluate the potential impacts that would occur from implementation of the proposed SFIA Master Plan, the percentage of all San Mateo County jobs located at SFIA was compared to the percentage of San Mateo housing units used by SFIA employees (see Table 67A). As shown in Table 67A, in 1990, 11.0 percent of all San Mateo County jobs were located at SFIA, and SFIA employees used about 5.2 percent of all the housing stock in the area. Based on SFIA employment (under the project) and San Mateo total number of jobs, 11.7 percent of all San Mateo jobs would be located at SFIA in 1996. However, SFIA employees would use about 5.5 percent of the San Mateo housing stock. In 2006, about 12.1 percent of all San Mateo County jobs would be located at the airport, and SFIA employees would use about 5.7 percent of San Mateo County's housing stock.

These figures show that in 1990, and in the future with the project, the percentage of San Mateo County housing units used by SFIA employees would be approximately half of the percentage of San Mateo County jobs located at SFIA, and the proposed project would not affect this ratio substantially. Given these results, it can be concluded that no significant impacts on housing would occur as a result of the project.

SECONDARY EMPLOYMENT AND HOUSING DEMAND

New Indirect and Induced Employment

On the basis of the new SFIA employees generated by the project, and the job creation factors noted on p. 229 (0.5 indirect and 3.8 induced jobs per direct SFIA job), it is projected that the project would result in the creation of about 2,310 new induced jobs by 1996, and about 4,490 by 2006. Additionally, the project would likely result in the creation of about 17,520 indirect jobs by 1996, and about 34,100 by 2006, due to additional expenditures by visitors to the Bay Area. The total number of indirect and induced jobs created as a result of the project would be about 19,820 by 1996, and 38,570 by 2006. The total number of all jobs created by the project would be about 24,440 by 1996 and 47,540 by 2006.

TABLE 67A: EMPLOYMENT AND POPULATION PROJECTIONS FOR SFIA AND SAN MATEO COUNTY/a,b/

	1990	Projected 1996	Projected 2006	Absolute Difference 1990 - 1996	Absolute Difference 1990 - 2006
Total SFIA Jobs	33,400	38,000	42,400	4,600	9,000
Total San Mateo County Jobs /c/	303,600	326,300	349,900	22,700	46,300
Total SFIA Employees Living in San Mateo County	12,600	14,300	15,700	1,700	3,200
Total Number of Housing Units in San Mateo County /d/	241,900	256,500	274,000	18,200	32,100
Percent of SFIA Employees Living in San Mateo County	37.6%	37.1%	37.1%	-0.50%	-0.50%
Percent of All San Mateo County Jobs Located at SFIA	11.0%	11.7%	12.1%	0.64%	1.12%
Percent of San Mateo Housing Units Used by SFIA Employees	5.2%	5.5%	5.7%	0.33%	0.52%
Percent of New San Mateo County Jobs Located at SFIA	N/A	20.3%	19.4%	N/A	N/A
Percent of New San Mateo Housing Units Used by New SFIA Employees	N/A	9.3%	10.0%	N/A	N/A

NOTES:

/a/ Methodology for deriving figures in this table is described in a background paper available for review in Department of City Planning files, 450 McAllister Street.
/b/ Totals may not add due to rounding.
/c/ From data provided by the San Mateo County Planning Department.
/d/ Based on results of housing inventory contained in Consolidated Comprehensive Housing Affordability Strategy, Department of Environmental Management, San Mateo County. November 19, 1991.

SOURCE: Environmental Science Associates, Inc.

It is assumed that the indirect and induced jobs created as a result of implementation of the SFIA Master Plan would be located throughout the Bay Area and also outside the region. The specific locations of these jobs within the Bay Area cannot be determined because projections of the number of jobs are based on regional multipliers.

Housing Demand Created by Indirect and Induced Employment

Employees holding the indirect and induced jobs resulting from the project would create additional demands on the Bay Area housing stock. On the basis of the employed residents-to-households ratio shown in Tables 65 and 67 (for the Bay Area) and the number of indirect and induced jobs that would be created as a result of the project, there would be a demand for an additional 14,880 housing units through 1996, and an additional 29,460 units through 2006. (The total housing demand generated by the project would be 19,490 units through 1996, and 38,430 units through 2006.)

Although, as shown above, it is possible to estimate the number of housing units required to house individuals holding the induced and indirect jobs resulting from the project, it is not possible to accurately determine their residence patterns. As stated above, the indirect and induced jobs could be located anywhere in the Bay Area or even in locations adjacent to the Bay Area. This is because some direct, new SFIA employees would live in Concord for example, and would create demand for goods and services in and around the Concord area, as well as other parts of the region, resulting in creation of jobs indirectly related to the new SFIA jobs. This scenario would be repeated all over the Bay Area and beyond. Since the locations of these indirect and induced jobs are unknown, it is not possible to determine the residence patterns of the individuals holding the jobs. As such, it is not possible to determine the extent of impacts on housing that would be experienced by any one local jurisdiction, including San Mateo County.

Indirect and Induced Housing Demand Impacts

The significance of the potential impacts on housing resulting from a project-generated increase in indirect and induced employment can be analyzed by comparing the proportion of Bay Area housing units used by the individuals holding the indirect and induced jobs to the employees' share of the Bay Area labor force. If proportionally, the proposed project's use of the regional housing stock is substantially greater than its share of the regional labor force, the impact could be considered significant.

Based on a comparison of the projections of induced and indirect employment and related housing demand mentioned above with ABAG projections of total Bay Area employment and number of households, the housing impacts resulting from project-generated indirect and induced employment would be insignificant. In 1990, induced and indirect jobs created by the operation of SFIA accounted for approximately 4.5 percent of the Bay Area total number of jobs; these employees used approximately 4.7 percent of total Bay Area housing stock. In 1996, induced and indirect jobs created as a result of the project would account for approximately 0.6 percent of the Bay Area labor force; the employees would use approximately 0.8 percent of the total Bay Area projected housing stock. In 2006, approximately 1.0 percent of all the jobs in the Bay Area would be induced by, or indirectly related to, the proposed project. Employees

- holding these jobs would use approximately 1.3 percent of the Bay Area housing stock. Although the shares of the Bay Area labor force and housing stock represented by SFIA-created induced and indirect employment would increase under the project, the relationship between the employment and housing shares would not change substantially, and the project would not result in proportionally greater demands on housing (relative to employment).

- Thus, impacts on housing created by indirect and induced employment would not be significant.

NOTES - Employment and Housing

/1/ Association of Bay Area Governments, *Projections - 90: Forecasts for the San Francisco Bay Area to the Year 2005*, Oakland, California, December 1989.

/2/ Martin Associates, *1987 Airport Economic Impact Study*, February 1988.

/3/ Estimates of construction employment were based on the following assumptions: 1) Construction would proceed as scheduled in the SFIA Draft Master Plan Table "Summary-Optimum Development Schedule"; 2) Costs are as presented in SFIA Draft Master Plan Tables 11.2, 11.3, 11.4 and 11.5; 3) Percent of total development cost attributable to on-site construction labor is 30% for buildings and 50% for infrastructure development; 4) An average annual construction wage of $43,000 in 1986 constant dollars; 5) Project management and administrative personnel account for 20% of the total person-years; 6) All demolition work would occur in the first two year for all short-term projects, and in 1998 and 1999 for the long-term projects; and 7) project costs are subdivided among buildings based on square footage of new construction / remodeling.

/4/ The residential distribution of employees is based on data from a 1987 employee survey conducted for the *1987 Airport Economic Impact Study*, February 1988. Projection of future residential distributions is calculated on the sub-employment section level; i.e., fixed-base maintenance workers in the future are assumed to maintain the same geographical distribution as the fixed-base maintenance workers of 1987. The sub-employment levels are then summed for all areas.

/5/ County 1990 housing stock estimated from ABAG *Projections-90* from note /1/ above, and an assumed four-percent vacancy rate.

/6/ County employment estimates for 1996 and 2006 are based on a straight-line interpolation of ABAG's employment forecasts for 1995 and 2000, and a straight-line extrapolation of ABAG's employment forecasts for 2000 and 2005.

J. UTILITIES

INFRASTRUCTURE IMPROVEMENTS

With the implementation of the SFIA Master Plan, SFIA would relocate, reroute, or extend utilities to new facilities. These improvements would not increase the capacity of the existing infrastructure except for drainage and electrical improvements. A listing of these changes is shown in Appendix H, Table H-2, p. A.171.

WATER

The SFIA Master Plan projected future demand based on an analysis of each use category for both near- and long-term SFIA Master Plan projects. Water demand factors were developed from an analysis conducted in 1986-1987. It was found that overall SFIA demand for water was about 1.7 million gallons per day (mgd). These factors were applied to the net increase and decrease in areas to be developed. Systemwide impacts were developed and then tested against the current installed facilities.

To project future demand, the water system was analyzed by functional use category for both the near- and long-term Master Plan. Water demand factors were applied to the net increase (decrease) in floor area to develop the systemwide impacts of the scenarios. Specific projects were then tested against the current installed facilities to determine future requirements.

Near-Term Demand/1/

The proposed project would generate an additional near-term demand of 422,278 gallons per day of water to serve the site for a total demand of about 2.1 mgd. This represents an increase of approximately 25 percent over current water consumption. The San Francisco Water Department projects water demand for the Airport to be about 1.9 mgd in 1996. The Water Department assumes implementation of water conservation methods in its projections for future use, especially in the long term. The near-term SFIA Master Plan projection is approximately 0.4 mgd greater than current usage: this could be supplied by the San Francisco Water Department./2/ SFIA could actively implement conservation methods throughout all Airport facilities to reduce this usage./3/ The San Francisco Water Department is reviewing for adoption various permanent conservation methods that include both present and future uses. The methods include low-flush toilets, low-water-use landscaping, industrial recycling, and the individual metering of large or individual water users./2/

The SFIA Master Plan analyzed the SFIA water supply mains and concluded that adequate capacity exists to serve near-term SFIA Master Plan projects. The SFIA Master Plan also concluded that the internal distribution system is adequate and would not require additional mains or up-sizing of existing mains to serve near-term SFIA Master Plan projects. North Access Road, the perimeter roadway system, and building construction under the SFIA Master Plan would require relocation of existing water mains to provide supplies to new buildings or relocation from adjoining future development parcels. (North Access Road improvements are included in the approved SFIA Five-Year Capital Project Plan.)

Long-Term Demand/1/

The proposed project would generate an additional long-term demand over the near-term demand of about 0.3 mgd, or about 0.7 mgd of water over current demand. This represents an increase of 13 percent and 41 percent mgd, respectively. The San Francisco Water Department projects water demand at the airport to be 2.2 mgd in 2006, about 0.2 mgd less than the SFIA Master Plan projection and about 0.5 mgd over current water demand. While the City may be able to meet SFIA's long-term demand for water, water-conservation measures discussed under near-term demand, above, could be implemented./3/

The SFIA Master Plan analysis of the incoming supply mains and internal distribution system indicates that adequate facilities currently exist. New water distribution facilities would not be required to support long-term SFIA Master Plan projects.

WASTEWATER MANAGEMENT

Sanitary Sewer System/1/

Demand for the sanitary sewer is based directly upon 100 percent of the demand for water. The present system is capable of treating 2.2 mgd and is currently operating at 77 percent capacity at a rate of 1.7 mgd.

Near-Term Requirements

On the basis of 100 percent water demand, an increase of 25 percent in sewer service demand could be met by the existing wastewater treatment plant. However, to meet future water demand, and therefore wastewater treatment, the water quality control plant's capacity would need to be increased an additional 0.8 mgd to 3.0 mgd. Once increased and prior to long-term demand, the plant would discharge 2.12 mgd daily and operate at a near-term capacity of approximately 73 percent. The Airport would not be exceeding the discharge limits of its current National Pollutant Discharge Elimination System (NPDES) permit. SFIA indicated that increasing the capacity of the wastewater treatment plant would require two additional sedimentation tanks and one equalization tank./4/ The SFIA Master Plan did not indicate a schedule for the implementation of the sewer plant capacity increase. As indicated previously, several of the proposed terminal changes would require the rerouting, relocation, or extension of sewer lines to access new site locations.

Long-Term Requirements

Long-term SFIA Master Plan projects would increase the water demand and, therefore, sewage treatment requirements by a total of 41 percent over present demand, requiring additional sewer capacity. SFIA has planned to add 0.8 mgd to the sewer capacity. The SFIA Master Plan indicates a long-term increase in daily sewage requirements from the current 1.7 mgd to 2.4 mgd. With a new capacity of 3.0 mgd, the water quality control plant would operate at 80 percent of capacity./4/ The resulting average daily discharge rate of 2.4 mgd projected by the SFIA Master Plan would exceed the existing NPDES permit average dry weather discharge limit of 2.2 mgd. The existing permit expires in January 1995. At that time a revised permit would be required regardless of whether the SFIA Master Plan is adopted as well as of other changes in discharge parameters. The new permit would be required to address the projected increase in discharge rate./5/

Additionally, the new West Field Cargo/Maintenance Facilities sewer lines would be relocated into the new roadways serving those structures.

Industrial Waste Sewer System/1/

Currently, the industrial wastewater treatment plant has a capacity of 1.65 mgd and operates between 0.8 and 1.2 mgd. According to the SFIA Master Plan, the proposed increase in ramp areas and other functions would contribute less than five percent to the industrial waste collection system. The plant is operating between 50 percent and 75 percent capacity. Neither near- nor long-term SFIA Master Plan projects would require additional capacity for the industrial waste sewer system./1/

Selected SFIA Master Plan projects would require local system improvements and rerouting and relocation of both industrial- and storm-drainage collection-system lines. Given the existing capacity, the project's contribution to potential increase of spills, and the historic handling of spills on site (see Section III.H. Hazardous Materials and IV.H. Hazardous Materials), additional impacts would not be expected as a result of the project.

Solid Waste

Solid waste disposal is a problem of growing urgency in many counties. San Mateo County, with a population of approximately 630,000, annually generates one million tons of solid waste. As mentioned in III.J. Utilities Setting, SFIA's major activity centers contribute approximately 18,250 to 36,500 tons of the one million ton annual total for the county. Ox Mountain Landfill, San Mateo County's only landfill, has approximately two years of remaining landfill capacity. Because Browning-Ferris Industries (BFI) was denied a permit for a new County landfill in Apanolio Canyon, BFI is now pursuing an alternate plan involving the expansion of the existing Ox Mountain landfill. Approval of the alternative plan by all involved regulatory agencies would provide the County with approximately 16 years of landfill capacity, taking into consideration growth factors for the entire County. BFI is confident that it will receive all necessary permits to carry out the plan./6/ The expansion area of the Ox Mountain landfill would be the likely disposal site for the solid waste generated at the Airport during the Master Plan period. However, increases in solid-waste generation would still further diminish the finite resource of landfill space. The emergence of new waste-management laws within the state require city and county governments to plan for source reduction, recycling and composting, while ensuring adequate landfill space for materials that cannot be reused. The California Integrated Waste Management Act (AB 939) requires cities and counties to divert 25 percent of solid waste from landfills by 1995 and 50 percent by 2000. Even with the expansion of the Ox Mountain Landfill, the County still will be faced with the task of finding a more long-range solution to its solid waste problem.

NOTES - Utilities

/1/ SFIA, *Final Draft Master Plan*, Chapter 10.0., November, 1989.

/2/ Vasconcellos, Robert, Manager, Water Supply Division, San Francisco Water Department, telephone conversation, July 9, 1990.

/3/ Lougee, Norm, Water Supply Engineer, San Francisco Water Department, telephone conversation, January 29, 1991.

/4/ Leong, Melvin M., Superintendent Water Quality Control Plant, San Francisco International Airport, meeting, July 24, 1990.

/5/ National Pollutant Discharge Elimination System Permit, NPDES No. CA0038318, California Regional Water Quality Control Board, San Francisco Bay Region, January 17, 1990.

/6/ Valbusa, Leno, District Manager, Browning-Ferris Industries, telephone conversation, January 17, 1991.

K. PUBLIC SERVICES

CRASH / FIRE / RESCUE

SFIA Fire Department would be affected by increases in terminal passengers forecast for 1996 and 2006, and proposed construction projects. Most of the SFIA Fire Department responses are for first aid. Should the projected increase in terminal passenger traffic occur, then the SFIA Fire Department would receive a larger number of calls per year. This increase could cause an increase in current response times. The proposed construction projects could increase firefighting response times to the passenger terminal area. The SFIA Fire Department has indicated that an additional station would be required if SFIA Master Plan projects are implemented, because of increases in response times that could result from construction and demolition activities as well as additional passenger and vehicle traffic./1/ This service degradation may also affect the ability of the SFIA Fire Department to respond to a major emergency event.

SFIA Fire Department determines service levels based on the number of calls divided by the total number of passengers to SFIA. This figure can be applied to future increases in passengers to SFIA to determine the level of service./1/ The annual number of passengers is projected to increase by 41 percent by 1996 and 71 percent by 2006 (see Chapter II. Project Description, Table 1, p. 24). The number of calls for by CFR operations can be expected to increase proportionately. Therefore, the current CFR level of service and response times could not be maintained without additional Fire Department staff. In order to provide the existing level of service, seven new staff would be needed by 1996 and a further additional five staff by 2006.

SFIA POLICE

In part of the SFIA Master Plan, the Police Department intends to develop a 3,300-sq.-ft. substation in the existing International or Central Terminal on the main level in the ticketing area.

The SFIA Police Department would be affected by the increase in terminal passenger traffic. The increase in passengers would result in increases in calls; without additional personnel this could result in longer response times. The SFIA Police Department bases its level of service for traffic control on curbside square footage.

Level of service for service calls is based on the annual passenger count provided by SFIA./2,3/ Existing curbspace at SFIA is approximately 8,100 feet./4/ Implementation of the SFIA Master Plan would include the addition of roughly 3,000 feet of curb space at the new International Terminal, representing an approximate 37 percent increase over current conditions, if no existing curb space is lost due to construction./5/ In order to maintain the existing level of service for traffic control, a similar increase in police staff would be needed.

The 41 percent and 71 percent increases in annual passengers forecast for the near- and long-term, respectively, can be expected to affect the level of service for service calls provided by the Airport police. In order to continue to provide the existing level of police service, the Department would need approximately 106 new staff in the near-term, proportionately among sworn-in officers, unsworn uniformed officers, and office staff. Approximately 78 further additional staff would be needed in the long term.

NOTES - Public Services

/1/ Anderson, Milton, Operations and Training Supervisor, San Francisco International Airport, telephone conversations, August 8, 15, and 27, 1990.

/2/ Driscoll, Ron, Chief, SFIA Police Department, telephone conversations, August 22 and 28, 1990.

/3/ Massola, Bob, Officer, SFIA Police Department, telephone conversation, August 14, 1990.

/4/ SFIA, 1989 Summary of Curb Space at San Francisco International Airport by Terminal and Type of Use.

/5/ Costas, John, Assistant Administrator, Planning and Construction, SFIA, telephone conversation, April 21, 1991.

L. AVIATION SAFETY

Increasing operations at SFIA have the potential to approach and possibly exceed the capacity of the airport. SFIA Master Plan projections would cause the hourly capacity of SFIA to be exceeded for certain hours of the day in both the near-term and long-term. FAA regulations and the Air Traffic Control System limit the level of activity that can occur safely in the airspace of any airport. Therefore, if operations exceed the capacity of the airport for a number of hours during the day, flights would be delayed./1/ FAA would require that flights destined for San Francisco be delayed at departure at other airports until such time as they could be landed safely without leading to excessive congestion of the SFIA airspace.

As operations increase at SFIA, there would be increasing pressure on the existing Air Traffic Control System. Expanding diversity in size and type of aircraft using the airspace contributes to the severity of the safety hazard. The Air Traffic Control System that currently operates in California is one of the busiest and most complex in the world. The FAA is in the process of implementing the National Airspace System (NAS) Plan, which would improve air traffic control and airway facilities services throughout the country. This plan has not been fully implemented yet.

AIRCRAFT ACCIDENTS

The National Transportation Safety Board (NTSB) compiles aviation accident statistics for U.S. carriers. Annual national accident rates are derived on the basis of the number of departures. According to the NTSB statistics, the national average accident rate for the period 1979 through 1989 is 0.392 per 100,000 departures./2/

Aircraft operations at SFIA are projected to increase by 16 percent in the near term and 26 percent in the long term, according to the SFIA Master Plan forecast. As seen in Chapter II. Project Description, Table 1, p. 24, the total number of aircraft operations in the 1990 base year was 427,475. With implementation of the SFIA Master Plan, the total aircraft operations forecast is 496,805 for 1996 and 538,464 for 2006. On the basis of the above figure, the existing accident rate for SFIA at the 1990 aircraft departure level of 213,738 (427,475 landings and departures) would be 0.83 accidents per year. As described in Section III.L. Aviation Safety, the Airport is actually operating at an accident rate below this level. In 20 years of operation, five aircraft accidents have taken place at SFIA.

Implementation of the near-term SFIA Master Plan would increase annual aircraft departures to 248,402 (496,805 landings and departures) and increase the accident rate, based on the NTSB accident rate average, to 0.97 per year. In the long term (2006), the accident rate would increase to 1.0, based on this NTSB statistic, reflecting a 26 percent increase from the base year 1990. As SFIA has maintained a relatively low accident rate (five accidents) over the last twenty years, it would be expected that future accident rates would be lower than those predicted by NTSB statistics, if SFIA maintained its existing record.

NOTES - Aviation Safety

/1/ Wiggins, Jim, Program Manager, Airport Systems Capacity Office, Federal Aviation Administration, February 21, 1991.

/2/ National Transportation Safety Board, Aviation Accident Statistics, 1979-1989, Accident Data Division (SP-30).

M. GROWTH INDUCEMENT

According to SFIA Master Plan forecasts, annual passengers would increase from about 30 million in 1990 to about 42.3 million in 1996 and about 51.3 million in 2006. Under the SFIA Master Plan, approximately 1.4 million square feet of building space would be demolished and about 4.2 million square feet would be constructed by 2006, bringing total SFIA building area to approximately 11.1 million square feet. Air cargo tonnage and total aircraft operations would also increase under the SFIA Master Plan. Existing uses and activities would intensify, and several vacant parcels would be developed in airport uses, but total land area under the airport's jurisdiction would not increase as a direct result of SFIA Master Plan projects. However, if existing airfield capacity proved insufficient to accommodate growth in aircraft operations, pressure to expand SFIA runways could result from SFIA Master Plan implementation.

Under the near-term SFIA Master Plan (1990-1996), SFIA employment would be expected to increase by about 4,600 jobs. The new total would represent about
● 11.6 percent of the 326,300 employees in San Mateo County. Under the total SFIA Master Plan (1990-2006), SFIA employment is expected to increase by about 9,000 jobs. The new total would represent about 12.1 percent of the 349,900 jobs in San Mateo County in 2006. The majority of these jobs would be the flight crews and passenger service personnel of the airlines. Most of the new employees would be expected to reside in San Mateo County (37.1 percent), followed by San Francisco County (25.9 percent) and Alameda County (11.8 percent). Employment growth at SFIA would generate demand for an estimated 6,850 new housing units in the Bay Area, including 2,450 in San Mateo County and 1,940 in San Francisco.

Increases in SFIA passenger volumes could induce pressure for hotel, restaurant and other travel-serving development, while increases in SFIA employment could stimulate demand for additional housing and public services in airport environs cities. Ground transportation and parking needs of both employees and passengers could also induce growth of roadway, parking and transit land uses in airport environs cities. Airport-induced demand would likely most affect the cities closest to SFIA (Brisbane, South San Francisco, San Bruno, Millbrae and Burlingame); in the other environs cities, SFIA-induced development would not likely be distinguishable from background development.

Off-airport water and sewer infrastructure capacity increases would not be required to support SFIA Master Plan projects. However, water demand would increase by approximately 0.69 mgd by 2006, a 41 percent increase over current demand. Sewage treatment demand would increase in proportion to water demand, necessitating expansion of SFIA wastewater treatment plant capacity by an additional 0.8 mgd to 3.0 mgd. Neither near- nor long-term SFIA Master Plan projects would require additional capacity for the industrial waste sewer system. Increased electrical demand resulting from Master Plan projects would necessitate expansion of an existing PG&E substation. Selected SFIA Master Plan projects would require local system improvements and rerouting and relocation of both industrial and storm drainage collection system lines. None of these infrastructure changes would likely induce growth either at SFIA or environs cities.

V. MITIGATION MEASURES PROPOSED TO MINIMIZE POTENTIAL ADVERSE IMPACTS OF THE PROJECT

In the course of project planning and design, measures have been identified that would reduce or eliminate potential environmental impacts of the proposed project. Some of these measures have been, or would be, adopted by the project sponsor and thus are proposed; some have been identified by this Report but are not proposed as part of the SFIA Master Plan or are not agreed to by SFIA staff. Implementation of some may be the responsibility of public agencies other than SFIA. Measures under consideration or not agreed to by SFIA staff may be required by the Airport Commission as conditions of project approval, if the project were to be approved.

Each mitigation measure and its status are discussed below. Impacts of measures are also discussed as appropriate. The mitigation measures have been separated to identify those that are within the control of SFIA to undertake and implement (identified by the subhead "SFIA") and those that are entirely or partially outside of SFIA's control because they require implementation by another agency or jurisdiction (identified under "Other Agencies").

A. TRANSPORTATION

The mitigations that are identified in this report (as noted in the first paragraph above) have been categorized by:

- Existing-Condition Measures/1/
- Project-Impact Measures (1996 and 2006)
- Cumulative-Impact Measures (1996 and 2006)

The distinction among existing-condition, project-impact and cumulative-impact measures is a result of the context used in the impact analysis evaluation. Existing-condition measures are identified to resolve existing deficiencies. These measures for existing conditions do not address project impacts and would not be considered mitigation measures under CEQA. Project-impact mitigation measures, which focus on streets and intersections, transit services and parking, relate to impacts caused by development of the project.

Cumulative-impact mitigation measures are those that would be generated by changes occurring in the entire Bay Area transportation system; these mitigations require action to be taken at a regional rather than a project level. This three-way breakdown is carried through the following listing using each transportation category (e.g., Intersections, Transit/Ridesharing).

INTERSECTIONS

Existing-Condition Measures Identified In This Report

Other Agencies

- At South Airport Boulevard / Utah Avenue, restripe the westbound movements (east leg) on Utah Avenue from the current single-left, single-through and single-right-turn lanes (three lanes total) to a double-left-turn lane and single-combined-through / right-turn lane (three lanes total). This reconfiguration would improve p.m. peak hour LOS from LOS E (V/C = 0.91) to LOS B (V/C ratio = 0.60). The worst-case degradation, under Project + List-added growth (2006) conditions, would be LOS C (V/C ratio = 0.77), versus LOS F (V/C = 1.10) without this mitigation. **Implementing Agency: City of South San Francisco**

- At El Camino Real / San Bruno Avenue, provide double-left-turn lanes on those approaches where right-of-way can be obtained. The maximum improvement, if all approaches had double-left-turn lanes, would be from LOS F (V/C = 1.00) to LOS D (V/C = 0.89), under p.m. peak-hour conditions. Service levels would still degrade to LOS F conditions under future conditions, even with the recommended improvements (1996, V/C = 1.19; 2006, V/C = 1.23). **Implementing Agencies: Caltrans, City of San Bruno**

Cumulative-Impact Measures (1996) Identified In This Report

Other Agencies

- Monitor intersection operations and, as necessary, coordinate/retime traffic signals on El Camino Real (SR 82) and at all freeway ramp intersections. **Implementing Agencies: Caltrans, Cities of South San Francisco, San Bruno, Millbrae, and Burlingame**

Cumulative-Impact Measures (2006) Identified In This Report

Other Agencies

- Continue monitoring intersection operations and, as necessary, coordinate/retime traffic signals on El Camino Real (SR 82) and at all freeway ramp intersections. **Implementing Agencies: Caltrans, Cities of South San Francisco, San Bruno, Millbrae, and Burlingame**

TRANSIT / RIDESHARING

Project-Impact Measures (1996 and 2006) Identified In This Report

SFIA

- Encourage airlines and travel agencies to provide information to encourage air passengers to take transit (e.g., up-to-date shuttle and bus information distributed with all airline tickets-by-mail (sent to Northern California zip codes) and tickets sold at SFIA and Bay Area airline counters.)

- In order to minimize or eliminate congestion and parking problems identified in the Impacts section by limiting auto use, establish a Transportation System Management (TSM) program for SFIA. The goal of the TSM program would be to attain a reduction in the percentage of air passengers and employees who come to SFIA by single-occupant vehicle of two percent each year for the first five years through 1996, and one percent each year thereafter through 2006. The total change desired by buildout (2006) would be a reduction of 20 percentage points (e.g., 72 percent drive alone to 52 percent drive alone)./2/

  - A TSM Manager would develop the specific program and coordinate it with activities of SFIA, San Mateo County, the City and County of San Francisco, SamTrans, BART, CalTrain, shuttle/van/taxi companies that serve SFIA, and other public agencies whose services or regulatory functions would affect the mode of travel chosen by employees and air passengers. The objective of the TSM program would be to reduce travel throughout the day by private automobile, especially single-occupant vehicles.

  - SFIA TSM Program elements that appear to have relatively high potential for success (see Other Agencies for implementation as appropriate) include:

    For SFIA Employees:

    - Flexible work hours for the major employers, to reduce peaking of traffic in the typical 6:00 - 9:00 a.m. and 3:00 - 6:00 p.m. peak hours;

    - Incentives for transit use (e.g., free or subsidized transit fares / shuttle vouchers);

    - Carpool/vanpool matching through a centralized SFIA matching service (or contracted to RIDES for Bay Area Commuters).

- Provide economic disincentives for SFIA employees who commute by single-occupant vehicles (e.g., increased parking rates).

For SFIA Air Passengers:

- electronic transit/shuttle information in all baggage claim areas;

For SFIA Air Passengers and Employees:

- Pricing of parking (highest for single-occupant vehicles, graduated lower rates for carpools/vanpools) and preferential parking location for carpools/vanpools;

- efficient design of the Ground Transportation Center (GTC)

- electronic transit/shuttle information in the GTC and at Automated People Mover (APM) stops);

- Once it is developed, participate in the San Mateo County TSM program.
- Provide a share (based on SFIA employee and air passenger patronage) of the transit operating costs for SamTrans, CalTrain and BART, each of which is necessary to support increased SFIA operations.
- Work with airlines to design the Automated People Mover / Terminal connections to minimize air passenger pedestrian circulation, with baggage service available where departing air passengers exit the BART station or parking areas.

Other Agencies

- Implement aspects of the TSM program within control of those agencies: **Implementing Agencies: airlines, SamTrans, BART, Caltrans, shuttle/van/taxi companies, other agencies**
- Provide information to encourage air passengers to take transit (e.g., up-to-date shuttle and bus information distributed with all airline tickets-by-mail (sent to Northern California zip codes)) and tickets sold at SFIA and Bay Area airline counters. **Implementing Agencies: airlines, travel agencies**
- Provide economic disincentives for airline employees who commute by single-occupant vehicles (e.g., charge or increase current charges for employee parking). **Implementing Agencies: SFIA, airlines and other SFIA employers**
- Provide incentives for transit use (e.g., free subsidized transit fares / shuttle vouchers). **Implementing Agencies: airlines, other SFIA employers**
- Provide a share (based on air passenger patronage) of the transit operating costs for SamTrans, CalTrain and BART, each of which is necessary to support increased airline operations. **Implementing Agencies: airlines and other SFIA employers**
- Once it is developed, participate in the San Mateo County TSM program. **Implementing Agencies: airlines and other SFIA employers**

Cumulative-Impact Measures (1996) Identified In This Report

Other Agencies

- At as many locations as possible near US 101, I-280 and I-380 interchanges in San Mateo County, create park-and-ride lots for commuters through lot-construction and shared-use agreements with churches and shopping centers. Use uniform signage that clearly indicates lot location from the freeway and arterial roadways. **Implementing Agencies: Caltrans, local governments**

Project-Impact Measures (2006) Identified In This Report

SFIA

- Continue to monitor and implement the TSM Program identified above for 1996.
- To the extent that they are under the control of SFIA, continue to implement all incentives and disincentives identified above for 1996 that encourage air passengers and employees to take mass transit and rideshare, and discourage use of vehicles, especially single-occupant vehicles.
- Continue to provide a share (related to SFIA employee and air passenger patronage) of the transit operating costs for SamTrans, CalTrain and BART identified above for 1996.
- If a decision is made to place the SFIA BART station west of U.S. 101, in lieu of a station in the terminal parking garage, build an exclusive right-of-way, bus or rail connection between the SFIA BART station and the Ground Transportation Center with connecting service to the terminal and major employment areas, and operate service on this facility in a manner coordinated with BART/CalTrain arrivals and departures. It should be noted that any construction on the "West of Bayshore" land could cause potentially significant impacts to two endangered species: the San Francisco garter snake and the red-legged frog. The connection must be designed to accommodate safe passage of bicyclists, with no time restrictions on bicycle access. If direct BART service to the SFIA terminal is chosen, dedicate all necessary rights-of-way, and enhance the Ground Transportation Center to function as the multi-modal transfer facility. Reserve rights-of-way through SFIA for high speed rail service in a corridor east of U.S. 101 and on the "West of Bayshore" land.

Other Agencies

- Continue to implement all incentives and disincentives identified above for 1996 that encourage air passengers and employees to take mass transit and rideshare, and discourage use of vehicles, especially single-occupant vehicles. **Implementing Agencies: airlines, local governments, Caltrans**

Cumulative-Impact Measures (2006) Identified In This Report

Other Agencies

- Concurrently with the extension of BART to SFIA, increase the frequency of CalTrain service, especially during non-commute hours, so that there is minimal transfer time between CalTrain and BART. As an alternative, extend BART south to San Jose in the CalTrain right-of-way and provide MUNI light rail in the Bayshore Freeway / Third Street corridor as a replacement for CalTrain service. **Implementing Agencies: BART, Caltrans, CalTrain, MUNI**

- Extend CalTrain beyond its current location at Fourth and Townsend Streets in the South of Market area of San Francisco to the Financial District at, or near, Second and Market Streets. Although an expensive connection, this would make CalTrain an attractive option to US 101 commuters, thereby retarding the rate at which levels of service worsen on US 101./3/ **Implementing Agencies: Caltrans, CalTrain, Peninsula Commute Service Joint Powers Board**

- Increase SamTrans service to BART and CalTrain stations in San Mateo County to encourage use of both systems, both by reducing headways on existing routes and by adding new routes to serve both residential and employment centers. **Implementing Agency: SamTrans**

- Improve MUNI transit capacity in San Francisco so that new BART and CalTrain riders destined for locations outside the Financial District would find transit a viable alternative. This measure is consistent with MTC's current Regional Transportation Plan./4/ **Implementing Agency: MUNI**

ROADWAYS

Measures Proposed As Part Of The Project (1996)

SFIA

- Widen McDonnell Road (Road R-3) from two lanes to four lanes from U.S. 101 to San Bruno Avenue.

- Widen North Access Road from two lanes to four lanes.

Project Impact Measures (1996) Identified In This Report

SFIA

- Consolidate curb cuts on Road R-2 and McDonnell Road (Road R-3) to ensure that these facilities provide the best possible future levels of service.

- Continue prohibition of parking on all SFIA area roadways. This will eliminate parking overflow from using SFIA roadways and will preserve roadway capacity.

Project-Impact Measures (2006) Identified In This Report

SFIA

- Modify all terminal area / Ground Transportation Center ramps to include an exclusive lane for buses, shuttles and high-occupancy vehicles (HOV) in order to minimize delay for these vehicles and maximize their attractiveness as modes of travel to SFIA. The ramps should be designed so that only minor modifications would be required when exclusive HOV/bus lanes are designated by Caltrans on U.S. 101.

- Continue prohibition of parking on all SFIA area roadways.

Other Agencies

- Modify mainline U.S. 101 to accommodate new ramps that would be required to provide direct service to the U.S. 101 HOV/bus lanes. **Implementing Agencies: Caltrans, SFIA**

Cumulative-Impact Measures (2006) Identified In This Report

Other Agencies

- Designate one lane in each direction on US 101 from San Jose to San Francisco as a High Occupancy Vehicle (HOV) lane, to encourage use of carpools by employees of SFIA and use of shared taxis and shuttles by air passengers. This would be part of the TSM program discussed above under transit/ridesharing, whereby a goal of the TSM program would be to reduce travel throughout the day by private automobile, especially single-occupant vehicles. To minimize air quality impacts, new freeway lanes should not be constructed to satisfy this recommended mitigation measure (other than for the existing six-lane section between San Carlos and the San Mateo / Santa Clara County line, which could be widened to a maximum of eight lanes, including the HOV lane, as noted below. The HOV lanes should be signed to accommodate any vehicle carrying three or more persons, including all buses and airport shuttles. Only those taxis carrying three or more persons should be permitted to use the lanes. **Implementing Agency: Caltrans**

- Install ramp meters and variable message signs on US 101 ramps from San Jose to San Francisco, and on I-280 north of I-380 in an effort to maintain flow and better manage incident response on U.S. 101 and I-280. Maintaining flow along these freeways will help reduce travel times to SFIA through better management of incident responses. **Implementing Agency: Caltrans**

PARKING

Measures Proposed As Part Of Project (1996)

SFIA

- Add approximately 7,000 parking stalls. This would provide adequate parking for both air passengers and SFIA employees, even during peak periods of the year. However, providing sufficient parking would have an air quality impact as both air passengers and SFIA employees would be further encouraged to drive to the airport rather that utilize car pooling, shuttles, or public transit options.

Project-Impact Measures (1996) Identified In This Report

SFIA

- Reallocate parking spaces in the proposed new parking facilities in favor of air passengers, as TSM program elements could be expected to reduce employee parking demand more than air passenger parking demand. Phase the expansion of parking supply at SFIA to allow evaluation of the effectiveness of expanded TSM programs and transit improvements before the addition of parking (adding parking before or simultaneous with TSM programs and transit improvements may itself undermine the relative attractiveness of alternatives to single-occupant automobile travel).

- Monitor parking demand in the garage, Lot D, Lot DD, and the GTC and direct motorists to currently available parking locations through changeable message signs.

- Monitor parking demand throughout the year. When employee or air passenger parking demand exceeds supply twenty days a year, build additional parking spaces to maintain a 5 to 20 day exceedance level. In the event the annual mode split targets of the TSM program outlined under "TSM / TRANSIT / RIDESHARING" above are not being met, no additional parking can be provided at SFIA until the annual target is met, reevaluate the program for possible implementation of other measures to meet targets before providing additional parking.

- To improve access to SFIA parking areas by minimizing weaving and maintaining flow, install variable message signs along all roadways entering SFIA directing vehicles to various SFIA locations. The signs could indicate:

  - GTC, Rental Car Return, Buses and Shuttles - Right Lanes,
  - Short Term Parking, Arrivals and Departures - Left Lanes,
  - Long Term Parking, Air Cargo - Left Lane.

- To improve access to SFIA parking areas by minimizing weaving and maintaining flow, install variable message signs in the short-term garage and the Ground Transportation Center that direct exiting vehicles to use the appropriate exit (toll) gates. The signs could indicate:

- US 101 South to San Jose - Left Lanes,
- US 101 North to San Francisco - Right Lanes,
- I-380 to I-280 - Far Right Lanes.

- To minimize unnecessary circulation and reduce vehicle miles traveled, provide frequent radio broadcasts of parking availability, with signage on U.S. 101, I-280, and I-380 indicating the frequency to which motorists could tune to obtain the information. Update the recording as necessary to manage the flow of traffic to SFIA parking areas, and, when necessary, relatively major private lots or garages.

- To alleviate year-to-year occurrence of parking deficits, use vacant land for temporary overflow parking pending and during the construction of lots and garages.

- Index air passenger and employee parking costs to ensure that parking costs escalate with the costs of all goods and services.

Measures Proposed As Part Of The Project (2006)

SFIA

- Add approximately 930 parking stalls.

Project-Impact Measures (2006) Identified in This Report

SFIA

- Reallocate parking spaces in the proposed new parking facilities in favor of air passengers, as TSM program elements could be expected to reduce employee parking demand more than air passenger parking demand. Phase the expansion of parking supply at SFIA to allow evaluation of the effectiveness of expanded TSM programs and transit improvements before the addition of parking (adding parking before or simultaneous with TSM programs and transit improvements may itself undermine the relative attractiveness of alternatives to single-occupant automobile travel).

- Monitor parking demand in the garage, Lot D, Lot DD, Lot C/CC and the GTC and direct motorists to currently available parking locations.

- Monitor parking demand throughout the year. When parking demand exceeds supply twenty days a year, build additional parking spaces to maintain a 5 to 20 day exceedance level. In the event the annual mode split targets of the TSM program outlined under "TSM / TRANSIT / RIDESHARING" above are not being met, reevaluate the program for possible implementation of other measures to meet targets before providing additional parking.

- Use vacant land for temporary overflow parking during the construction of lots and garages.

- To minimize unnecessary circulation and reduce vehicle miles traveled, continue to provide a radio broadcast of parking availability, with signage on U.S. 101, I-280, and I-380 indicating the frequency to which motorists should tune to obtain the information. Update the recording as necessary to manage the flow of traffic to SFIA parking areas, and, when necessary, relatively major private lots or garages.

Cumulative-Impact Measures (2006) Identified In This Report

Other Agencies

- If the BART San Francisco Airport station is located on the west of Bayshore property, provide only carpool (three-person minimum) and vanpool parking access from the U.S. 101 HOV lanes to the BART SFIA station. For those commuters who do not carpool or vanpool, increased SamTrans service (see Transit mitigations above) would encourage use of SamTrans and CalTrain to access BART. **Implementing Agencies: Caltrans, BART, SamTrans, CalTrain**

BICYCLING

Project-Impact Measures (1996) Identified In This Report

SFIA

- As part of any non-freeway roadway reconstruction (e.g. McDonnell Road (Road R-3)), provide a minimum four-foot striped bicycle travel lane for each direction of travel.

Cumulative-Impact Measures (1996) Identified In This Report

SFIA

- Encourage other agencies identified below to provide the signed bicycle travel lane and or the Class I bikeway described below. If bicycle lanes are provided elsewhere, provide signed bicycle travel lanes on Road R-2 and McDonnell Road (Road R-3).

Other Agencies

- To further encourage cycling as an alternate mode of transportation, not only for travel to SFIA but for all bicycle trips in the US 101 Corridor, provide signed bicycle travel lanes or a Class I bikeway, as appropriate, from the Burlingame Recreation Lagoon west of Coyote Point north along Old Bayshore Highway, South Airport Boulevard and Bayshore Boulevard to existing bike lanes near San Bruno Mountain. Class I facilities could also be developed in wider parts of the Southern Pacific right-of-way (where adequate space exists for both BART and a bikeway) and parallel to U.S. 101 between Candlestick Park and the South San Francisco CalTrain Station. **Implementing Agencies: Caltrans, CalTrain, local governments, SFIA**

Project-Impact Measures (2006) Identified In This Report

SFIA

- As part of any non-freeway roadway reconstruction (e.g., McDonnell Road (Road R-3) or Road R-2), provide a minimum four-foot striped bicycle travel lane for each direction of travel.

Cumulative-Impact Measures (2006) Identified In This Report

SFIA

- To the extent that the multi-modal transfer station (BART, CalTrain, SamTrans) is located on Airport property, include bicycle travel lanes as an integral part of any connection between SFIA and the multi-modal transfer station west of U.S. 101.

● PEDESTRIANS

● Project-Impact Measures (1996) Identified In This Report

● SFIA

● • Incorporate, into the GTC design, safe and convenient walkways, amenities, easy access to transit and other modal transfer points, and other measures that facilitate safe pedestrian movements.

CONSTRUCTION

Project-Impact Measures (1996 and 2006) Identified In This Report

SFIA

- Prior to any major phase of construction, SFIA Landside Operations could prepare and submit a Maintenance of Vehicular and Pedestrian Traffic Plan to the City of San Francisco Department of Traffic and Parking, Caltrans, and/or San Mateo County for their review, to ensure that no adverse impacts would result from SFIA construction activity.

- Construction activities could involve closure of travel lanes, sidewalks and parking lanes / transit-taxi staging areas, especially during construction of the Ground Transportation Center (GTC), due to its proximity to the passenger terminal. It is imperative that during construction of the GTC at least four travel lanes on the arrivals deck and four lanes on the departure deck be left open and usable. During construction of the new ramps proposed for U.S. 101, the same number of travel lanes that exist today could be maintained to mitigate traffic conditions. Safely marked, temporary sidewalks and pedestrian paths may be used in association with lane closures.

- The inventory of public and employee parking should be maintained at all times during lot, garage and building construction. When a building or garage replaces an existing parking lot, make replacement parking spaces ready for use and, if necessary, shuttles available for easy access to the terminal and employment sites.

FREEWAY RAMPS

Cumulative-Impact Measures (2006) Identified In This Report

Other Agencies

- Freeway ramps could be monitored on an ongoing basis to identify where and when ramp widening or ramp design modifications (to increase the design speed) would be necessary. **Implementing Agency: Caltrans**

- A typical mitigation to resolve Level of Service E and F operation on an on-ramp would be to add a lane to the ramp. However, because of the poor operations projected on mainline U.S. 101, it is doubtful whether ramp widening would achieve anything other than increasing the vehicle storage (stacking) capacity of the ramp. Thus, metering US 101 ramps could help to maintain stable flow on the mainline freeway. The studies necessary to implement the ramp meters would consider the appropriate storage room that would be necessary, based on the future vehicle arrival patterns and alternative metering frequencies. Trial operations of the ramp meters under various schemes would be necessary prior to determining the optimal geometry for U.S. 101 ramps. **Implementing Agency: Caltrans**

AUTOMATED PEOPLE MOVER MITIGATIONS

<u>Measures Proposed As Part Of Project (1996)</u>

SFIA

- Construct an Automated People Mover from the new Ground Transportation Center to the SFIA terminal building.

<u>Measures Proposed As Part Of Project (2006)</u>

SFIA

- Extend the Automated People Mover from the Ground Transportation Center to parking Lots D and DD.

<u>Project-Impact Measures (1996 and 2006) Identified In This Report</u>

SFIA

- For passenger convenience, design of the Automated People Mover should strive to minimize air passenger walking distance and, where possible, level changes.

Other Agencies

- Work with SFIA to design the Automated People Mover / Terminal connections to minimize air passenger pedestrian circulation, with baggage-deposit or other baggage handling service available where departing air passengers enter the Automated People Mover from the BART station or parking areas. **Implementing Agencies: airlines**

FREEWAY MAINLINE MITIGATIONS

<u>Cumulative-Impact Measures (2006) Identified In This Report</u>

The widening of U.S. 101 to ten lanes in the vicinity of SFIA is not identified as a freeway traffic mitigation measure, because of overriding considerations related to the Bay Area's air quality. Rather, high-occupancy-vehicle (HOV) lanes could be added to U.S. 101 from San Jose to San Francisco, designated for express buses, airport shuttles and other vehicles carrying three or more persons. Since the mainline freeway section near SFIA is projected to operate at a poor level of service, direct ramps to and from the HOV lanes should be considered prior to construction of the Ground Transportation Center.

Basic freeway sections projected to operate worse than LOS D during peak hours would benefit most from installation of ramp meters and variable message signs that direct motorists to use less-congested roadways. Ramp meters manage (through signals on the freeway ramp) the flow of vehicles onto the freeway in a manner so as not to exceed downstream capacity constraints. They permit vehicles to enter the traffic stream to take advantage of gaps in traffic in the lane adjacent to the ramp. Recent research indicates that 60 percent of all urban freeway congestion is related to "incidents" (i.e., vehicle accidents and disablements). /5/ The rapid clearing of incidents combined with installation of variable message signs on the freeway would reduce congestion levels.

U.S. 101 south of SFIA is expected to become more congested, primarily because of additional employment growth in San Mateo and Santa Clara counties. This congestion is unrelated to growth at SFIA and the proposed project, and is expected to occur independently of SFIA Master Plan improvements. Any further increases in U.S. 101's capacity are not expected, because of limited right-of-way for widening and because of air-quality considerations. Construction of highway reliever routes would also be unlikely because of inter-jurisdictional and environmental concerns. It is likely that increased congestion on U.S. 101 south of SFIA would cause trips to divert to I-280, especially during peak hours./6/

Increased congestion on the Bay Area's freeway system, and transit improvements, would have the effect of shifting motorists to alternate modes of transportation. Shifts to BART and CalTrain could benefit the U.S. 101 corridor. Increased reliance on transit service improvements (e.g., the extension of BART to SFIA and CalTrain to downtown San Francisco) by commuters to jobs along the corridor, both at SFIA and elsewhere, would help reduce future congestion in this corridor. However, SamTrans is not likely to play an effective role without the BART extension and provision of HOV lanes on (or across, for a BART extension to the West of Bayshore land) U.S. 101. A diversion to SamTrans would not be expected to relieve U.S. 101 congestion, as there is difficulty in transit's ability to serve low-density, dispersed employment centers in San Mateo and Santa Clara Counties. There is difficulty in providing enough service to make transit attractive in low-density, dispersed employment centers along the U.S. 101 corridor. In addition, the more likely and more effective shift to Sam Trans for trips through the impact area (between San Mateo / Santa Clara Counties and San Francisco) by SamTrans would be affected adversely if no preferential treatment (e.g. HOV/bus lane) is given to buses.

B. NOISE

AVIATION NOISE

Measures Identified in This Report

SFIA

The following measures are intended to mitigate the noise impacts from the continued operation of the Airport.

- Select the earliest practicable date by which the Airport is to achieve 100 percent Stage 3 operations, and amend the SFIA Noise Abatement Regulation to reflect the phase out date (such an amendment was recently adopted by the Airport Commission with a January 1, 2000 phaseout date). The airlines serving SFIA would be responsible for compliance with the regulation. As discussed in Section IV.C. Noise, p. 331, achieving 100 percent Stage 3 operations would result in a one-dBA reduction to the CNEL contours in 2006.

- Encourage the airlines to use large long-range, two-engine aircraft as an alternative to four-engine aircraft. Aircraft such as the Boeing 767 and Boeing 777 (currently under development) can climb higher and faster than four-engine aircraft. The use of the aircraft would allow more long-range flights to depart on Runways 1L and 1R over the Bay, and would reduce noise levels in areas under departure paths from Runway 28R. An increased number of departures on Runways 1L and 1R would result in an increase in the occurrence of single-event noise in communities under the departure flight paths for those runways, including San Francisco and communities on the Peninsula and in the East Bay. An increased number of departures on Runways 1L and 1R would also result in an increase in the occurrence of backblast noise in communities behind those runways, including Burlingame and Millbrae.

- Encourage FAA to review and, if possible, revise the Quiet Bridge Approach to Runways 28L and 28R. Noise levels at the remote monitoring station in Foster City (station 12) are forecast to increase by about one decibel from 1990 to 2006, primarily because the increased use of quieter, Stage 3 aircraft at SFIA would not substantially reduce landing noise (to which areas of Foster City are exposed). Increasing the distance between approaching planes and Foster City could reduce cumulative and single-event ambient noise levels there, although it would not reduce the number of aircraft landings heard.

- Encourage FAA to study and, if possible, institute the use of a "quiet departure" flight routing for aircraft departing on Runways 1L and 1R. Currently, aircraft departing on Runways 1L and 1R make a left turn over the Peninsula. Requiring the aircraft to travel further north over the Bay before turning could reduce single-event noise over Peninsula communities, but could result in increased overflights and single-event noise in communities further north. In addition, a revised flight routing could conflict with departures from Metropolitan Oakland International Airport.

- Continue voluntary maximum use of the existing preferential runway use procedures at SFIA (nighttime use of Runways 10L and 10R for departures). Use the information in the SFIA Director's Reports to track and discuss actual use of the procedures at Airport/Community Roundtable meetings. If the use of the procedures could be increased, consider taking actions to encourage and promote such increased use. In addition, establish informal (through agreement with the airlines) nighttime preferential use of Runways 19L and 19R for arrivals (to the extent allowed by air traffic and weather conditions). If possible, arrival paths should be designed to minimize the possibility of increased noise levels in East Bay communities. The use of Runways 19L and 19R for arrivals could reduce overflight noise levels in Foster City and communities near the arrival paths for Runways 28L and 28R. Depending on the arrival flight paths used, the use of Runways 19L and 19R for arrivals could result in increased noise levels in East Bay communities. **Implementing Agencies: SFIA, FAA, airlines serving SFIA**

- Use the SFIA PASSUR Tracking System to evaluate actual flight patterns at SFIA and determine the value of existing and proposed noise abatement procedures. Develop regular reports from the PASSUR System for inclusion in the Director's Reports presented at Airport/Community Roundtable meetings.

- Participate with the FAA, California Department of Transportation, local agencies, Bay Area airports staffs, public interest groups, and area residents, conduct a regional study of air traffic control requirements, constraints, and opportunities, with the goal of minimizing noise impacts. The study would involve identifying the flight patterns and routes region-wide that are most environmentally desirable, determining how to establish and coordinate use of the routes while maintaining aircraft safety, and working with area airports, the FAA, and pilots to implement any changes to flight patterns or procedures.

- Complete study on the feasibility of and benefits from a new runway(s) (to replace the existing runways) or extension(s) to the existing runway(s). New runway(s) with a more westerly orientation could reduce overflights of Foster City and result in increased altitudes for aircraft using the Gap Departure route. Extended or new runways could potentially handle departures by long-range, heavy aircraft such as the B-747, with flight paths over the Bay instead of the Peninsula. (Currently, these aircraft primarily use Runway 28R.) New or extended runways might result in an overall reduction in the population within the CNEL 65 contour. If the study results in SFIA decision to pursue runway reconfigurations, work with FAA and other authorities to obtain necessary approvals to permit such reconfigurations. This work would include environmental review under CEQA and, possibly, NEPA. Potential environmental impacts of new or extended runways include: potential shifts in flight patterns that result in increased cumulative or single-event noise levels in certain locations; potential effects on airspace management in the Bay Area, and on flight procedures for (and noise impacts near) San Jose and Metropolitan Oakland International Airports; an increase in the number of operations that could be accommodated during bad weather conditions, and thus, a reduction in aircraft delays (if new runways are separated by 4,300 feet to allow simultaneous landings during adverse weather conditions); the filling of areas of the Bay, with accompanying temporary water-quality impacts and longer-term biological impacts; and increased energy use and pollutant emissions associated with longer aircraft taxiing distances. **Implementing Agencies: FAA, SFIA**

- Work with FAA and airlines to develop a "quiet climb" program (takeoff procedures) to reduce the single-event takeoff noise of Stage 2 aircraft in areas near SFIA. The program could involve delaying the application of climb power (after engine cutback soon after takeoff) until reaching a specified altitude (such as 5,000 feet above the ground) or clearing populated areas. When FAA Advisory Circular 91-53 is updated, review the Circular and determine whether runway-specific and other appropriate procedures can be adopted.
Implementing Agencies: FAA, SFIA, airlines serving SFIA

- Consider developing and implementing additional restrictions on nighttime operations by Stage 3 aircraft. **Implementing Agencies: SFIA, airlines serving SFIA**

- Work with the FAA and the Foster City Noise Committee to develop noise abatement approach procedures using the LDA/DME planned for installation at SFIA in 1992. Use of such procedures could result in a reduction in cumulative noise levels in Foster City.

  If SFIA is selected for receipt of an MLS, work with the FAA and the Airport/Community Roundtable to review and revise flight procedures, with the goal of using the MLS to reduce single-event and cumulative noise levels.

- Consider increased funding for implementation of noise insulation projects in cities near the Airport.

- With the California Department of Transportation and the FAA, conduct a study involving the use of the C-weighting to quantify backblast impacts, and the development of a standard for evaluating backblast impacts.

- Improve the existing noise barrier for Runway 1R to better contain jet blast. This improvement could result in more aircraft departures on Runway 1R instead of Runways 28L or 28R, and a corresponding reduction in aircraft noise levels under the departure flight paths for Runways 28L and 28R. An increase in departures on Runway 1R could result in an increase in backblast noise in the communities behind the runway.

- Consider the feasibility and benefits of a noise barrier(s) behind Runways 1L or 1R. If barriers are found to be feasible and to reduce noise levels, install the barriers as appropriate.

- Continue to support and participate in the Airport/Community Roundtable to provide an ongoing public forum to address community airport noise issues, and to monitor Airport noise abatement actions.

- Consider the installation of additional noise monitors to help evaluate the effectiveness of existing, and/or develop new, noise abatement procedures.

- Continue to keep track of information on late night air carrier operations by runway and scheduled operations from midnight to 6:00 a.m. as part of the Director's Reports presented at Airport/Community Roundtable meetings. If the percentage of annual total operations performed at night increases such that nighttime cumulative noise levels increase 1.5 dBA, CNEL or more, conduct an investigation to determine the cause of the increase. To the extent allowed by law, implement mitigation measures to offset the increase in nighttime noise levels.

Other Agencies

- Comply with SFIA Noise Abatement Regulation to achieve Stage 3 operations by phase out date. As discussed in Section IV.C. Noise, p. 331, achieving 100 percent Stage 3 operations would result in a one dBA reduction to the CNEL contours in 2006. **Implementing Agency: airlines**

- Use large long-range, two engine aircraft as an alternative to four-engine aircraft. **Implementing Agency: airlines**

- Review and revise, if possible, the Quiet Bridge approach to Runways 28L and 28R. **Implementing Agency: FAA**

- Study and, if possible, institute the use of a "quiet departure" for aircraft departing on Runways 1L and 1R. **Implementing Agency: FAA**

- Conduct a regional study of air traffic control requirements, constraints, and opportunities, with the goal of developing specific measures for minimizing noise impacts. The study would involve identifying the flight patterns and routes region-wide that are most environmentally desirable, determining how to establish and coordinate use of the routes while maintaining aircraft safety, and working with area airports, the FAA and pilots to implement changes to flight patterns and procedures. **Implementing Agencies: FAA, MTC, Regional Airport Planning Committee, SFIA and other airports in the region**

- Implement "quiet climb" program to reduce the single-event noise of Stage 2 aircraft in areas near SFIA. **Implementing Agencies: FAA, airlines**

- ● Implement the planned installation of an LDA/DME at SFIA. Study and, if possible, develop approach procedures using the LDA/DME, with the goal of reducing cumulative noise levels in Foster City. **Implementing Agency: FAA**

- ● Consider SFIA as an early recipient for an MLS. If SFIA is selected, implement the installation of the MLS. Review, and if possible, revise SFIA flight procedures, with the goal of using the MLS to reduce single-event and cumulative noise levels. **Implementing Agency: FAA**

- ● Conduct a study involving the use of the C-weighting to quantify backblast impacts and the development of a standard for evaluating backblast impacts. **Implementing Agencies: FAA, Caltrans**

CONSTRUCTION NOISE

<u>Measures Identified In This Report</u>

SFIA

- The construction contract could require that the project contractor muffle and shield intakes and exhausts, shroud or shield impact tools, and use electric-powered rather than diesel-powered construction equipment, as feasible, so that noise from construction activities is reduced to the fullest extent possible at noise-impacted locations.

- The project sponsor could require that the project contractor predrill holes (if feasible based on soils) for piles to the maximum feasible depth to minimize noise and vibration from pile driving. The actual pounding from pile driving would occur during a five- to eight-minute span per pile.

- The project sponsor could consult with neighboring jurisdictions to determine the time when pile driving would cause the least disturbance to neighboring uses. The project sponsor could require that the construction contractor limit pile driving activity to result in least disturbance.

- The project sponsor could require the general contractor to construct barriers around the site, and around stationary equipment such as compressors, which would reduce construction noise by as much as five dBA, and to locate stationary equipment in pit areas or excavated areas if possible, as these areas could serve as noise barriers.

C. AIR QUALITY

Measures Idenfified in This Report

SFIA

- The project sponsor would require the contractor to sprinkle demolition sites with water continuously during demolition activity; sprinkle unpaved construction areas with water at least twice per day; cover stockpiles of soil, sand, and other material; cover trucks hauling debris, soils, sand or other such material; and sweep streets surrounding demolition and construction sites at least once per day to reduce particulate emissions. The project sponsor would require the project contractor to maintain and operate construction equipment so as to minimize exhaust emissions of particulates and other pollutants, by such means as a prohibition on idling of motors when equipment is not in use or when trucks are waiting in queues, and implementation of specific maintenance programs to reduce emissions for equipment that would be in frequent use for much of the construction period.

- Mitigation measures designed to reduce aircraft emissions would be centered on reducing the time each aircraft spends in the taxi/idle phase within the parameters of FAA regulations. SFIA could adopt operating procedures to provide to each airline that aircraft engines not be started until the aircraft is ready to pull away from the gate. When no gate is immediately available to unload newly arrived aircraft, aircraft engines would be turned off and aircraft would be towed when a gate becomes available. Emissions of carbon monoxide and hydrocarbons would be reduced by approximately 1,200 lbs/day and 400 lbs/day, respectively, for each minute the airport-wide taxi/idle phase average is reduced.

- Measures identified to mitigate traffic impacts would also mitigate air quality impacts. Reducing vehicular traffic through increased ridesharing (carpool, vanpool and transit), and implementing flexible and/or staggered work hours would reduce local and regional emissions of all pollutants.

<u>Other Agencies</u>

- Comply with SFIA operating procedures designed to reduce aircraft emissions. **Implementing Agency: FAA, airlines**

- Measures identified to mitigate traffic impacts would also mitigate air quality impacts. Reducing vehicular traffic through increased ridesharing (carpool, vanpool and transit), and implementing flexible and/or staggered work hours would reduce local and regional emissions of all pollutants. **Implementing Agencies: airlines, travel agencies, local governments, local public transportation providers**

D. <u>ENERGY</u>

<u>Measures Identified In This Report</u>

SFIA

- Install high-efficiency lamps for all parking lot lighting.

- Measures identified to mitigate traffic impacts would also mitigate energy impacts. Reducing vehicular traffic through increased ridesharing (carpool, vanpool and transit), and implementing flexible and/or staggered work hours would reduce local and regional energy use.

- The measure identified to reduce aircraft emissions would also mitigate energy impacts. Reducing aircraft idling time would reduce aviation fuel consumption.

E. CULTURAL RESOURCES

Measures Identified In This Report

SFIA

- Given the potential of the proposed project to adversely affect prehistoric and historic archaeological resources, the project sponsor would retain the services of an archaeologist. The sponsor would submit copies of the general soil survey and site-specific geotechnical investigations prepared for the San Francisco Airport expansion projects for review by the project archaeologist. The project archaeologist would report recommendations to the Environmental Review Officer (ERO). The archaeologist would give consideration to the potential presence of coastal prehistoric sites below existing bay alluvium and remains of Chinese shrimp camps (c. 1870 to c. 1910 A.D.) in evaluating the archaeological sensitivity of individual projects sites and in developing recommendations. An archaeologist should instruct excavation crews of the potential for discovery of cultural and historic artifacts on the site, and of the procedures to be followed if such artifacts are uncovered.

  Should evidence of cultural or historic artifacts or features of potential significance, as determined by the project archaeologist, be found during project excavation, the Environmental Review Office (ERO) and the President of the Landmarks Preservation Advisory Board (LPAB) would be notified immediately, and any excavation which could damage such artifacts or features would be halted. The archaeologist would prepare a report to be submitted to the ERO and the President of the LPAB containing an assessment of the potential significance of the find and recommendations for what measures should be implemented, including an appropriate security program, and a program for the preservation and recovery of any potential artifacts/features. Should evidence of prehistoric or historic Native American artifacts be found during excavation, the Native American Heritage Commission would be notified immediately, an action required by state law when Native American remains are found. Also, an appropriate representative of the local Native American group would be retained as needed if burial remains were found. Three copies of written reports documenting results of study, recovery and plan for preservation shall be submitted to the ERO.

  Excavation or construction activities which might damage discovered cultural resources would be suspended for a total maximum of four weeks over the course of construction to permit inspection, recommendation and retrieval, if appropriate.

  The archaeologist would prepare a draft report documenting the artifacts/features that were discovered, an evaluation as to their significance, and a description as to how any archaeological testing, exploration and/or recovery program was conducted. Copies of the draft reports prepared according to these mitigation measures would be sent first and directly to the Environmental Review Officer and to the President of the Landmarks Preservation Advisory Board for review. Following approval of the report by the ERO and the President of LPAB, a final report is to be sent to California Archaeological Site Survey Office at Sonoma

State University. The Office of Environmental Review shall receive final copies of the final archaeological findings report.

F. GEOLOGY AND SEISMICITY

Measures Proposed As Part Of The Project

SFIA

- All foundation and geotechnical recommendations presented in the general soil survey and site-specific geotechnical investigations would be incorporated into the project.
- Facilities earthquake safety inspections would continue and would be expanded to include all new facilities. Periodic training concerning earthquake preparedness and seismic hazards reduction would be conducted at all new facilities.

GEOLOGY

Measures Identified In This Report

SFIA

- Facilities earthquake safety inspections would continue and would be expanded to include all new facilities. Periodic training concerning earthquake preparedness and seismic hazards reduction would be conducted at all new facilities.
- The airport's emergency response plan would continue to be practiced and would be updated, as necessary, as construction is completed and as the SFIA Master Plan is implemented.
- Where practical, limit excavation to depths above the water table. This would reduce the need for dewatering and special below groundwater engineering design and construction techniques.
- See Mitigation Section G. Hazardous Materials for a measure to locate suspected underground obstructions, particularly fuel or gas pipes, prior to excavation.
- If dewatering were required, temporarily retain groundwater pumped from the site in a holding tank before discharge to allow suspended particles to settle.
- Prepare and implement erosion control plans for any construction activities during the wet season that involve grading or other activities that would expose soil to erosion.

SEISMICITY

Measures Identified In This Report

SFIA

- Prioritize building removal and replacement such that older buildings in poor condition and older (pre-1973) reinforced concrete buildings are replaced first.

- Equip new gas lines with automatic shut-off valves that would be activated in the event of a major earthquake.

- Tie all potentially dangerous non-structural features into structural elements of the building. Secure heavy equipment and other potentially hazardous objects to floors or walls.

G. HAZARDS

SITE INVESTIGATION

Measures Identified In This Report

SFIA

- Perform a site investigation if construction is proposed in areas of known or suspected contamination. A site investigation includes the collection of soil and/or groundwater samples at a site, transportation of the samples to an analytical laboratory, and analysis and reporting.

  The potential for impacts relating to exposure to contamination exists for workers directly engaged in the sampling activity of this measure. Workers could be exposed to contaminants if accidents occur during transportation, or if access to the site where sampling is occurring is not controlled. In general, since relatively small amounts of material are normally sampled, exposure to potential hazards during site investigation is limited, and associated impacts would be localized.

SITE REMEDIATION

Measures Identified In This Report

SFIA

- Perform remediation activities if levels of contaminants found in any site investigation exceed regulatory requirements and/or pose a threat to the public health and the environment as defined by the responsible regulatory agencies. Remediation could be required for both soils and groundwater. Soil remediation methods could include excavation and on-site treatment, excavation and off-site treatment or disposal, or treatment without excavation. Remediation alternatives for clean-up of contaminated groundwater could include in-situ treatment, extraction and on-site treatment, or extraction and off-site treatment and/or disposal. Discharge of treated groundwater to the industrial wastewater treatment plant at the Airport or to San Francisco Bay would require regulatory agency approval.

  Potential impacts could result from remediation activities. Workers, and possibly the public, could come into contact with chemical compounds in soils, soil gases or groundwater during site remediation. The public and the environment could be exposed to airborne chemical compounds migrating from a site under remediation. Accidents during transportation of contaminated soils and/or groundwater could lead to exposure of the public and the environment to the chemical compounds.

- If site remediation is found necessary, a site-specific Safety and Health Plan for hazardous materials and waste operations would be prepared and submitted to the San Mateo County Department of Health Services, Environmental Services Division before site activities would proceed. The site-specific Safety and Health Plan, which would be applicable to all activities at the site prior to completion of site remediation, would establish policies and procedures to protect workers and the public from potential hazards posed by hazardous wastes. The Plan would be prepared according to federal and California OSHA regulations for hazardous waste site Safety and Health plans (if such regulations are not adopted prior to initial site activities, National Institute for Occupational Safety and Health guidelines /7/ would be followed). The site safety officer's log would be made available to the San Francisco Department of Public Health for inspection.

- The site mitigation plan would include a dust control program, to minimize potential public health impacts associated with exposure to contaminated soil dust.

- Reports (including sample locations, chain of custody forms, and laboratory analysis reports) of further site investigations (if any) would be sent to the San Mateo County Department of Health Services, Environmental Services Division.

- A report describing the remediation process in detail and certifying completion of remediation would be prepared by a Registered Environmental Assessor (REA) or registered engineer, and submitted to the San Mateo County Department of Health Services, Environmental Services Division. The report would include copies of hazardous waste transport manifests.

DEMOLITION/RENOVATION

<u>Measures Identified In This Report</u>

SFIA

- Conduct asbestos surveys for all structures planned for demolition or renovation that have not been previously surveyed. For development involving any structure identified to contain asbestos, retain a registered asbestos inspector to inspect buildings after asbestos removal or encasing to ensure adequacy of remediation, proceeding with demolition or renovation only when the quality assurance inspector agrees that asbestos abatement is complete.

- Consult Airport and tenant records of PCB-containing electrical articles before any demolition or renovation occurs. Remove PCB-containing equipment prior to demolition following all regulations for worker safety and disposal in accordance with applicable laws and regulations.

EXCAVATION

Measures Identified In This Report

SFIA

- Reduce excavation impacts in areas of suspected contamination by performing a site investigation and any necessary remedial activities.

- Prior to any excavation, consult Airport records for locations of underground tanks, utility lines and fuel distribution pipes. Tank-locating technologies would be used to determine whether any unrecorded or misrecorded underground tanks, utility lines or fuel distribution pipelines are present on-site. In the case of relatively large excavations, contingency plans would be developed for protection and possible evacuation of workers and nearby public.

DEWATERING

Measures Identified In This Report

SFIA

- Conduct groundwater testing for petroleum hydrocarbons before dewatering is performed at any airport site. Treatment would be applied, in consultation with the RWQCB and/or wastewater treatment plant operators to ensure that all discharges meet applicable quality requirements.

H. UTILITIES

Measures Identified In This Report

SFIA

- Increase the SFIA sewer system capacity to ensure that sewer capacity meet the long-term demand. As part of the near-term buildout phase, design a specific project which would provide for an 0.8 million gallons per day increase, scheduled for implementation and completion before long-term phase improvements begin (i.e., next 5 years).

  Although the San Francisco Water Department projects less water use at SFIA than the SFIA Master Plan projects, they would be able to fulfill the SFIA projected demand. SFIA could implement the water conservation measures to meet the Water Department projections: low-flush toilets, low-water-use landscaping, industrial recycling, and individual metering of large or individual water users.

- As all Cities and Counties are required to reduce waste generation by 25 percent by 1995 and 50 percent by 2000, SFIA could accomplish equivalent levels of reduction by implementing source reduction and recycling measures. Perform Waste Characterization Study to generally identify types and amounts of waste generated from both Airport-owned and tenant-owned facilities. Based on waste composition data, develop source reduction and recycling programs that would target high-volume materials. Possible measures could include source-separated recycling bins for cans, bottles, newspaper and mixed paper in all passenger terminal areas; office paper recycling in all administrative offices; and convenient measures for airlines to separate recyclable materials from passengers flights.

I. PUBLIC SERVICES

Measures Identified In This Report

SFIA

- Review current fire service levels and response times to the passenger terminal area in relationship to the proposed SFIA Master Plan projects. Identify and begin planning for an additional fire substation to be in operation by the time near-term SFIA Master Plan projects have been completed. A potential location would be near the old Pan Am/TWA Hangars which would enable access to all levels of passenger terminals.

- Review current police service levels and response times in relationship to proposed SFIA Master Plan projects and projected passenger levels. Maintain current levels of service.

NOTES - Mitigation

/1/ These measures are not required under CEQA (California Environmental Quality Act) guidelines. They have been included in this report to point out the needs that currently exist for mitigation measures.

/2/ The 20 percent total reduction due to implementation of a TSM program is a goal. The impact analysis takes no credit for reduced trip generation that would result from a successful TSM program.

/3/ An extension of CalTrain from its current terminus at Fourth Street / Townsend Street in San Francisco's South of Market district to the vicinity of Second Street / Market Street in the Financial District is shown in Caltrans' current Short Range Transit Plan. This extension, which is the subject of a separate environmental review, could make CalTrain service to SFIA competitive with BART for those transit patrons familiar with CalTrain's less-frequent schedule.

/4/ Metropolitan Transportation Commission, Regional Transportation Plan for the San Francisco Bay Area, April, 1991.

/5/ "Assessing the Traffic Impacts of Freeway Incidents and Driver Information", *ITE Journal*, August 1990.

/6/ Where two parallel facilities operate or are projected to operate at significantly different levels of service, or where one is recognized to be frequently saturated and the other facility is not, trip diversions occur that tend to maintain flow on the more-saturated facility. An example of facilities in the Bay Area that see this type diversion are I-880 and I-580 in Oakland, San Leandro and Hayward.

/7/ National Institute for Occupational Safety and Health, *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, U.S. Department of Health and Human Services, DHHS Publication No. 85-15, October, 1985.

VI. SIGNIFICANT ENVIRONMENTAL EFFECTS THAT CANNOT BE AVOIDED IF THE PROPOSED PROJECT IS IMPLEMENTED

In accordance with Section 21067 of the California Environmental Quality Act (CEQA), and with Section 15040, 15081 and 15082 of the State CEQA Guidelines, the purpose of this chapter is to identify impacts that could not be eliminated or reduced to an insignificant level by mitigation measures included as part of the proposed project, or by other mitigation measures that could be implemented, as described in Chapter V. Mitigation Measures, pp. 411-434.

- The final decision maker for this project, the San Francisco Airports Commission, also will make findings regarding alternatives and mitigation measures and may include in those findings additional determinations regarding significant effects.

This chapter identifies significant impacts that could not be eliminated or reduced to an insignificant level by mitigation measures included as part of the project, as described in Chapter V. Mitigation Measures, pp. 411-434.

The project would have a significant effect on traffic in that it would cause the intersection of California Drive at Millbrae Avenue to degrade from LOS D to LOS E during both the a.m. and p.m. peak hours in 2006. In 2006 during the p.m. peak hour, the project would cause the Rollins Road at Millbrae Avenue intersection to degrade below LOS D, and the Long-Term Parking and Road R-3 intersection to degrade from LOS C to LOS E.

The project would have a temporary, although significant, effect on sensitive receptors during project construction. Interior noise levels at noise sensitive land use areas would exceed the State Department of Health Services' Recommended Land Use Compatibility Guidelines for Community Noise.

The project would have significant air quality effects for the following reasons: Project-related surface traffic would further contribute to existing violations of roadside CO concentrations and would probably lead to an increase in the frequency of standards violations in the project area over future CO levels without the project. Project-related traffic would contribute more than one percent of transportation related emissions resulting from development in the County, based on the BAAQMD *Emissions Summary Report*. Project-generated emissions would be over the BAAQMD threshold of 150 lb/day for HC, NO_X, SO_X, and PM_{10}. In addition, because CO concentrations were modeled to be in violation of State standards in the future, the BAAQMD threshold of 550 lb/day for CO is applicable; project-generated emissions would be over the BAAQMD threshold for CO.

- If the SFIA Master Plan were implemented without consideration or inclusion of mitigation measures described in the Final Environmental Impact Report, Chapter V, pp. 411-434, additional effects would be significant. Implementation of the SFIA Master Plan without consideration or inclusion of mitigation measures will cause levels of service to degrade to "E" or below at Holly Street at Ralston Ave; will cause levels of service to degrade to "E" or below on certain freeway ramps in the vicinity of SFIA; will cause levels of service to degrade to "E" or below on various sections of freeways in the vicinity of SFIA; will cause violations of particulate air quality standards due to dust production during construction; will possibly cause impacts on subsurface cultural resources during construction; will cause sediment from dewatering (if any) and from other construction activities to enter storm drains and/or the Bay; will cause soil to be temporarily exposed to erosion during construction; will expose construction workers, other Airport workers or the public to hazardous wastes if hazards are found in soils or ground water in and around construction areas; will contribute to cumulative traffic increases on US 101 in the vicinity that would further reduce levels of service on some segments of the freeway; and, will contribute to cumulative air quality impacts in San Mateo County and the Bay Area region.

VII. THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE HUMAN ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Approval of the project would intensify land uses in the project area. The project would possibly attract new passengers to San Francisco International Airport who otherwise could have used facilities closer to their place of residence or work (e.g., Oakland or San Jose) if those airports had expanded instead of San Francisco International Airport.

The project would include treatment or removal of hazardous materials that may be present in the project area, in compliance with applicable local and state regulations. This would enhance the long-term environmental safety of the project area.

VIII. SIGNIFICANT IRREVERSIBLE ENVIRONMENTAL CHANGES WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION SHOULD IT BE IMPLEMENTED

Construction materials and energy used for project construction would involve use of nonrenewable resources. Continued development would also result in continuing increases in automobile and transit trips. The additional vehicle trips, plus construction activities from new development, would contribute to future cumulative air quality impacts from increases in particulate matter, CO and precursor emissions to ozone. Additional vehicle trips and building operations would contribute to future energy use.

IX. ALTERNATIVES TO THE PROPOSED PROJECT

This chapter identifies alternatives to the proposed project, discusses environmental impacts associated with each alternative, and explains why SFIA staff have rejected these alternatives in favor of the project. The San Francisco Airports Commission could approve an alternative instead of the project if the Commission believed the alternative would be more appropriate.

Three categories of alternatives to the proposed project are examined in this EIR. The three categories are the No-Project Alternative (includes two variants), Onsite Alternative, and Offsite Alternative.

BART service to SFIA in 2006 is not considered as a separate alternative because it is not a change to the project as proposed, but rather an option for serving SFIA that could bring about a change in impacts associated with the project. For this reason, BART service to SFIA is evaluated as an option in Section IV.B. Transportation impacts, above.

A. NO-PROJECT ALTERNATIVE

OVERVIEW

The No-Project Alternative assumes no future development of SFIA landside facilities to meet forecast passenger, cargo and flight operation demand. Under both No-Project Alternative variants, only projects included in the September 1989 SFIA Five-Year Capital Projects Plan (see Appendix B) would be implemented at SFIA during the SFIA Master Plan period (1990 - 2006); these projects would also be implemented under the SFIA Master Plan. Variant 1 reflects the SFIA Master Plan assumption that terminal facilities, and specifically boarding gates, represent the primary capacity constraint at SFIA. Variant 2 reflects the assumption of other agencies -- including Caltrans, MTC and the FAA -- that airfield facilities, airspace and/or ground traffic congestion represent the primary capacity constraints at SFIA. Both variants are based on the existing SFIA facility inventory (Chapter II. Project Description, Table 3).

Two categories of environmental impacts could result from the No-Project Alternative: a) impacts associated with growth in aviation activity at SFIA, and b) impacts associated with unserved demand for expanded aviation services and facilities at SFIA. The second category of impacts is addressed qualitatively under the description of Offsite Alternative. Impacts of demolition and construction associated with SFIA Master Plan projects would be avoided under both variants of the No-Project Alternative.

NO-PROJECT ALTERNATIVE, VARIANT 1 (moderate growth)

Description

No new facility construction, except that which has been approved under the SFIA Five-Year Capital Projects Plan, would occur under this Project Alternative. The impact evaluation is based on SFIA Master Plan "constrained" passenger forecasts, air carrier operations forecasts developed by Ken Eldred Engineering on the basis of SFIA Master Plan "constrained" passenger forecasts, and FAA Terminal Area Forecasts of commuter, general aviation and military aircraft operations./1,2/ These descriptive criteria are compared with SFIA Master Plan forecasts in Tables 68 and 69, pp. 441-446. "Constrained" cargo and mail tonnage forecasts are not available./3/

Growth in aviation activity (passenger counts, cargo tonnage and aircraft operations) would occur under the No-Project Alternative, Variant 1, but to a lesser extent than under the SFIA Master Plan "unconstrained" development scenario. The No-Project Alternative, Variant 1 would result in an increase in annual passengers of about 26 percent during the near-term compared to an increase of about 41 percent with the project, and would result in about a 33 percent increase in annual passengers during the long-term compared to about a 71 percent increase in annual passengers with the project. SFIA Master Plan "constrained" forecasts assume that some growth in annual passenger counts would be accommodated by industry-driven increases in the proportion of large aircraft in SFIA's aircraft fleet mix, and by more efficient utilization of aircraft seating (higher "load factors").

● TABLE 68: NO-PROJECT ALTERNATIVE (VARIANT 1) COMPARED TO MASTER PLAN: NEAR-TERM (1990-1996)/a/

	Actual 1990	No-Project Variant 1 Forecast 1996	No-Project Variant 1 Net Change 1990-1996 /b/	Total Master Plan Forecast 1996	Total Master Plan Net Change 1990-1996 /b/	Comparison of No-Project Alternative (Variant 1) With Near-Term Master Plan
Total Annual Passengers	29,939,835 /c/	37,780,000 /d/	+7,840,000	42,280,000 /d/	+12,340,000	Annual passengers would increase by about 26% under the No-Project Alternative, Variant 1 compared to about 41% under the Near Term Master Plan.
Total Cargo and Mail Tonnage	558,078 /c/	NA	NA	785,872 /e/	+177,790	Cargo tonnage would increase by about 32% under the Near Term Master Plan. Comparative No-Project, Variant 1 ("constrained") figures are unavailable from either SFIA Draft Near Term Master Plan or FAA Terminal Area Forecasts./a,e/
Annual Aircraft Operations /f/						
Air Carrier	302,460 /g/	338,450 /k/	+35,990	375,105 /o/	+72,645	Air carrier operations would increase by about 12% under the No-Project Alternative, Variant 1 compared to about 24% under the Near Term Master Plan. Commuter operations would increase by about 32% under the No-Project Alternative, Variant 1 compared to about 5% under the Near Term Master Plan./q/ Total operations would increase by about 13% under the No-Project Alternative, Variant 1 compared to about 16% under the Near Term Master Plan.
Commuter	87,266 /h/	115,000 /l/	+28,000	91,700 /p/	+4,000	
General Avaition	35,132 /i/	25,400 /l/	-9,700 /m/	27,300 /p/	-7,800 /m/	
Military	2,617 /c/	3,000 /l/	0 /n/	2,700 /p/	+0 /n/	
Total	427,475 /j/	482,000 /l/	+54,000	496,800 /p/	+69,300	

(Continued)

TABLE 68: NO-PROJECT ALTERNATIVE (VARIANT 1) COMPARED TO MASTER PLAN: NEAR-TERM (1990-1996)/a/ (Continued)

	Actual 1990	No-Project Variant 1 Forecast 1996	No-Project Variant 1 Net Change 1990-1996 /b/	Total Master Plan Forecast 1996	Total Master Plan Net Change 1990-1996 /b/	Comparison of No-Project Alternative (Variant 1) With Near-Term Master Plan
Building Area (Square Feet)	8,197,683 /r/	New construction limited to SFIA Five-Year Capital Projects Plan /s/		10,702,137 /t/	+2,504,450	SFIA Capital Plan projects would be implemented under both Near Term Master Plan and No-Project Alternative, Variant 1. Whereas no additional construction would occur under the No-Project Alternative, Variant 1, SFIA building area (excluding parking garages and proposed Ground Transportation Center) would increase by about 31% under the Near Term Master Plan.

NOTES:

/a/ No-Project Alternative, Variant 1 is based on the "constrained" development scenario in the *SFIA Final Draft Master Plan*. This scenario assumes that, without implementation of SFIA Master Plan projects, "lack of adequate or restructured facilities will necessitate increased utilization of existing facilities, constraining growth and causing corresponding degradations in levels of service" (*SFIA Final Draft Master Plan*, p. 7.1). Forecasts of "constrained" aviation activity are provided in the SFIA Master Plan only for annual passenger levels, not cargo tonnage or aircraft operations. Aircraft operations forecasts for the "constrained" scenario were subsequently developed by Ken Eldred Engineering and SFIA for this EIR; "constrained" cargo and mail forecasts are not available (see footnote /3/ of this EIR Section).

/b/ Each "Net Change" difference or sum is rounded to reflect accuracy of the forecast figure(s) from which it was derived. Columns may not add due to rounding. Forecast annual aircraft operations totals are similarly rounded to reflect least accurate component forecasts.

/c/ From "San Francisco International Airport Comparative Traffic Report," December 1989. Note: passenger figure represents total enplaned and deplaned passengers, including transfers. 1989 "Total Terminal Passengers," which includes "through" passengers, was approximately 560,580 (about 2%) greater.

/d/ From Table 7.2, *SFIA Final Draft Master Plan*, 1989.

/e/ From Tables 7.7 - 7.11, *SFIA Final Draft Master Plan*, 1989; "constrained" cargo forecasts are not provided. A 1996 "constrained" estimate, based on data from the 1989 Caltrans *California Aviation System Plan (CASP)*, is 846,302 tons. This was interpolated from 1995 and 2000 *CASP* forecasts of enplaned mail and cargo, then doubled to account roughly for deplaned tonnage. This "constrained" estimate is greater than the Master Plan forecast; however, according to SFIA, the Master Plan "unconstrained" cargo forecasts are now considered "extremely low" (conversation with John Costas, July 2, 1990).

/f/ Aircraft operations include all takeoffs and landings. Air carrier operations, as defined by SFIA, are scheduled commercial jet operations. Commuter operations, as defined by SFIA, are "the operations of the trunk carriers' subsidiary airlines operating primarily turbo-prop aircraft." These operations are accounted for at SFIA by two carriers: United Express (affiliated with United Airlines) and American Eagle (affiliated with American Airlines). FAA defines commuter/regional carriers as those which "operate

TABLE 68: NOTES, (Continued)

aircraft with a maximum of 60 seats, provide at least five round trips per week between two or more points, or carry mail" (FAA "Terminal Area Forecasts, FY 1989 - 2005," Appendix B). General Aviation operations at SFIA are those utilizing the Fixed Base Operator (FBO) and Chevron Corporation facilities for agricultural, industrial, recreational, air charter, air ambulance service, aerial photography, police patrol, fire control or Federal, State and local government aviation. Almost all military aircraft operations at SFIA are accounted for by U.S. Coast Guard helicopter activities.

/g/ 1989 air carrier operations total of 302,460 is from 1989 SFIA landing fee reports, which are based on fees paid to SFIA by runway users. SFIA landing fee report air carrier figures are about 2% lower than the FAA tower counts used in the SFIA Comparative Traffic Reports (the latter reported 309,126 air carrier operations for 1989). The SFIA landing fee report figure is cited here because it is used in SFIA Noise Abatement Program reports to the State, and because it is the basis of constrained and unconstrained fleetmix forecasts generated by Ken Eldred Engineering (KEE) for this EIR (conversation with Ken Eldred, August 1, 1990).

/h/ 1989 commuter operations total of 87,266 is from letter dated July 14, 1990 from John Costas, SFIA, and matches the 1989 SFIA landing report figure. The 1989 commuter operations total from FAA tower counts, as reported in the "San Francisco International Airport Comparative Traffic Report," December 1989, was 83,595, which is approximately 4% less than the landing fee report figure. This discrepancy may derive from miscategorization of commuter and air carrier operations; as noted above, the 1989 FAA tower report air carrier figure is greater than the landing report air carrier figure. When air carrier and commuter figures from the respective reports are added, the discrepancy between the two sources is 2,995 operations, or about 0.8% of the total (letter dated July 20, 1990 from Ken Eldred).

/i/ 1989 General Aviation total, from FAA tower counts reported in the December 1989 SFIA Comparative Traffic Report, was 32,137. To reconcile total operations by category with FAA tower counts, the 2,995 operations noted above have been added to the General Aviation category, bringing it to an estimated 35,132 operations in 1989 (as recommended in letter dated August 2, 1990 from Ken Eldred).

/j/ San Francisco International Airport Comparative Traffic Report, December 1989.

/k/ 1996 No-Project, Variant 1 forecasts of air carrier operations were derived by KEE from actual 1989 SFIA fleetmix data, FAA national fleetmix forecasts, and *SFIA Master Plan* "constrained" passenger and aircraft load factor forecasts (letter dated July 20, 1990 from Ken Eldred).

/l/ 1996 No-Project, Variant 1 forecasts of commuter, General Aviation and military aircraft operations figures are from FAA "Terminal Area Forecasts, FY 1989 - 2005," April 1989. 1996 values represent linear interpolation between 1995 and 2000 data points (corresponding FAA 1996 passenger interpolation is 35,169,200, about 2,610,800 or 7% less than the Master Plan "constrained" 1996 passenger forecast). Total 1996 operations figure combines FAA and KEE forecasts.

/m/ Although SFIA and FAA forecast figures differ, both sources reflect a steady decline in General Aviation operations during the Master Plan period.

/n/ Although SFIA and FAA forecast figures differ, both sources reflect little or no change in military aircraft operations during the Master Plan period.

/o/ 1996 *SFIA Master Plan* forecasts of air carrier operations were derived by KEE from actual 1989 SFIA fleetmix data, FAA national fleetmix forecasts, and *SFIA Master Plan* "unconstrained" passenger forecasts and aircraft load factor forecasts (letter dated July 20, 1990 from Ken Eldred).

/p/ *SFIA Master Plan* commuter, General Aviation and military aircraft operations forecasts from July 14, 1990 letter from John Costas, SFIA. The total is a combination of these figures and KEE air carrier operations forecast.

/q/ Forecasts of commuter operations by SFIA, FAA, Caltrans Division of Aeronautics and other agencies vary considerably due to differing assumptions and uncertainties in aviation industry trends (particularly the effects of industry deregulation).

/r/ Existing facility area total is from EIR Project Description Table 3, based on *SFIA Master Plan* Table 6.3 and updated facility information from SFIA.

/s/ SFIA Capital Projects Plan, September 1989. Capital projects included in the *SFIA Master Plan* are listed in EIR Project Description Table 2.

/t/ 1996 facility area total is from EIR Project Description Table 4, based on *SFIA Master Plan* Table 12.5 and updated *SFIA Master Plan* information from SFIA.

SOURCES: U.S. Department of Transportation, Federal Aviation Administration, April 1989; Ken Eldred Engineering, 1990; Caltrans Division of Aeronautics, 1989; SFIA Airports Commission, 1990; Environmental Science Associates, Inc., 1990.

TABLE 69: NO-PROJECT ALTERNATIVE (VARIANT 1) COMPARED TO MASTER PLAN: TOTAL (1990-2006)/a/

	Actual 1990	No-Project Variant 1 Forecast 2006	No-Project Variant 1 Net Change 1990-12006 /b/	Total Master Plan Forecast 2006	Total Master Plan Net Change 1990-2006 /b/	Comparison of No-Project Alternative (Variant 1) With Total Master Plan
Total Annual Passengers	29,939,835 /c/	39,760,000 /d/	+9,820,000	51,330,000 /d/	+21,390,000	Annual passengers would increase by about 33% under the No-Project Alternative, Variant 1 compared to about 71% under the Total Master Plan.
Total Cargo and Mail Tonnage	558,078 /c/	NA	NA	865,404 /e/	+307,326	Cargo tonnage would increase by about 55% under the Total Master Plan. Comparative No-Project, Variant 1 ("constrained") figures are unavailable from either SFIA Draft Master Plan or FAA Terminal Area Forecasts./a,c/
Annual Aircraft Operations /f/						
Air Carrier	302,460 /g/	321,660 /k/	+19,200	411,560 /o/	+109,100	Air carrier operations would increase by about 6% under the No-Project Alternative, Variant 1 compared to about 36% under the Total Master Plan. Commuter operations would increase by about 45% under the No-Project Alternative, Variant 1 compared to about 15% under the Total Master Plan./q/ Total operations would increase by about 10% under the No-Project Alternative, Variant 1 compared to about 26% under the Total Master Plan.
Commuter	87,266 /h/	126,200 /l/	+38,900	100,000 /p/	+12,700	
General Aviation	35,132 /i/	19,400 /l/	-15,700 /m/	24,200 /p/	-10,900 /m/	
Military	2,617 /c/	3,000 /l/	0 /n/	2,700 /p/	0 /n/	
Total	427,475 /j/	470,000 /l/	+42,400	538,000 /p/	+110,900	

(Continued)

TABLE 69: NO-PROJECT ALTERNATIVE (VARIANT 1) COMPARED TO MASTER PLAN: TOTAL (1990-2006)/a/ (Continued)

	Actual 1990	No-Project Variant 1 Forecast 2006	No-Project Variant 1 Net Change 1990-2006 /b/	Total Master Plan Forecast 2006	Total Master Plan Net Change 1990-2006 /b/	Comparison of No-Project Alternative (Variant 1) With Total Master Plan
Building Area (Square Feet)	8,197,683 /r/	No new construction after Five-Year Capital Projects		11,068,250 /t/	+2,870,570	SFIA Capital Plan projects would be Plan implementation/s/ Master Plan and No-Project Alternative, Variant 1. Whereas no additional construction would occur under the No-Project Alternative, Variant 1, SFIA building area (excluding parking garages and proposed Ground Transportation Center) would increase by about 35% under the Total Master Plan.

NOTES:

/a/ No-Project Alternative, Variant 1 is based on the "constrained" development scenario in the *SFIA Final Draft Master Plan*. This scenario assumes that, without implementation of Master Plan projects, "lack of adequate or restructured facilities will necessitate increased utilization of existing facilities, constraining growth and causing corresponding degradations in levels of service" (*SFIA Final Draft Master Plan*, p. 7.1). Forecasts of "constrained" aviation activity are provided in the Master Plan only for annual passenger levels, not cargo tonnage or aircraft operations. Aircraft operations forecasts for the "constrained" scenario were subsequently developed by Ken Eldred Engineering and SFIA for this EIR; "constrained" cargo and mail forecasts are not available (see footnote /3/ of this EIR Section).

/b/ Each "Net Change" difference or sum is rounded to reflect accuracy of the forecast figure(s) from which it was derived. Columns may not add due to rounding. Forecast annual aircraft operations totals are similarly rounded to reflect least accurate component forecasts.

/c/ From "San Francisco International Airport Comparative Traffic Report," December 1989. Note: passenger figure represents total enplaned and deplaned passengers, including transfers. 1989 "Total Terminal Passengers," which includes "through" passengers, was approximately 560,580 (about 2%) greater.

/d/ From Table 7.2, *SFIA Final Draft Master Plan*, 1989.

/e/ From Tables 7.7 - 7.11, *SFIA Final Draft Master Plan*, 1989; "constrained" cargo forecasts are not provided. A 2006 "constrained" estimate, based on data from the 1989 *Caltrans California Aviation System Plan (CASP)*, is 942,632 tons. This was extrapolated from 2000 and 2006 *CASP* forecasts of enplaned mail and cargo, the top-off portion was adjusted by *CASP*'s tonnage-per-thousand-passenger factor to reflect the "constrained" passenger forecast, then the total was doubled to account roughly for deplaned tonnage. This "constrained" estimate is greater than the Master Plan forecast; however, according to SFIA, the Master Plan "unconstrained" cargo forecasts are now considered "extremely low" (conversation with John Costas, July 2, 1990).

TABLE 69: NOTES, (Continued)

/f/ Aircraft operations include all takeoffs and landings. Air carrier operations, as defined by SFIA, are scheduled commercial jet operations. Commuter operations, as defined by SFIA, are "the operations of the trunk carriers' subsidiary airlines operating primarily turbo-prop aircraft." These operations are accounted for at SFIA by two carriers: United Express (affiliated with United Airlines) and American Eagle (affiliated with American Airlines). FAA defines commuter/regional carriers as those which "operate aircraft with a maximum of 60 seats, provide at least five round trips per week between two or more points, or carry mail" (FAA "Terminal Area Forecasts, FY 1989 - 2005," Appendix B). General Aviation operations at SFIA are those utilizing the Fixed Base Operator (FBO) and Chevron Corporation facilities for agricultural, industrial, recreational, air charter, air ambulance service, aerial photography, police patrol, fire control or Federal, State and local government aviation. Almost all military aircraft operations at SFIA are accounted for by U.S. Coast Guard helicopter activities.

/g/ 1989 air carrier operations total of 302,460 is from 1989 SFIA landing fee reports, which are based on fees paid to SFIA by runway users. SFIA landing fee report air carrier figures are about 2% lower than the FAA tower counts used in the SFIA Comparative Traffic Reports (the latter reported 309,126 air carrier operations for 1989). The SFIA landing fee report figure is cited here because it is used in SFIA Noise Abatement Program reports to the State, and because it is the basis of constrained and unconstrained fleetmix forecasts generated by Ken Eldred Engineering (KEE) for this EIR (conversation with Ken Eldred, August 1, 1990).

/h/ 1989 commuter operations total of 87,266 is from letter dated July 14, 1990 from John Costas, SFIA, and matches the 1989 SFIA landing report figure. The 1989 commuter operations total from FAA tower counts, as reported in the "San Francisco International Airport Comparative Traffic Report," December 1989, was 83,595, which is approximately 4% less than the landing fee report figure. This discrepancy may derive from miscategorization of commuter and air carrier operations; as noted above, the 1989 FAA tower report air carrier figure is greater than the landing report air carrier figure. When air carrier and commuter figures from the respective reports are added, the discrepancy between the two sources is 2,995 operations, or about 0.8% of the total (letter dated July 20, 1990 from Ken Eldred).

/i/ 1989 General Aviation total, from FAA tower counts reported in the December 1989 SFIA Comparative Traffic Report, was 32,137. To reconcile total operations by category with FAA tower counts, the 2,995 operations noted above have been added to the General Aviation category, bringing it to an estimated 35,132 operations in 1989 (as recommended in letter dated August 2, 1990 from Ken Eldred).

/j/ San Francisco International Airport Comparative Traffic Report, December 1989.

/k/ 2006 No-Project, Variant 1 forecasts of air carrier operations were derived by KEE from actual 1989 SFIA fleetmix data, FAA national fleetmix forecasts, and SFIA Master Plan "constrained" passenger and aircraft load factor forecasts (letter dated July 20, 1990 from Ken Eldred). The decline in air carrier operations is assumed due to larger aircraft capacities and higher load factors.

/l/ 2006 No-Project, Variant 1 forecasts of commuter, General Aviation and military aircraft operations figures are from FAA "Terminal Area Forecasts, FY 1989 - 2005," April 1989. 2006 values represent linear extrapolation from 2000 and 2006 data points (corresponding FAA 2006 passenger extrapolation is 40,523,600, about 763,600 or 2% more than the Master Plan "constrained" 2006 passenger forecast). Total 2006 operations figure combines FAA and KEE forecasts.

/m/ Although SFIA and FAA forecast figures differ, both sources reflect a steady decline in General Aviation operations during the Master Plan period.

/n/ Although SFIA and FAA forecast figures differ, both sources reflect little or no change in military aircraft operations during the Master Plan period.

/o/ 2006 SFIA Master Plan forecasts of air carrier operations were derived by KEE from actual 1989 SFIA fleetmix data, FAA national fleetmix forecasts, and SFIA Master Plan "unconstrained" passenger forecasts and aircraft load factor forecasts (letter dated July 20, 1990 from Ken Eldred).

/p/ SFIA Master Plan commuter, General Aviation and military aircraft operations forecasts from July 14, 1990 letter from John Costas, SFIA. The total is a combination of these figures and KEE air carrier operations forecast.

/q/ Forecasts of commuter operations by SFIA, FAA, Caltrans Division of Aeronautics and other agencies vary considerably due to differing assumptions and uncertainties in aviation industry trends (particularly the effects of industry deregulation).

/r/ Existing facility area total is from EIR Project Description Table 3, based on SFIA Master Plan Table 6.3 and updated facility information from SFIA.

/s/ SFIA Capital Projects Plan, September 1989. Capital projects included in the SFIA Master Plan are listed in EIR Project Description Table 2.

/t/ 2006 facility area total is from EIR Project Description Table 5, based on SFIA Master Plan Table 12.5 and updated SFIA Master Plan information from SFIA.

SOURCES: U.S. Department of Transportation, Federal Aviation Administration, April 1989; Ken Eldred Engineering, 1990; Caltrans Division of Aeronautics, 1989; SFIA Airports Commission, 1990; Environmental Science Associates, Inc., 1990.

Impacts

Impacts associated with growth in aviation activity under Variant 1 of the No-Project Alternative would thus be similar to, but less intensive than, impacts associated with growth in aviation activity under the SFIA Master Plan. As noted above, impacts of demolition and construction associated with SFIA Master Plan projects, except those approved under the 1989 SFIA Capital Projects Plan, would be avoided under the No-Project Alternative, Variant 1. Impacts associated with potential unserved demand (under this scenario, the difference between SFIA Master Plan "unconstrained" and "constrained" forecasts) are discussed qualitatively under the Offsite Alternative. Variant 1 of the No-Project Alternative assumes that terminal facilities, and specifically boarding gates, are the primary capacity constraints at SFIA.

The comparisons of vehicle traffic (V/C ratios and LOS) between the No-Project Alternative, Variant 1 and the project in the short-term are shown in Table 70, and the comparisons in the long-term are shown in Table 71, p. 450. The purpose of this table is to compare the impacts of the No-Project Alternative with the project. Thus, the vehicle traffic in these tables includes baseline forecast growth only and not additional list-based cumulative growth.

The *SFIA Five-Year Capital Projects Plan*, the minimum level of infrastructure necessary to support the constrained passenger forecasts, includes two traffic-related construction projects:

- widening of Road R-3 (McDonnell Road) from two lanes to four lanes, from US 101 to San Bruno Avenue, and
- widening of North Access Road from two lanes to four lanes.

Traffic impacts associated with the constrained alternative are as follows:

- On the basis of passenger projections, the No-Project Alternative would have 64 percent (or approximately two-thirds) of the proposed project's impacts in 1996, and 46 percent (or less than one-half) of the project's impacts in 2006.

TABLE 70: 1996 INTERSECTION LEVELS OF SERVICE IN THE VICINITY OF SFIA: NO-PROJECT ALTERNATIVE, VARIANT 1 - A.M. PEAK HOUR

Intersection	1990 Existing V/C	1990 Existing LOS	No Project V/C	No Project LOS	Project V/C	Project LOS
Signalized						
1. El Camino Real/Millbrae Ave.	0.92	E	0.96	E	1.03	F
2. Rollins Rd./Millbrae Ave.	0.94	E	0.97	E	1.02	F
3. Old Bayshore Hwy./Millbrae Ave.	0.24	A	0.24	A	0.31	A
4. Rd. R-2/Rd. R-16/Hilton Hotel	0.24	A	0.24	A	0.28	A
5. Rds. R-20, R-22/Rd. R-18	0.24	A	0.24	A	0.28	A
6. Rd. R-3 (McDonnell)/Rd. R-18	0.28	A	0.20	A	0.29	A
7. Rd. R-3/UAL Cargo	0.15	A	0.15	A	0.18	A
8. Rd. R-3/Rd. R-6	0.25	A	0.19	A	0.29	A
9. S. Airport Blvd./San Bruno Ave.	0.39	A	0.39	A	0.46	A
11. N. Access Rd./N. Access Road E. (101/380 on-/off-ramp)	0.51	A	0.40	A	0.53	A
12. S. Airport Blvd./N. Access Rd. S. (101/380 off-ramp)	0.44	A	0.45	A	0.60	A/B
13. S. Airport Blvd./N. Access Rd. N. (101/380 on-ramp)	0.32	A	0.33	A	0.34	A
14. S. Airport Blvd./Belle Air Rd.	0.30	A	0.31	A	0.31	A
15. S. Airport Blvd./Utah Ave.	0.50	A	0.50	A	0.50	A
16. S. Airport Blvd./US 101 NB ramps/ Radisson Hotel	0.52	A	0.53	A	0.54	A
17. S. Airport Blvd./Gateway Blvd.	0.30	A	0.29	A	0.29	A
18. Airport Blvd./Produce Ave./ San Mateo Ave.	0.37	A	0.37	A	0.37	A
19. Airport Blvd./Grand Ave.	0.65	B	0.86	D	0.86	D
20. San Mateo Ave./San Bruno Ave.	0.59	A	0.52	A	0.55	A
21. El Camino Real/San Bruno Ave.	0.61	B	0.61	A/B	0.66	B
Unsignalized/a/						
22. California Dr./Millbrae Ave.		A/A		A/C		A/D
23. Rds. R-24, R-26/Rd. R-16/b/		> C		> C		< C
24. Rd. R-3/Rd. R-6		< C		> C		> C
25. Long-Term Parking/Rd. R-3		A/C		A/C		A/D

NOTE: > C = LOS C or better (e.g., LOS A, B or C); < C = LOS D or worse (e.g., LOS D, E or F). Intersection 10 in Figure 17, Section III.B, was counted for pedestrian volumes only, so does not appear in this table.

/a/ Unsignalized intersection levels of service reflect the delays from left-turning movements from the major street onto the minor street (the first letter), and from the minor street onto the major street (the second letter). They are based on the excess capacity available to make the indicated movement.

/b/ For multi-stop controlled intersections (3-way and 4-way stop signs), the 1985 *Highway Capacity Manual* specifies a total intersection approach volume that corresponds to LOS C.

SOURCE: DKS Associates.

TABLE 70: 1996 INTERSECTION LEVELS OF SERVICE IN THE VICINITY OF SFIA: NO-PROJECT ALTERNATIVE, VARIANT 1 - P.M. PEAK HOUR (Continued)

	1990 Existing		No Project		Project	
Intersection	V/C	LOS	V/C	LOS	V/C	LOS
Signalized						
1. El Camino Real/Millbrae Ave.	1.00	F	1.05	F	1.10	F
2. Rollins Rd./Millbrae Ave.	0.77	C	0.80	C/D	0.84	D
3. Old Bayshore Hwy./Millbrae Ave.	0.49	A	0.49	A	0.55	A
4. Rd. R-2/Rd. R-16/Hilton Hotel	0.42	A	0.42	A	0.43	A
5. Rds. R-20, R-22/Rd. R-18	0.23	A	0.23	A	0.30	A
6. Rd. R-3 (McDonnell)/Rd. R-18	0.32	A	0.23	A	0.36	A
7. Rd. R-3/UAL Cargo	0.18	A	0.18	A	0.24	A
8. Rd. R-3/Rd. R-6	0.28	A	0.19	A	0.23	A
9. S. Airport Blvd./San Bruno Ave.	0.39	A	0.35	A	0.38	A
11. N. Access Rd./N. Access Road E. (101/380 on-/off-ramp)	0.35	A	0.22	A	0.24	A
12. S. Airport Blvd./N. Access Rd. S. (101/380 off-ramp)	0.51	A	0.51	A	0.62	B
13. S. Airport Blvd./N. Access Rd. N. (101/380 on-ramp)	0.33	A	0.33	A	0.49	A
14. S. Airport Blvd./Belle Air Rd.	0.71	C	0.73	C	0.73	C
15. S. Airport Blvd./Utah Ave.	0.91	D/E	0.94	E	0.94	E
16. S. Airport Blvd./US 101 NB ramps/ Radisson Hotel	0.52	A	0.54	A	0.54	A
17. S. Airport Blvd./Gateway Blvd.	0.45	A	0.48	A	0.48	A
18. Airport Blvd./Produce Ave./ San Mateo Ave.	0.71	C	0.73	C	0.73	C
19. Airport Blvd./Grand Ave.	0.70	C	0.72	C	0.72	C
20. San Mateo Ave./San Bruno Ave.	0.69	B	0.65	B	0.69	B
21. El Camino Real/San Bruno Ave.	1.00	F	1.00	E/F	1.01	E/F
Unsignalized/a/						
22. California Dr./Millbrae Ave.		A/C		A/C		A/D
23. Rds. R-24, R-26/Rd. R-16/b/		> C		> C		< C
24. Rd. R-3/Rd. R-6		< C		> C		> C
25. Long-Term Parking/Rd. R-3		A/C		A/C		A/D

NOTE: > C = LOS C or better (e.g., LOS A, B or C); < C = LOS D or worse (e.g., LOS D, E or F). Intersection 10 in Figure 17, Section III.B, was counted for pedestrian volumes only, so does not appear in this table.

/a/ Unsignalized intersection levels of service reflect the delays from left-turning movements from the major street onto the minor street (the first letter), and from the minor street onto the major street (the second letter). They are based on the excess capacity available to make the indicated movement.

/b/ For multi-stop controlled intersections (3-way and 4-way stop signs), the 1985 *Highway Capacity Manual* specifies a total intersection approach volume that corresponds to LOS C.

SOURCE: DKS Associates.

TABLE 71: 2006 INTERSECTION LEVELS OF SERVICE IN THE VICINITY OF SFIA: NO-PROJECT ALTERNATIVE, VARIANT 1 - A.M. PEAK HOUR

Intersection	1990 Existing V/C	1990 Existing LOS	No Project V/C	No Project LOS	Project V/C	Project LOS
Signalized						
1. El Camino Real/Millbrae Ave.	0.92	E	1.01	F	1.12	F
2. Rollins Rd./Millbrae Ave.	0.94	E	1.05	F	1.12	F
3. Old Bayshore Hwy./Millbrae Ave.	0.24	A	0.21	A	0.31	A
4. Rd. R-2/Rd. R-16/Hilton Hotel	0.24	A	0.21	A	0.26	A
5. Rds. R-20, R-22/Rd. R-18	0.24	A	0.24	A	0.31	A
6. Rd. R-3 (McDonnell)/Rd. R-18	0.28	A	0.20	A	0.37	A
7. Rd. R-3/UAL Cargo	0.15	A	0.15	A	0.19	A
8. Rd. R-3/Rd. R-6	0.25	A	0.19	A	0.38	A
9. S. Airport Blvd./San Bruno Ave.	0.39	A	0.39	A	0.53	A
11. N. Access Rd./N. Access Road E. (101/380 on-/off-ramp)	0.51	A	0.41	A	0.54	A
12. S. Airport Blvd./N. Access Rd. S. (101/380 off-ramp)	0.44	A	0.46	A	0.63	B
13. S. Airport Blvd./N. Access Rd. N. (101/380 on-ramp)	0.32	A	0.34	A	0.35	A
14. S. Airport Blvd./Belle Air Rd.	0.30	A	0.32	A	0.32	A
15. S. Airport Blvd./Utah Ave.	0.50	A	0.52	A	0.53	A
16. S. Airport Blvd./US 101 NB ramps/ Radisson Hotel	0.52	A	0.54	A	0.56	A
17. S. Airport Blvd./Gateway Blvd.	0.30	A	0.33	A	0.34	A
18. Airport Blvd./Produce Ave./ San Mateo Ave.	0.37	A	0.39	A	0.38	A
19. Airport Blvd./Grand Ave.	0.65	B	0.88	D	0.88	D
20. San Mateo Ave./San Bruno Ave.	0.59	A	0.52	A	0.56	A
21. El Camino Real/San Bruno Ave.	0.61	B	0.61	B	0.67	B
Unsignalized/a/						
22. California Dr./Millbrae Ave.		A/A		A/D		A/E
23. Rds. R-24, R-26/Rd. R-16/b/		> C		> C		< C
24. Rd. R-3/Rd. R-6		< C		> C		< C
25. Long-Term Parking/Rd. R-3		A/C		A/C		A/D

NOTE: > C = LOS C or better (e.g., LOS A, B or C); < C = LOS D or worse (e.g., LOS D, E or F). Intersection 10 in Figure 17, Section III.B, was counted for pedestrian volumes only, so does not appear in this table.

/a/ Unsignalized intersection levels of service reflect the delays from left-turning movements from the major street onto the minor street (the first letter), and from the minor street onto the major street (the second letter). They are based on the excess capacity available to make the indicated movement.

/b/ For multi-stop controlled intersections (3-way and 4-way stop signs), the 1985 *Highway Capacity Manual* specifies a total intersection approach volume that corresponds to LOS C.

SOURCE: DKS Associates.

TABLE 71: 2006 INTERSECTION LEVELS OF SERVICE IN THE VICINITY OF SFIA: NO-PROJECT ALTERNATIVE, VARIANT 1 - P.M. PEAK HOUR (Continued)

Intersection	1990 Existing V/C	1990 Existing LOS	No Project V/C	No Project LOS	Project V/C	Project LOS
Signalized						
1. El Camino Real/Millbrae Ave.	1.00	F	1.11	F	1.20	F
2. Rollins Rd./Millbrae Ave.	0.77	C	0.86	D	0.94	E
3. Old Bayshore Hwy./Millbrae Ave.	0.49	A	0.39	A	0.47	A
4. Rd. R-2/Rd. R-16/Hilton Hotel	0.42	A	0.39	A	0.42	A
5. Rds. R-20, R-22/Rd. R-18	0.23	A	0.23	A	0.34	A
6. Rd. R-3 (McDonnell)/Rd. R-18	0.32	A	0.23	A	0.42	A
7. Rd. R-3/UAL Cargo	0.18	A	0.18	A	0.24	A
8. Rd. R-3/Rd. R-6	0.28	A	0.19	A	0.28	A
9. S. Airport Blvd./San Bruno Ave.	0.39	A	0.35	A	0.42	A
11. N. Access Rd./N. Access Road E. (101/380 on-/off-ramp)	0.35	A	0.22	A	0.24	A
12. S. Airport Blvd./N. Access Rd. S. (101/380 off-ramp)	0.51	A	0.54	A	0.70	C
13. S. Airport Blvd./N. Access Rd. N. (101/380 on-ramp)	0.33	A	0.34	A	0.60	B
14. S. Airport Blvd./Belle Air Rd.	0.71	C	0.75	C	0.76	C
15. S. Airport Blvd./Utah Ave.	0.91	D/E	0.96	E	0.97	E
16. S. Airport Blvd./US 101 NB ramps/ Radisson Hotel	0.52	A	0.55	A	0.56	A
17. S. Airport Blvd./Gateway Blvd.	0.45	A	0.49	A	0.49	A
18. Airport Blvd./Produce Ave./ San Mateo Ave.	0.71	C	0.74	C	0.74	C
19. Airport Blvd./Grand Ave.	0.70	C	0.74	C	0.74	C
20. San Mateo Ave./San Bruno Ave.	0.69	B	0.65	B	0.71	C
21. El Camino Real/San Bruno Ave.	1.00	F	1.00	F	1.02	F
Unsignalized/a/						
22. California Dr./Millbrae Ave.		A/C		A/D		A/E
23. Rds. R-24, R-26/Rd. R-16/b/		> C		> C		< C
24. Rd. R-3/Rd. R-6		< C		> C		< C
25. Long-Term Parking/Rd. R-3		A/C		A/C		B/E

NOTE: > C = LOS C or better (e.g., LOS A, B or C); < C = LOS D or worse (e.g., LOS D, E or F). Intersection 10 in Figure 17, Section III.B, was counted for pedestrian volumes only, so does not appear in this table.

/a/ Unsignalized intersection levels of service reflect the delays from left-turning movements from the major street onto the minor street (the first letter), and from the minor street onto the major street (the second letter). They are based on the excess capacity available to make the indicated movement.

/b/ For multi-stop controlled intersections (3-way and 4-way stop signs), the 1985 *Highway Capacity Manual* specifies a total intersection approach volume that corresponds to LOS C.

SOURCE: DKS Associates.

- Air passengers would shift to the other two major commercial airports in the Bay Area, Oakland and San Jose. This would bring about an increase in congestion levels in these areas.

- This alternative would generate approximately 12,900 fewer daily, 600 fewer a.m. peak-hour and 650 fewer p.m. peak-hour trips relative to the project in 1996. This alternative would generate about 33,240 fewer daily, 1,530 fewer a.m. peak-hour and 1,860 fewer p.m. peak-hour trips relative to the project in 2006.

- Relative to the proposed project, highway congestion and transit use would not increase as much in 1996 and 2006. This alternative would degrade the p.m. peak hour levels of service below "D" at one intersection, whereas the project would degrade p.m. peak-hour levels of service below LOS "D" at three intersections in 2006.

There would be fewer aircraft and vehicle related emissions than with the project. See Table 72 for the aircraft emissions of this Alternative compared to the project.

Impacts from aircraft noise would be essentially the same with or without the project (or this alternative) in 1996. This would be due to existing noisier aircraft that would remain in operation under the project or this Alternative. The increased aircraft operations under the project would require additional aircraft; these additional aircraft are assumed to be newer and quieter than existing aircraft based on existing SFIA noise requirements. In 2006 there would be fewer aircraft noise impacts than with the project. By the year 2006, most aircraft operations under the project or this alternative would be performed by the newer, quieter aircraft (and the noise levels reflected in the CNEL contours would be caused primarily by these aircraft), because FAA regulations require a change to use of quieter Stage 3 aircraft by January 1, 2000. Under the project, there would be more operations by these aircraft than under this alternative. (See Figures 34 and 35, pp. 454-455, for the aircraft noise contours for 1996 and 2006, respectively).

Energy impacts would be less than with the project because there would be less construction, there would be less building area to heat, cool and light, and there would be fewer vehicle (including aircraft) trips than with the project.

There could potentially be fewer cultural resource impacts due to this alternative, compared to the project. This is because there would be less excavation for construction or demolition than with the project.

TABLE 72: ESTIMATED AIRCRAFT EMISSIONS AT SFIA, 1990-2006

		Emissions by Alternative (lb/day)/a,b/				
		1990	1996	1996	2006	2006
Pollutant	LTO Phase	Existing	No Project	Project	No Project	Project
CO	Taxi / Idle	23,600	36,000	44,600	27,700	57,600
	Takeoff	100	100	100	100	100
	Climbout	400	400	400	300	400
	Approach	1,900	1,800	2,000	1,400	1,600
	TOTAL/c/	26,000	38,300	47,100	29,500	59,800
NO_X	Taxi / Idle	1,800	2,900	3,700	2,700	6,200
	Takeoff	3,300	3,700	4,400	3,400	4,200
	Climbout	6,600	7,500	8,800	6,900	8,700
	Approach	1,900	2,200	2,500	2,100	2,600
	TOTAL/c/	13,600	16,200	19,400	15,100	21,700
HC	Taxi / Idle	8,800	13,100	16,000	9,400	19,700
	Takeoff/d/	--	--	--	--	--
	Climbout	100	100	100	100	100
	Approach	200	300	300	200	300
	TOTAL/c/	9,200	13,400	16,300	9,700	20,100

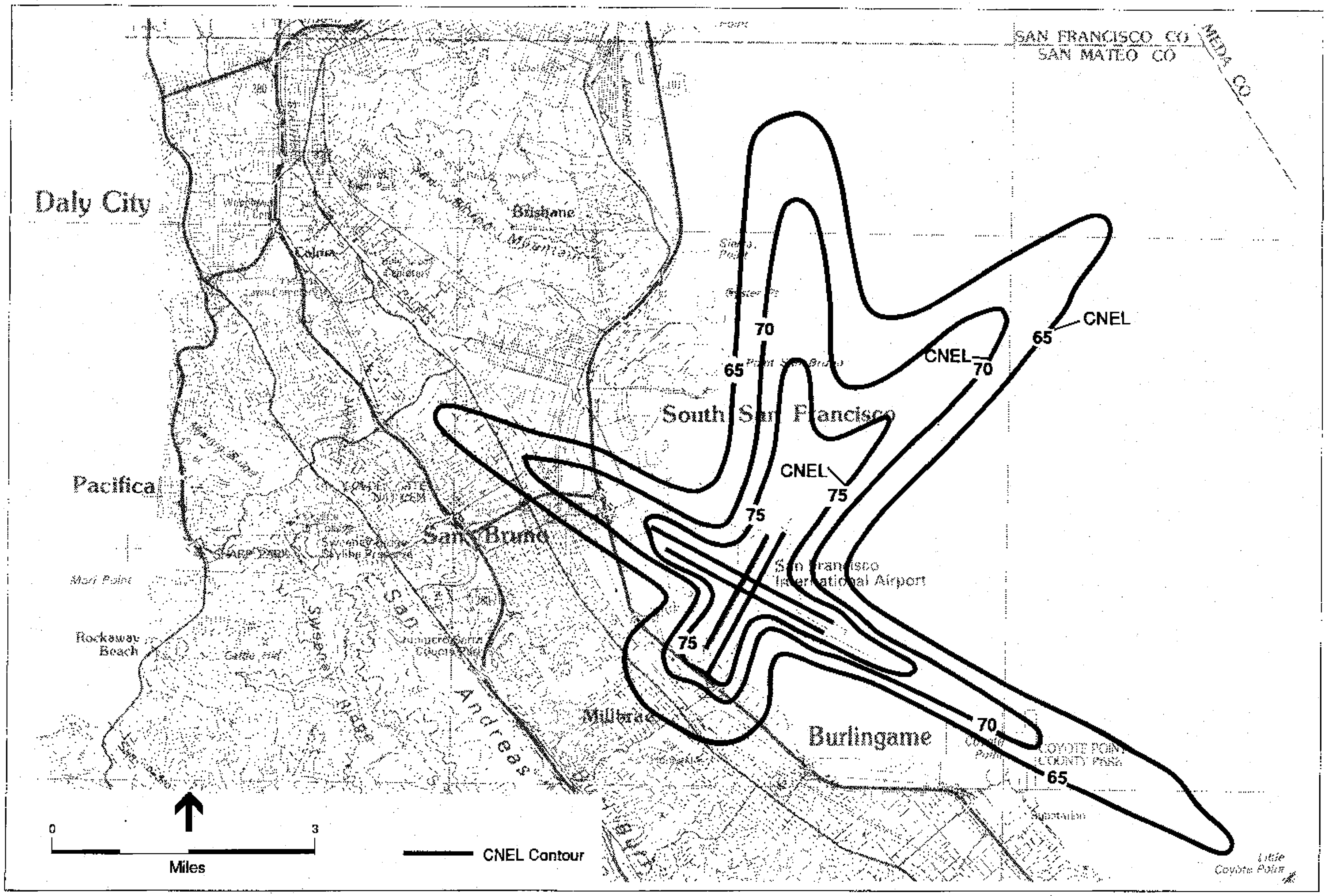
/a/ The existing and future air carrier fleet mix was determined by Ken Eldred Engineering, Inc., and the commuter, general aviation, and military fleet mixes were estimated by Environmental Science Associates, Inc. No data on the 1990 SFIA fleet mix are available yet, so the 1990 fleet mix is based on 1989 operations data. Emission rates and engine types for each aircraft were obtained from one of two sources. The EPA's AP-42 contained emission rates for older aircraft (pre-1985) such as the DC10, and Nick Krull of the Federal Aviation Administration (FAA) provided the remaining factors for the more recent and under-construction aircraft that were not supplied in AP-42, such as the MD11 and the A330/340. Data supplied by Mr. Krull were originally provided to the International Civil Aviation Organization by the engine manufacturer and have not been validated by the FAA. When no data for a particular engine were available, emission rates from a similar engine were assumed.

/b/ Estimates rounded to the nearest 100 lbs/day.

/c/ Estimates may not add due to rounding.

/d/ Each of these amounts was less than 50 lbs/day.

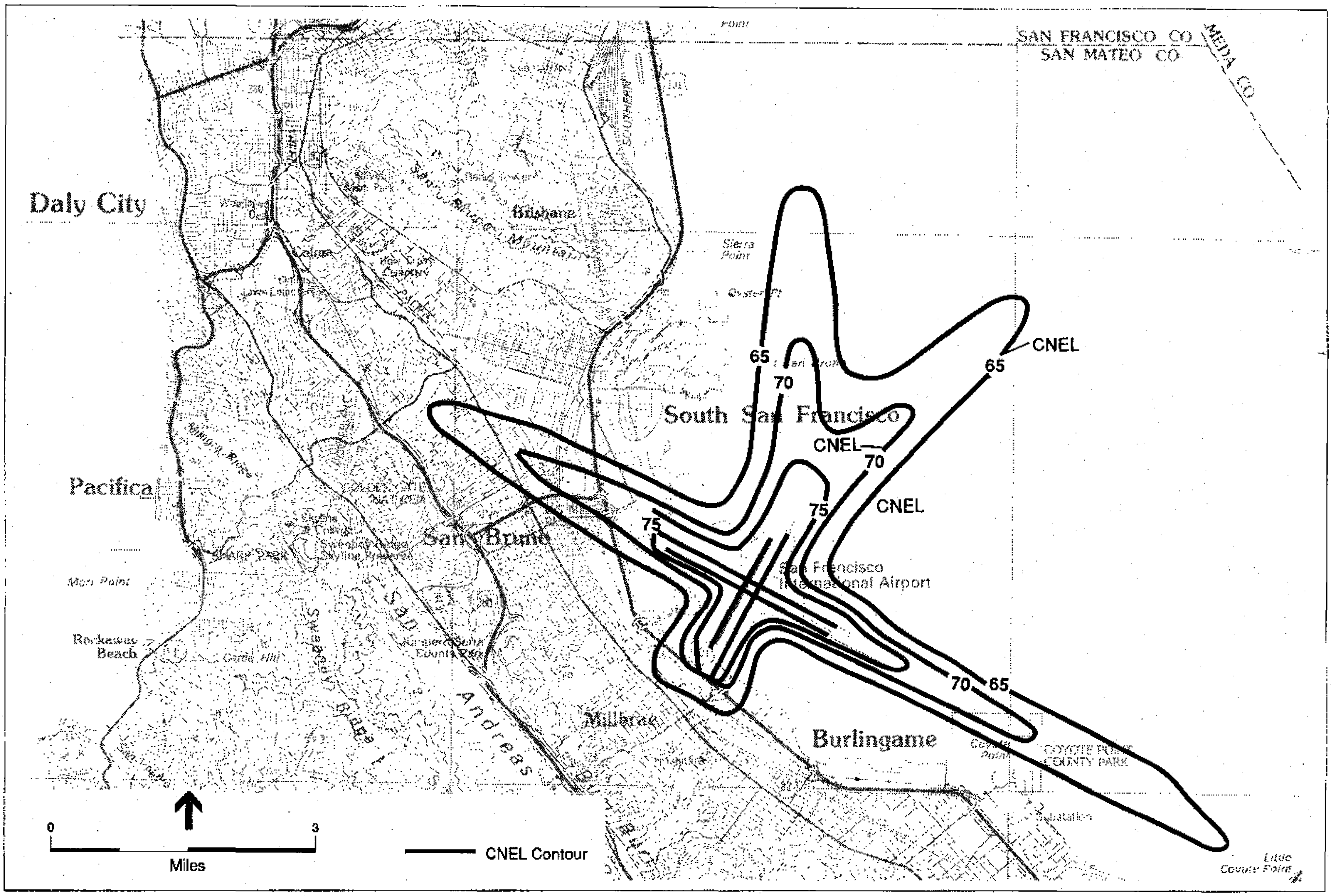
SOURCE: Environmental Science Associates, Inc.



SOURCE: Ken Eldred Engineering and Environmental Science Associates, Inc.

San Francisco International Airport

Figure 34
1996 No Project Alternative
Aircraft Noise Contours



SOURCE: Ken Eldred Engineering and Environmental Science Associates, Inc.

San Francisco International Airport ■

Figure 35
2006 No Project Alternative
Aircraft Noise Contours

There would potentially be fewer hazardous materials impacts due to this alternative, compared to the project. This is because there would be less aviation fuel used and less maintenance of aircraft than with the project.

Employment would increase by 2,540 people compared to 4,600 people for the project by 1996 and 2,680 people compared to 9,000 people for the project by 2006. This would create a demand for 1,810 housing units compared to 4,610 housing units by 1996 and 1,970 units compared to 8,970 housing units by 2006.

There would be fewer impacts on utilities and public services than with the project because there would be fewer passengers, employees, and aircraft operations. There would be fewer impacts under aviation safety because these impacts are based on total flight operations.

Reasons for Rejection

The sponsor has chosen the Draft SFIA Master Plan as its preferred alternative instead of this alternative because the alternative would not meet the sponsor's objective to accommodate the demand from forecast growth in an orderly manner.

NO-PROJECT ALTERNATIVE, VARIANT 2 (near-no-growth)

Description

As under Variant 1, no new facility construction, except that which has been approved under the SFIA Five-Year Capital Projects Plan, would occur under No-Project Alternative, Variant 2. The impact evaluation is based on annual passenger levels recommended by the 1980 *Regional Airport Plan* (*RAP*), prepared by the Metropolitan Transportation Commission (MTC) and the Association of Bay Area Governments (ABAG)./4/ The RAP recommends a policy limit of 31 million annual passengers (MAP); a similar level (32.1 MAP) is recommended by the 1989 *California Aviation System Plan* (*CASP*), prepared by Caltrans Division of Aeronautics./5/ Existing passenger load is about 30 million annual passengers.

Future cargo and mail tonnage were not forecast for the No-Project Alternative, Variant 2; 1990 levels are assumed for both 1996 and 2006. Air carrier operations forecasts developed by Ken Eldred Engineering for this variant are based on 1990 passenger levels (approximately 30 million annual passengers) and load factor (55.23%). The Ken Eldred Engineering No-Project, Variant 2 air carrier forecasts for 1996 and 2006 reflect only the fleet changes likely to occur through the retirement of aircraft. A moderate decline in air carrier operations could occur as larger aircraft replace those to be retired./6/ Future commuter, General Aviation and military aircraft operations were not forecast for this variant and are assumed to remain at 1990 levels. These descriptive criteria are compared with SFIA Master Plan forecasts in Tables 73 and 74.

Impacts

Impacts associated with aviation activity under Variant 2 of the No-Project Alternative would be similar to impacts of current landside operations at SFIA, combined with a potential reduction in air carrier operations. Impacts of demolition and construction associated with SFIA Master Plan projects, except those approved under the 1989 SFIA Capital Projects Plan, would be avoided under the No-Project Alternative, Variant 2. Impacts associated with potential unserved demand (under this scenario, the difference between SFIA Master Plan "unconstrained" forecasts and near-no-growth in all aviation activity categories) are discussed qualitatively under the Offsite Alternative.

The impacts of the No-Project Alternative - Variant 2 would be similar to the 1996 and 2006 Base Traffic scenarios discussed in Chapter IV, Impacts. This alternative would have approximately nine percent (or one-eleventh) of the proposed project's impact in 1996. It would have approximately five percent (or one-twentieth) of the proposed project's impact in 2006.

There would be fewer aircraft and vehicle related emissions than with the project or with Variant 1.

Impacts from aircraft noise would be less than with the project or with Variant 1 for both 1996 and 2006. Even with the project, aircraft noise impacts would decrease due to quieter aircraft that will be used in the future. With Variant 1, noise impacts would further decrease from project impacts, and with Variant 2, noise impacts would decrease even more.

TABLE 73: NO-PROJECT ALTERNATIVE (VARIANT 2) COMPARED TO MASTER PLAN: NEAR-TERM (1990-1996)/a/

	Actual 1990	No-Project Variant 2 Forecast 1996	No-Project Variant 2 Net Change 1990-1996 /b/	Total Master Plan Forecast 1996	Total Master Plan Net Change 1990-1996 /b/	Comparison of No-Project Alternative (Variant 2) With Near-Term Master Plan
Total Annual Passengers	29,939,835 /c	31,000,000 /d	+1,060,000	42,280,000 /e/	+12,340,000	Annual passengers would increase by about 4% under the No-Project Alternative, Variant 2 compared to about 41% under the Near Term Master Plan.
Total Cargo and Mail Tonnage	558,078 /c/	558,078	0	735,872 /f/	+177,790	Cargo tonnage would increase by about 32% under the Near Term Master Plan. Comparative No-Project, Variant 2 figures are unavailable; this EIR assumes 0% growth in cargo tonnage.
Annual Aircraft Operations /g/						
Air Carrier	302,460 /h/	295,650 /l/	-6,810	375,105 /m/	+72,645	Air carrier operations would decline by about 2% under the No-Project Alternative, Variant 2 compared to an increase of about 24% under the Near Term Master Plan. Forecasts of commuter, general aviation and military operations under this variant are unavailable; operations in these categories are assumed to remain unchanged. Total operations would decline by about 2% under the No-Project Alternative, Variant 2 compared to an increase of about 16% under the Near Term Master Plan.
Commuter	87,266 /i/	87,266 /i/	0	91,700 /n/	+4,400	
General Aviation	35,132 /j/	35,132 /j/	0	27,300 /n/	-7,800	
Military	2,617 /c/	2,617 /c/	0	2,700 /n/	0	
Total	427,475 /k/	420,665 /l/	-6,810	496,805 /n/	+69,000	

(Continued)

● TABLE 73: NO-PROJECT ALTERNATIVE (VARIANT 2) COMPARED TO MASTER PLAN: NEAR-TERM (1990-1996)/a/ (Continued)

	Actual 1990	No-Project Variant 2 Forecast 1996	No-Project Variant 2 Net Change 1990-1996 /b/	Total Master Plan Forecast 1996	Total Master Plan Net Change 1990-1996 /b/	Comparison of No-Project Alternative (Variant 2) With Near-Term Master Plan
Building Area (Square Feet)	8,197,683 /o/	New construction limited to SFIA Five-Year Capital Projects Plan /p/		10,702,137 /q/	+2,504,450	SFIA Capital Plan projects would be implemented under both Near Term Master Plan and No-Project Alternative, Variant 2. Whereas no additional construction would occur under the No-Project Alternative, Variant 2, SFIA building area (excluding parking garages and proposed Ground Transportation Center) would increase by about 31% under the Near Term Master Plan.

NOTES - TABLES 73 and 74:

/a/ No-Project Alternative, Variant 2 is based on a minimal passenger growth scenario, as recommended by the 1980 *Regional Airport Plan* (*RAP*) of the Metropolitan Transportation Commission (MTC) and the *California Aviation System Plan* (*CASP*) of the Caltrans Division of Aeronautics. These agencies recommend annual passenger levels at SFIA of 31,000,000 and 32,149,000, respectively; the MTC figure is used here.

/b/ Each "Net Change" difference or sum is rounded to reflect accuracy of the forecast figure(s) from which it was derived. Columns may not add due to rounding. Forecast annual aircraft operations totals are similarly rounded to reflect least accurate component forecasts.

/c/ From "San Francisco International Airport Comparative Traffic Report," December 1989. Note: passenger figure represents total enplaned and deplaned passengers, including transfers. 1989 "Total Terminal Passengers," which includes "through" passengers, was approximately 560,580 (about 2%) greater.

/d/ *Regional Airport Plan*, Metropolitan Transportation Commission, 1980.

/e/ From Table 7.2, *SFIA Final Draft Master Plan*, 1989.

/f/ From Tables 7.7 - 7.11, *SFIA Final Draft Master Plan*, 1989.

/g/ Aircraft operations include all takeoffs and landings. Air carrier operations, as defined by SFIA, are scheduled commercial jet operations. Commuter operations, as defined by SFIA, are "the operations of the trunk carriers' subsidiary airlines operating primarily turbo-prop aircraft." These operations are accounted for at SFIA by two carriers: United Express (affiliated with United Airlines) and American Eagle (affiliated with American Airlines). FAA defines commuter/regional carriers as those which "operate aircraft with a maximum of 60 seats, provide at least five round trips per week between two or more points, or carry mail" (FAA "Terminal Area Forecasts, FY 1989 - 2005," Appendix B). General Aviation operations at SFIA are those utilizing the Fixed Base Operator (FBO) and Chevron Corporation facilities for agricultural, industrial, recreational, air charter, air ambulance service, aerial photography, police patrol, fire control or Federal, State and local government aviation. Almost all military aircraft operations at SFIA are accounted for by U.S. Coast Guard helicopter activities.

TABLES 73 and 74 NOTES, (Continued)

/h/ 1989 air carrier operations total of 302,460 is from 1989 SFIA landing fee reports, which are based on fees paid to SFIA by runway users. SFIA landing fee report air carrier figures are about 2% lower than the FAA tower counts used in the SFIA Comparative Traffic Reports (the latter reported 309,126 air carrier operations for 1989). The SFIA landing fee report figure is cited here because it is used in SFIA Noise Abatement Program reports to the State, and because it is the basis of constrained and unconstrained fleetmix forecasts generated by Ken Eldred Engineering (KEE) for this EIR (conversation with Ken Eldred, August 1, 1990).

/i/ 1989 commuter operations total of 87,266 is from letter dated July 14, 1990 from John Costas, SFIA, and matches the 1989 SFIA landing report figure. The 1989 commuter operations total from FAA tower counts, as reported in the "San Francisco International Airport Comparative Traffic Report," December 1989, was 83,595, which is approximately 4% less than the landing fee report figure. This discrepancy may derive from miscategorization of commuter and air carrier operations; as noted above, the 1989 FAA tower report air carrier figure is greater than the landing report air carrier figure. When air carrier and commuter figures from the respective reports are added, the discrepancy between the two sources is 2,995 operations, or about 0.8% of the total (letter dated July 20, 1990 from Ken Eldred).

/j/ 1989 General Aviation total, from FAA tower counts reported in the December 1989 SFIA Comparative Traffic Report, was 32,137. To reconcile total operations by category with FAA tower counts, the 2,995 operations noted above have been added to the General Aviation category, bringing it to an estimated 35,132 operations in 1989 (as recommended in letter dated August 2, 1990 from Ken Eldred).

/k/ San Francisco International Airport Comparative Traffic Report, December 1989.

/l/ 1996 No-Project, Variant 2 forecasts of air carrier operations were derived by KEE from actual 1989 SFIA fleetmix data, FAA national fleetmix forecasts, and actual 1989 passenger and aircraft load factors. The forecast contains only the fleet changes that occur through replacement of retired aircraft (letter dated August 2, 1990 from Ken Eldred). Total combines KEE air carrier forecast and actual 1989 figures for the other categories.

/m/ 1996 and 2006 SFIA Master Plan forecasts of air carrier operations were derived by KEE from actual 1989 SFIA fleetmix data, FAA national fleetmix forecasts, and SFIA Draft Master Plan "unconstrained" passenger forecasts and aircraft load factor forecasts (letter dated July 20, 1990 from Ken Eldred).

/n/ SFIA Master Plan commuter, General Aviation and military aircraft operations forecasts from July 14, 1990 letter from John Costas, SFIA. The total is a combination of these figures and KEE air carrier operations forecast.

/o/ Existing facility area total is from EIR Project Description Table 3, based on SFIA Master Plan Table 6.3 and updated facility information from SFIA.

/p/ SFIA Capital Projects Plan, September 1989. Capital projects included in the SFIA Master Plan are listed in EIR Project Description Table 2.

/q/ 1996 and 2006 facility area totals are from EIR Project Description Tables 4 and 5, based on SFIA Master Plan Table 12.5 and updated Master Plan information from SFIA.

SOURCES: U.S. Department of Transportation, Federal Aviation Administration, April 1989; Ken Eldred Engineering, 1990; Caltrans Division of Aeronautics, 1989; SFIA Airports Commission, 1990; Environmental Science Associates, Inc., 1990.

TABLE 74: NO-PROJECT ALTERNATIVE (VARIANT 2) COMPARED TO TOTAL MASTER PLAN: TOTAL (1990-2006)/a/

	Actual 1990	No-Project Variant 2 Forecast 2006	No-Project Variant 2 Net Change 1990-2006 /b/	Total Master Plan Forecast 2006	Total Master Plan Net Change 1990-2006 /b/	Comparison of No-Project Alternative (Variant 2) With Total Master Plan
Total Annual Passengers	29,939,835 /c/	31,000,000 /d/	+1,060,000	51,330,000 /d/	+21,390,000	Annual passengers would increase by about 4% under the No-Project Alternative, Variant 2 compared to about 71% under the Total Master Plan.
Total Cargo and Mail Tonnage	558,078 /c/	558,078 /c/	0	865,404 /e/	+307,330	Cargo tonnage would increase by about 55% under the Total Master Plan. Comparative No-Project, Variant 2 figures are unavailable; this EIR assumes 0% growth in cargo tonnage.
Annual Aircraft Operations /g/						
Air Carrier	302,460 /h/	286,489 /l/	-15,960	411,560 /m/	+109,100	Air carrier operations would decline by about 5% under the No-Project Alternative, Variant 2 compared to an increase of about 36% under the Total Master Plan. Forecasts of commuter, General Aviation and military operations under this variant are unavailable; operations in these categories are assumed to remain unchanged. Total operations would decline by about 4% under the No-Project Alternative, Variant 2 compared to an increase of about 26% under the Total Master Plan.
Commuter	87,266 /i/	87,266 /i/	0	100,000 /n/	+12,700	
General Aviation	35,132 /j/	35,132 /j/	0	24,200 /n/	-10,900	
Military	2,617 /c/	2,617 /c/	0	2,700 /n/	0	
Total	427,475 /k/	411,504 /l/	-15,960	538,000 /n/	+110,000	

(Continued)

TABLE 74: NO-PROJECT ALTERNATIVE (VARIANT 2) COMPARED TO TOTAL MASTER PLAN: TOTAL (1990-2006)/a/ (Continued)

	Actual 1990	No-Project Variant 2 Forecast 2006	No-Project Variant 2 Net Change 1990-2006 /b/	Total Master Plan Forecast 2006	Total Master Plan Net Change 1990-2006 /b/	Comparison of No-Project Alternative (Variant 2) With Total Master Plan
Building Area (Square Feet)	8,197,683 /o/	New construction limited to SFIA SFIA Capital Plan Projects Plan /p/		11,068,250 /q/	+2,870,570	SFIA Capital Plan projects would be implemented under both the Total Master Plan and No-Project Alternative, Variant 2. Whereas no additional construction would occur under the No-Project Alternative, Variant 2, SFIA building area (excluding parking garages and proposed Ground Transportation Center) would increase by about 35% under the Total Master Plan.

NOTES:

See Table 73.

Energy impacts would be less than with the project or with Variant 1 of this alternative because there would be less construction, there would be less building area to heat, cool and light, and there would be fewer vehicle (including aircraft) trips than with the project or with Variant 1.

There would be fewer cultural resource impacts due to this alternative compared to the project or with Variant 1 of this alternative because there would be less excavation for construction or demolition than with the project or with Variant 1.

Employment would increase by 310 people compared to 4,600 people by 1996 and 610 compared to 9,000 people by 2006. This would create a demand for 220 housing units compared to 4,600 housing units by 1996 and 450 compared to 8,900 housing units units by 2006.

There would be fewer impacts on utilities and public services than with the project. It would not be necessary to increase the sanitary sewer plant as would be required for the project.

Some impacts, such as traffic, employment and housing demand, energy and possibly noise could shift to other Bay Area airports that would absorb some of the demand not served by SFIA under Variant 2. Traffic impacts could be as severe in Oakland and San Jose areas, as freeways in those areas (I-880, I-280 and US101) are congested during peak periods. Housing demand could also be as severe in those areas.

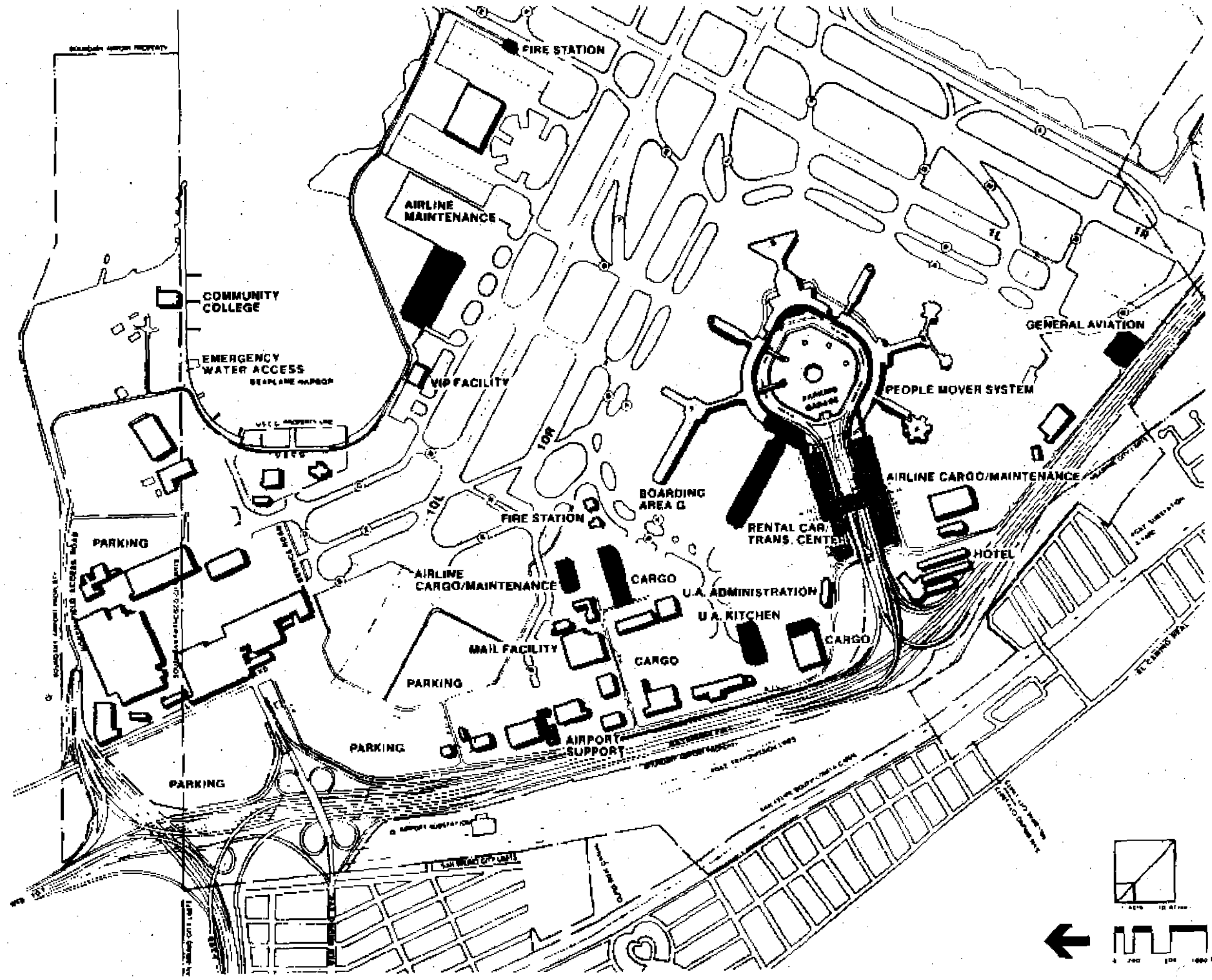
<u>Reasons for Rejection</u>

The sponsor has chosen the SFIA Master Plan for analysis as the preferred project instead of this alternative because the alternative would not accommodate the demand from forecast growth.

B. <u>ONSITE ALTERNATIVE</u> (reduced-intensity SFIA landside development)

<u>Description</u>

This Project Alternative is similar to the "Preferred Concept Plan" in SFIA Master Plan Working Paper B except that this Alternative would provide no parking west of Bayshore. This Alternative is hereinafter also referred to as the "Onsite Alternative," and is illustrated in Figures 36 and 37, pp. 464-465./7/

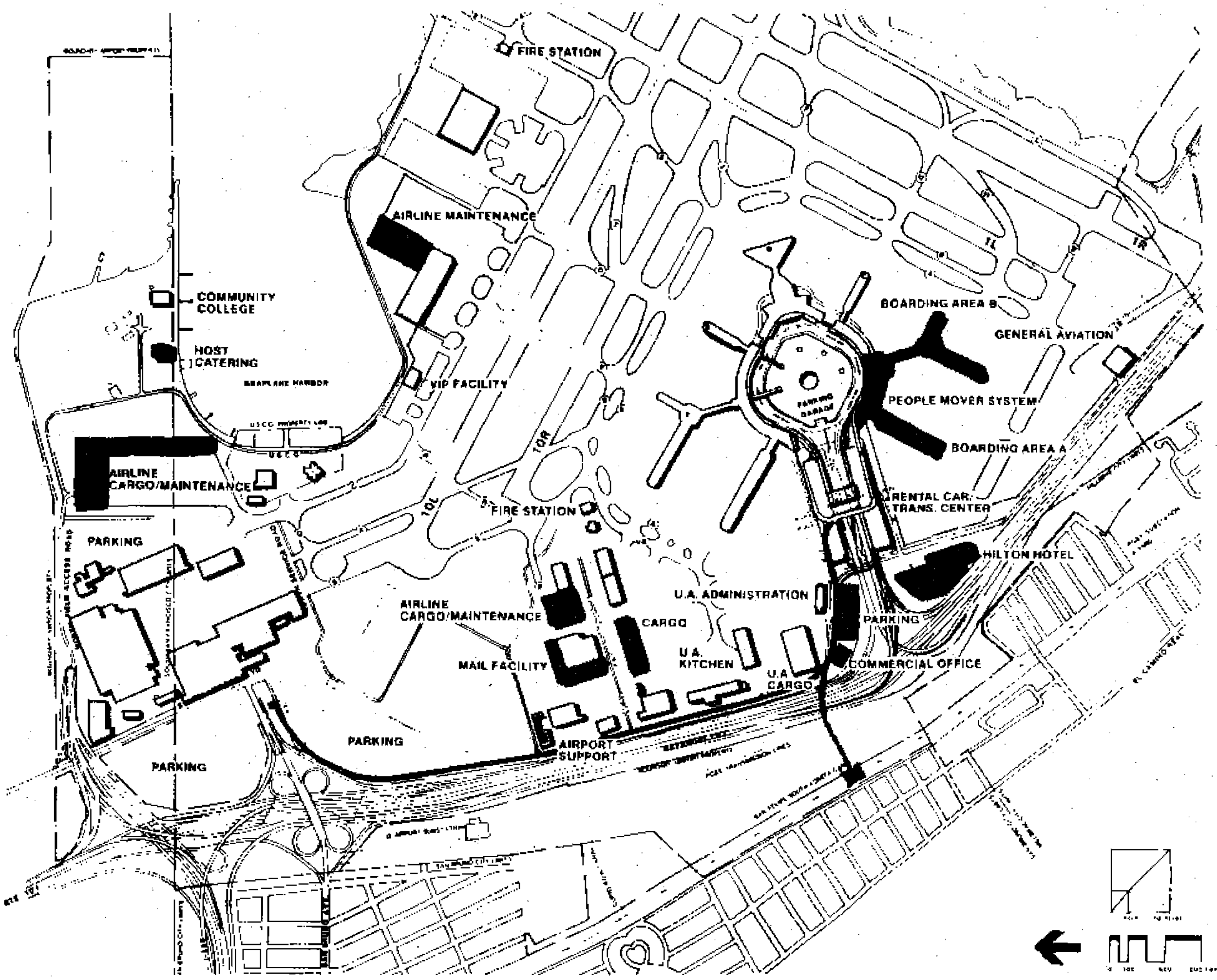


	PREFERRED CONCEPT
AIRFREIGHT AREA	
Total Cargo Area	1,110,643
Mail	200,000
Total Airfreight	1,310,643
AIRLINE MAINTENANCE	
General	1,227,915
MOC	2,870,950
Total Airline Maintenance	4,098,865
AVIATION & TERMINAL SUPPORT	
Catering	126,690
Airline Administration	126,068
Miscellaneous Support	
Total Aviation & Terminal Support	252,750
GENERAL AVIATION	
FBO & GA Hanger	90,000
AIRPORT SUPPORT	
Airport Administration	90,000
Maintenance Area	106,000
CFR	52,000
Airport Police	6,000
Educational	26,000
Total	280,000
TENANT PARKING	
Short-Term	9,200
Long-Term	5,880
Private	5,218
Total Public	20,298
CITY PARKING	
Total	3,910
RENTAL CAR	
Total	2,610
MISCELLANEOUS	
Vans, Bus, etc	300

■ Facilites Included in Alternative

SOURCE: San Francisco International Airport Master Plan, Working Paper B

Figure 36
Onsite Alternative
Near-Term



AIRFREIGHT AREA	PREFERRED CONCEPT
Total Cargo Area	1 197 038
Mail	220 000
Total Airfreight	1 417 038
AIRLINE MAINTENANCE	
General	1 170 740
MOC	2 946 550
Total Airline Maintenance	4 126 290
AVIATION & TERMINAL SUPPORT	
Catering	95 000
Airline Administration	192 216
Miscellaneous Support	
Total Aviation & Terminal Support	287 216
GENERAL AVIATION	
FBO & GA Hangar	90 000
AIRPORT SUPPORT	
Airport Administration	100 000
Maintenance Area	142 000
CFR	52 000
Airport Police	7 000
Educational	26 200
Total	327 200
TENANT PARKING	
Short Term	10 480
Long Term	8 355
Private	5 218
Total Public	24 053
CITY PARKING	
Total	13 701
RENTAL CAR	
Total	3 000
MISCELLANEOUS	
Vans, Bus, etc.	300

■ Facilites Included in Alternative

SOURCE: San Francisco International Airport Master Plan, Working Paper B

San Francisco International Airport ■

Figure 37
Onsite Alternative
Long-Term

The *Working Paper B* Preferred Concept Plan would not include a new international terminal and, overall, would require less demolition and construction than would the project. Operationally, however, impacts of the Onsite Alternative are based on the same passenger, cargo and aircraft operations forecasts as the SFIA Master Plan (see Tables 68 and 69, pp. 441-446)./8/

The Onsite Alternative and the SFIA Master Plan are both based on SFIA consultants' projections of future demand for airport facilities as well as analysis of ways to improve current operations. According to SFIA projections, the existing International Terminal and Boarding Area "D" would not meet future demand for gates capable of servicing increased numbers of larger aircraft, nor accommodate anticipated increases in international passenger activity and associated Federal Inspection Service (FIS) space requirements./7/

In contrast to the SFIA Master Plan, which proposes to construct a new International Terminal and boarding areas, the Onsite Alternative proposed to convert a portion of the existing adjacent domestic Boarding Area "E" to international use and construct a new Boarding Area "G" to accommodate the displaced domestic passenger and gate capacities. This proposal would require a means of conveyance for passengers and baggage among the boarding areas, ticket counters and customs areas. Concerns about the feasibility and cost effectiveness of a conveyance system contributed to SFIA's rejection of the Onsite Alternative in favor of the SFIA Master Plan.

Other aspects of the Onsite Alternative, such as consolidation of freight and maintenance functions, are similar to those in the SFIA Master Plan in their objectives and magnitude. A similar set of demolition projects would occur under both the project and the Onsite Alternative. Like the SFIA Master Plan, the near-term Onsite Alternative would include construction of a Rental Car Garage / Ground Transportation Center, demolition and construction of new, larger Boarding Areas "A" and "B," and construction of East Field Cargo / Maintenance and North Field Cargo / Maintenance buildings. General aviation hangers, tie-downs and related facilities would be relocated to the southwest corner of the SFIA property./7/

A second Onsite Alternative, incorporating proposed SFIA runway expansions, is not included in this EIR. A preliminary feasibility study for the expansion of SFIA runways, completed in June 1990, includes proposed new runway locations that could conflict with existing uses and proposed SFIA Master Plan projects in the East Field area./9/ Proposals have not been developed based on the feasibility study, nor have SFIA staff proposed to revise the draft SFIA Master Plan to accommodate any of the study's runway locations. Any future proposed runway expansions would require separate environmental review under the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA), and separate approval by the FAA, the Bay Conservation and Development Commission (BCDC) and other agencies that would not be involved in review and action on the landside SFIA Master Plan.

Runway expansion proposals are not included in the SFIA Master Plan because, as stated in its Introduction, "the master plan process addresses airside development only to the extent of its impact on landside constraints and opportunities." According to SFIA, this means that the existing airfield could accommodate SFIA Master Plan-related growth and "doesn't impose a significant constraint or opportunity on the landside plan."/8/ Although runway expansions could potentially mitigate some impacts of SFIA Master Plan projects (for example, by reducing noise impacts on airport environs from SFIA flight operations, and reducing fuel consumption and aircraft emissions associated with aircraft delays), such expansions are not analyzed as Project Alternatives in this EIR. Runway expansions are, however, noted as a potential mitigation measure for SFIA Master Plan aircraft noise impacts; potential adverse impacts of such expansions are discussed briefly in that context.

Impacts

Transportation, noise, air quality, energy, cultural resources, geology, seismicity, hazardous materials and aviation safety impacts would be essentially the same as for the project. There would probably be about the same number of employees, resulting in the same housing demand as with the project. There would probably be fewer construction noise and construction-related air quality impacts than with the project because this Alternative would not include construction of a new International Terminal. Sensitive noise receptors would not be affected for as long as they would be with the project. Utilities and public service impacts would be the same as for the project.

Reasons for Rejection

The sponsor has preliminarily rejected an alternative similar to this one (except for parking provided on the west of Bayshore parcel) during the Master Planning process because it would not meet the sponsor's objective to accommodate the demand from forecast growth in an orderly manner. Without the new International Terminal, crowded conditions could result in the Customs and International Terminal areas. The resultant number of of aircraft gates would be marginal in satisfying forecast demand; and the total available terminal area would be incapable of modification to incorporate an expanded Federal Inspection Service two-stop inspection area. Also contributing to the Airports Commission's preference for the Master Plan over the Onsite Alternative are security concerns and potential patron inconvenience, since some international passengers would be required to travel between the converted international Boarding Area E and the existing international Boarding Area D for customs checks.

C. OFFSITE ALTERNATIVE

Description

Under the range of Offsite Alternatives, potential demand for aviation activity at SFIA not served under the No-Project Alternative variants would be redistributed to other airports (including to local military aviation facilities that could be converted to passenger use and to a potentially newly constructed Bay Area airport) and transportation modes (intercity rail), or would remain unserved. As illustrated in the discussion of No-Project Alternative variants as well as in the discussion of SFIA Master Plan forecasts in Chapter II. Project Description, the amount of unserved demand that could result from not implementing the SFIA Master Plan varies according to forecast assumptions.

Redistribution of aviation demand from SFIA to other airports is recommended by MTC, Caltrans Division of Aeronautics, FAA and the other Bay Area air carrier airports (Metropolitan Oakland International and San Jose International). These agencies differ from SFIA and from one another in their forecasts of future passenger, cargo and aircraft operations, estimates of available and future airport capacities, and recommended actions to best accommodate demand and increase capacities. FAA and

Caltrans assumptions and recommendations for redistribution of future aviation demand in the Bay Area are included in Appendix B. Comparative passenger and aircraft operations levels at San Francisco Bay Area air carrier airports (existing and forecast), and existing terminal and airfield capacities, are presented in Section IV.A. Land Use, Tables 25 and 26, pp. 263-264. Historical passenger share of Bay Area air carrier airports by percentage is shown in Table 75.

As would SFIA, other Bay Area airports would have specific constraints and potential environmental impacts associated with either landside or airside expansion. The offsite expansions summarized and referenced in this EIR would not be exclusively caused by redistribution of demand from SFIA. Potential environmental impacts of action plan recommendations, many of which would require FAA and BCDC approval, airline policy decisions, and/or separate environmental review under CEQA and NEPA, are associated with the regional aviation system as a whole and are therefore addressed only qualitatively in this EIR.

As noted in Section IV.A. Land Use and Plans, MTC is currently updating its Regional ● Airport System Plan (RASP). Although the Regional Airport System Plan is not due for completion until Spring of 1992, MTC and its consultant, TRA, have generated a preliminary range of alternatives for addressing future regional aviation requirements. MTC's Preferred Alternative, when available, will likely provide the most feasible model for an Offsite EIR Alternative to the SFIA Master Plan. This EIR summarizes the MTC "Preliminary Definition of Air Carrier Airport Alternatives" and qualitatively addresses the impacts of potential unserved demand associated with not implementing the SFIA Master Plan. MTC's preliminary definition includes five categories, from which various elements may be selected ultimately to produce the MTC RASP Preferred Alternative./10/ The five categories are No Action, Airport System Management (ASM), Air Carrier Airport Master Plans, Airport System Optimization and New Technology.

"1. <u>NO ACTION</u>

> "This alternative provides the baseline for comparison of all other alternatives. It is based on the assumption that no additional airside, landside, or ground access capacity is built at the five existing air carrier airports. It also assumes that no major operational or other system management actions are taken, either by the airports, the FAA, the airlines, or other parties.

TABLE 75: HISTORICAL PASSENGER SHARE (PERCENTAGES), BAY AREA AIR CARRIER AIRPORTS, 1960-1990

Year	San Francisco Int'l	Metro. Oakland Int'l	San Jose Int'l	Buchanan Field	Sonoma County	Total
1960	91.8%	6.6%	1.6%	0.0%	0.0%	100.0%
1965	89.0%	9.9%	1.1%	0.0%	0.0%	100.0%
1970	79.2%	11.7%	9.1%	0.0%	0.0%	100.0%
1975	78.3%	10.6%	11.1%	0.0%	0.0%	100.0%
1980	80.1%	9.1%	10.8%	0.0%	0.0%	100.0%
1985	73.8%	12.2%	14.0%	0.0%	0.0%	100.0%
1990	70.7%	12.2%	16.5%	0.3%	0.3%	100.0%

SOURCES: Metropolitan Transportation Commission (MTC) and respective airport records; Environmental Science Associates, Inc.

"Alternative 1 does assume that existing construction projects which are contained in existing approved airport master plans, and which have received environmental approvals, will be built. These include the proposed runway extension at San Jose.

"The purpose of including this alternative is to allow us to evaluate what would happen if demand continues but no additional capacity is provided.

"Elements of the NO ACTION alternative include:

A. Approved projects
B. No other new runway capacity projects
C. No other terminal capacity projects
D. No major ground access improvement
E. No major transit improvements
F. All airport activity (passenger, GA, and cargo) would be constrained by existing facility capacity (including approved projects)
G. No major changes in airport traffic shares or airline scheduling

"Implications of the NO ACTION alternative:

A. Runway/airspace congestion and delay
B. Airport ground access constraints
C. Air fares (supply vs. demand)
D Environmental impacts"/10/

"2. AIRPORT SYSTEM MANAGEMENT (ASM)

"The ASM alternative would seek to maximize the existing airport system without major new construction by using a number of system management strategies aimed at matching supply and demand and making maximum use of existing facility capacity. This alternative would depend on increased cooperation between the airports and the airlines.

"Elements of the ASM strategy include:

A. FAA capacity-increasing measures, including
   - Reduced lateral separation
   - Reduced in-trail separation
   - Airspace improvements
B. Fleet-mix changes (by airlines)
C. Schedule changes (by airlines)
D. Airport congestion pricing (by airports)
E. Some market share shifts between airports to make use of under-utilized capacity (by airlines)
F. Expanded use of Buchanan Field / Sonoma County Airports up to locally approved commercial flight limits
G. Joint use of existing military airports (e.g., Travis AFB)
H. Development of reliever General Aviation airports
I. Improved ground access

"Implications of the ASM alternative:

A. Timing of FAA capacity improvement measures
B. Airport cooperation
C. Airline cooperation
D. Air fares (supply vs. demand)
E. Transit improvements to airports (exclusive of new fixed rail)
F. Joint use agreements with military"/10/

"3. MASTER PLANS

"This alternative would consist of full airport system buildout based upon the most recent airport master plan concepts. Capacity improvements to the airside, landside, and ground transportation systems would be built consistent with these plans. One function of this alternative will be to evaluate whether the five airport master plans will efficiently accommodate regional air travel demand from a capacity and environmental perspective.

"Elements of the MASTER PLANS alternative:

A. Increased runway capacity (OAK)
B. Increased terminal capacity (OAK, SFO, SJC)
C. Increased landside facility capacity (parking, curb space, internal roadway)
D. Mass transit improvements (fixed rail connections)
E. Reduced General Aviation use of air carrier airports (OAK, SJC)
   - GA-based aircraft fleet mix
   - GA-operations fleet mix

"Implications of the MASTER PLAN alternative:

A. Timing and funding
B. Airspace/runway capacity/delay
C. Funding for mass transit improvements
D. Environmental impacts
E. Impacts on general aviation (primarily at SJC, OAK) and development of reliever airports"/10/

"4. AIRPORT SYSTEM OPTIMIZATION

"This alternative would analyze the results of the Airport Master Plan alternative, and seek to correct any deficiencies or problems through the redistribution of air travel demand. The intent would be to optimize the performance of the airport system beyond the Airport Master Plans, if possible, from a variety of perspectives:

- passenger convenience
- airspace utilization
- airport ground access capacity
- environmental impacts
- airline cost
- etc.

"Subalternatives may include analysis of additional runway capacity at an existing air carrier airport, development of a major new air carrier airport, or increased scheduling of air carrier service to satellite General Aviation airports.

"Elements of the AIRPORT SYSTEM OPTIMIZATION alternative:

A. Potential capacity increases at SJC, OAK, SFO or a combination of these
B. Development of new airports (e.g., a new North Bay Airport)
C. New airline service at other General Aviation airports (e.g., Livermore, Napa, etc.)
D. Additional ground access improvements to support system optimization
E. Airspace/procedures improvements

"Implications of the AIRPORT SYSTEM OPTIMIZATION alternative:

A. Timing of new capacity/facilities
B. Funding source/operating agency (for new airport)
C. New General Aviation airport commercial airline service
D. Environmental impacts"/10/

"5. NEW TECHNOLOGY

"This alternative would focus on new air and rail technology to provide alternatives to the major expansion of the existing airport system. The alternatives include both aviation and non-aviation technology.

"Elements of the NEW TECHNOLOGY alternative:

A. Construction of high-speed rail (for California Corridor traffic)
B. Application of Tiltrotor technology (possibly directed to military or General Aviation airports)

C. Use of high-speed commercial transport aircraft
D. Use of future large aircraft

"Implications of the NEW TECHNOLOGY alternative:

A. Potential markets(s)
B. Degree of practical application
C. Effect on airport capacity and delay
D. Timing of new technology
E. Environmental impacts
F. New airport development financing
G. New airspace procedures"/10/

Impacts

- The Offsite Alternative assumes that, without implementation of the SFIA Master Plan, a portion of the future air travel demand the project would have served (the difference between the proposed project passenger levels and those in the No-Project Alternative, Variant 1) would be distributed to the other Bay Area airports and long-distance transportation modes (intercity rail). The transportation impacts in the SFIA vicinity would be the same as those for the No-Project Alternative, Variant 1. Because the assumed "distributed" passenger demand has not been split among the other Bay Area airports and transportation modes, and because a determination of future passenger levels at those facilities is pending the outcome of the RASP Update now underway at the Metropolitan Transportation Commission, a specific identification and calculation of the impacts of the "distributed" SFIA passenger demand and the level of significance of these impacts at these other locations would be premature.

There would be greater transportation impacts around the other airports and transportation centers due to this Alternative. These would cause traffic noise and vehicle-related (including aircraft-related) air quality impacts to increase at these other locations. With this Alternative, construction noise and construction-related air quality impacts could increase around other airports and transportation centers if additional construction were to occur at these other locations.

With this Alternative, vehicle-related and construction-related air quality impacts would be spread over a larger geographic area than with the project. With the use of high-speed railways there could potentially be fewer overall vehicle-related air quality impacts than with the project. It should be noted, however, that air quality around

SFIA is currently better and is predicted to be better in the future than air quality in Oakland, San Jose or Concord. Increases in air quality emissions at these locations could potentially be more significant than increases in emissions around SFIA.

On the assumption that newer, quieter aircraft were used for increased flights at other airports, aircraft noise would probably not increase at these other locations in the long-term due to this Alternative.

Total energy used for this Alternative would be expected to be similar to energy used for the project; it would be used in different locations.

Biological impacts could be greater with this Alternative if there were rare, threatened or endangered species or habitats at the sites of the other airports or transportation centers that could be affected by increased development at these other locations under this Alternative. There would be unknown cultural resource impacts at these other locations.

Hazardous materials impacts due to this Alternative would be expected to be the same as those of the project, except that these impacts would occur in different locations.

Seismic impacts of this Alternative compared to the project would depend on the location of the redistributed trips. It could be anticipated that a more decentralized airway and rail transit system would provide potentially greater travel options in the aftermath of a major seismic event.

Increases in employment would be expected to be the same as for the project, although employment under this Alternative would be spread throughout the Bay Area. Resulting housing demand would be the same as for the project, although the locations of residents would be expected to differ from those under the project.

Impacts on utilities and public services would be similar to those of the project except that other utility companies and other jurisdictions would be affected by this Alternative, as compared to the project. Aviation safety at other airports would expect to worsen proportionally to their increase in total aircraft flights due to the Alternative.

Reasons for Rejection

The sponsor has rejected this alternative because it would not meet the sponsor's objective to accommodate at SFIA the demand from forecast growth.

NOTES - Alternatives

/1/ Eldred, Ken, Ken Eldred Engineering, letter, July 20, 1990.

/2/ U.S. Department of Transportation, Federal Aviation Administration, *Terminal Area Forecasts, FY 1989 - 2005* (FAA-APO-89-5), April 1989.

/3/ Costas, John, Assistant Administrator, Planning and Construction, San Francisco International Airport, letter, August 8, 1990. According to this letter, "...the Master Plan consultants did not analyze a constrained forecast for cargo. All available cargo space at the Airport is presently leased with requests for additional space. Any growth in cargo tonnage processed at the Airport, above current levels, will primarily be the result of increased airline operating efficiencies or new technologies. Neither of these factors can be reasonably forecasted."

/4/ Cited in Metropolitan Transportation Commission, *Regional Transportation Plan for the Nine County San Francisco Bay Area*, April 1980.

/5/ California Department of Transportation, Division of Aeronautics, *California Aviation System Plan (CASP)* (seven elements: Inventory, Forecasts, Policy Plan, System Requirements, Financial, Action Plan, Executive Summary), 1987, 1988 and 1989.

/6/ Eldred, Ken, Ken Eldred Engineering, letter, August 2, 1990.

/7/ SFIA Airports Commission, *Master Plan Working Paper B*, August 1988.

/8/ Costas, John, Assistant Administrator, Planning and Construction, San Francisco International Airport, letter, July 14, 1990.

/9/ *San Francisco Examiner*, Tuesday, July 3, 1990.

/10/ Metropolitan Transportation Commission, Regional Airport Planning Committee, Meeting Minutes, March 1, 1991.

X. DRAFT EIR DISTRIBUTION LIST

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Honorable Mayor
City of Belmont
City Hall
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Belmont, CA 94002

Honorable Mayor
City of Brisbane
City Hall
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Honorable Mayor
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Burlingame, CA 94010

* Honorable Mayor
City of Pacifica
City Hall
170 Santa Maria
Pacifica, CA 94044

Honorable Mayor
Town of Portola Valley
Town Hall
765 Portola Road
Portola Valley, CA 94025

Honorable Mayor
City of Colma
City Hall
235 El Camino Real
Colma, CA 94014

Honorable Mayor
City of Daly City
City Hall
333 - 90th Street
Daly City, CA 94015

Honorable Mayor
City of East Palo Alto
Community Service Building
2415 University Avenue
East Palo Alto, CA 94303

Honorable Mayor
City of Foster City
City Hall
610 Foster City Boulevard
Foster City, CA 94404

Honorable Mayor
City of Half Moon Bay
City Hall
501 Main Street
Half Moon Bay, CA 94019

Honorable Mayor
Town of Hillsborough
Town Hall
1600 Floribunda Avenue
Hillsborough, CA 94010

Honorable Mayor
City of Menlo Park
City Hall - Civic Center
701 Laurel Street
Menlo Park, CA 94025

* Honorable Mayor
City of Millbrae
City Hall
621 Magnolia Avenue
Millbrae, CA 94030

Honorable Mayor
City of Redwood City
City Hall
1017 Middlefield Road
Redwood City, CA 94063

Honorable Mayor
City of San Bruno
City Hall
567 El Camino Real
San Bruno, CA 94066

* Honorable Mayor
City of San Carlos
City Hall
600 Elm Street
San Carlos, CA 94070

Honorable Mayor
City of San Mateo
City Hall
330 W. 20th Avenue
San Mateo, CA 94403

Honorable Mayor
City of So. San Francisco
City Hall
400 Grand Avenue
So. San Francisco, CA 94080

Honorable Mayor
Town of Woodside
Town Hall
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601 Harbor Colony Court
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Robert Fitzgerald, Councilman
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* Kevin Kelly, Mayor
City of San Carlos
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John James, Mayor
Town of Portola Valley
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Tom Casey
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Tom Mack, Councilman
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* Janet Fogarty, Mayor
City of Millbrae
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* Albert M. Teglia, Councilman
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333 90th Street
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* Ginny Silva Jaquith, Mayor
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* Tom Huening, Supervisor
SMC Board of Supervisors
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