



# Inventory







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### 3.1 OVERVIEW

This chapter presents information on existing conditions for the San Francisco International Airport (SFO, or the Airport) Airport Development Plan (ADP) and provides an overview of the data collected and analyzed for the development planning process. The inventory of existing conditions, conducted in 2014 and described in the following sections, is the foundation for subsequent analyses and facility planning. Six facility categories were inventoried:

- Airspace Operating Environment
- Airfield
- Passenger Terminal
- Ground Access and Parking
- Support Facilities
- Utilities

The ADP technical appendices should be reviewed for additional information on the assumptions and methodologies used during the inventory data collection process.

**Exhibit 3.1-1** shows an overview of the Airport.

### 3.2 AIRSPACE OPERATING ENVIRONMENT

#### 3.2.1 Airspace Classification

SFO is surrounded by Class B airspace. As defined by the Federal Aviation Administration (FAA):

“Class B airspace is generally airspace from the surface to 10,000 feet above mean sea level<sup>1</sup> surrounding the nation’s busiest airports in terms of operations or passenger enplanements. The configuration of each Class B airspace area is individually tailored, consists of a surface area and two or more layers (some Class B airspace areas resemble upside-down wedding cakes), and is designed to contain all published instrument procedures once an aircraft enters the airspace. Air Traffic Control (ATC) clearance is required for all aircraft to operate in the area, and all aircraft that are so cleared receive separation services within the airspace.”<sup>2</sup>

<sup>1</sup> Above mean sea level (AMSL) is defined as the elevation (on the ground) or altitude (in the air) of an object relative to the historic average sea level.

<sup>2</sup> Federal Aviation Administration. *Aeronautical Information Manual*, 2016.

The SFO Class B airspace is divided into 11 regions of minimum and maximum elevations for aircraft operating within the airspace. **Table 3.2.1** provides a summary of the minimum and maximum elevations in feet AMSL in each of the 11 areas of the SFO Class B airspace.

As depicted in **Exhibit 3.2-1**, SFO Class B airspace extends in concentric circles from the Airport to a distance no greater than 30 nautical miles with increasing altitude floors (i.e., the airspace floor is the ground elevation at the Airport; the airspace floor rises to 8,000 feet AMSL at a distance of 30 nautical miles). The San Francisco Class B airspace is surrounded by numerous smaller commercial and general aviation airports; it lies directly adjacent to the Oakland Class C airspace and above the San Jose Class C airspace.<sup>3</sup> This airspace borders the contiguous U.S. Air Defense Identification Zone<sup>4</sup> to the west. The Oakland Air Route Traffic Control Center provides enroute services, while the Northern California Terminal Radar Approach Control (TRACON) provides approach and departure services.

<sup>3</sup> Class C airspace is generally that airspace from the surface to 4,000 feet above the airport elevation (charted in AMSL) surrounding those airports that have an operational control tower, are serviced by a radar approach control, and have a certain number of instrument flight rules (IFR) operations or passenger enplanements.

<sup>4</sup> The Air Defense Identification Zone is defined as an area of airspace over land or water in which the ready identification, location, and control of all aircraft (except for Department of Defense and law enforcement aircraft) are required in the interest of national security.

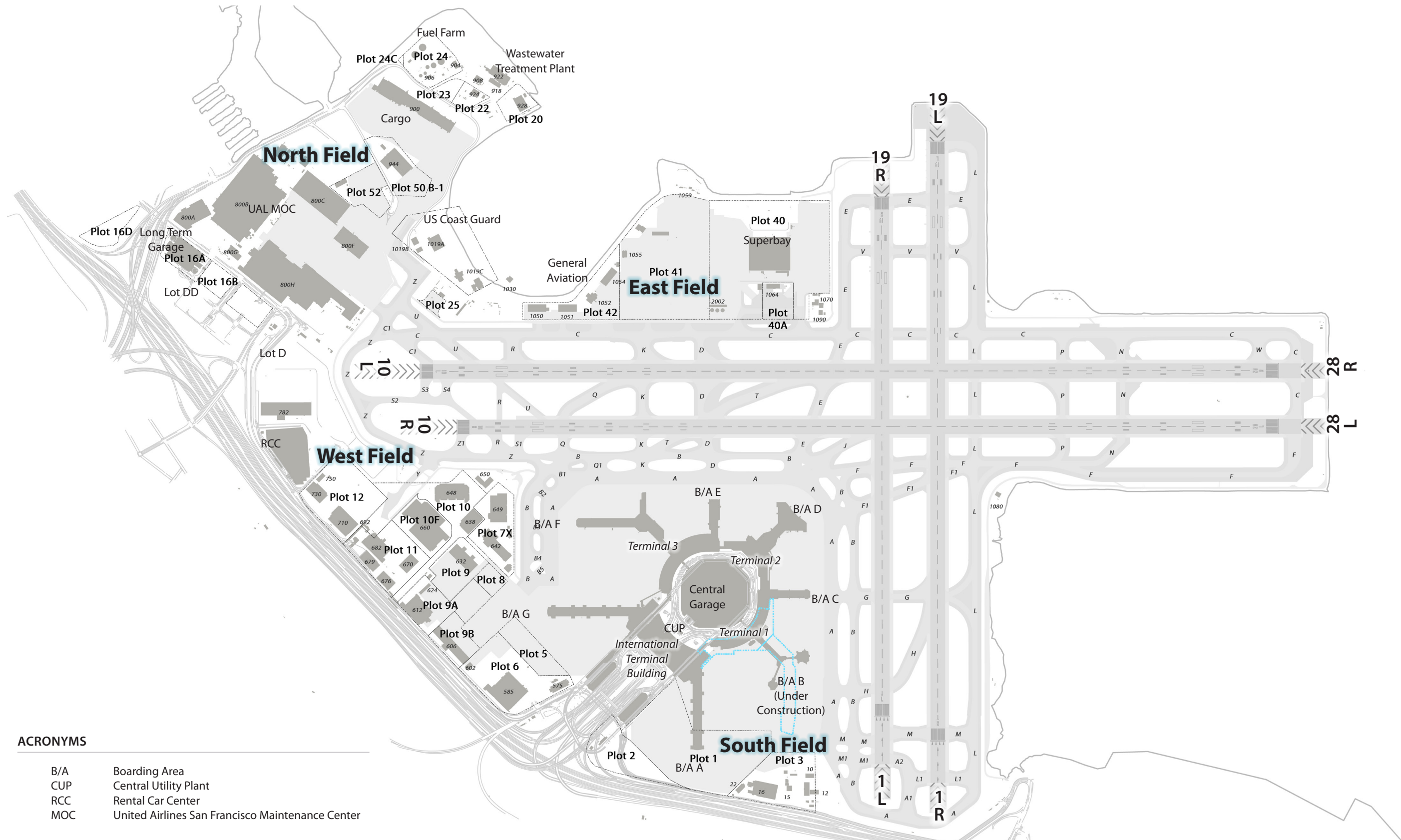
**Table 3.2.1 | San Francisco International Airport Class B Airspace Categories (in feet above mean sea level)**

SFO Class B Airspace Areas	Low Altitude	High Altitude
Area A	Ground elevation	10,000
Area B	1,500	10,000
Area C	2,500	10,000
Area D	4,000	10,000
Area E	6,000	10,000
Area F	2,100	10,000
Area G	3,000	10,000
Area H	4,000	10,000
Area I	1,500	10,000
Area J	8,000	10,000
Area K	5,000	10,000

Source: National Flight Data Center database, September 2015



Exhibit 3.1-1 | Airport Overview



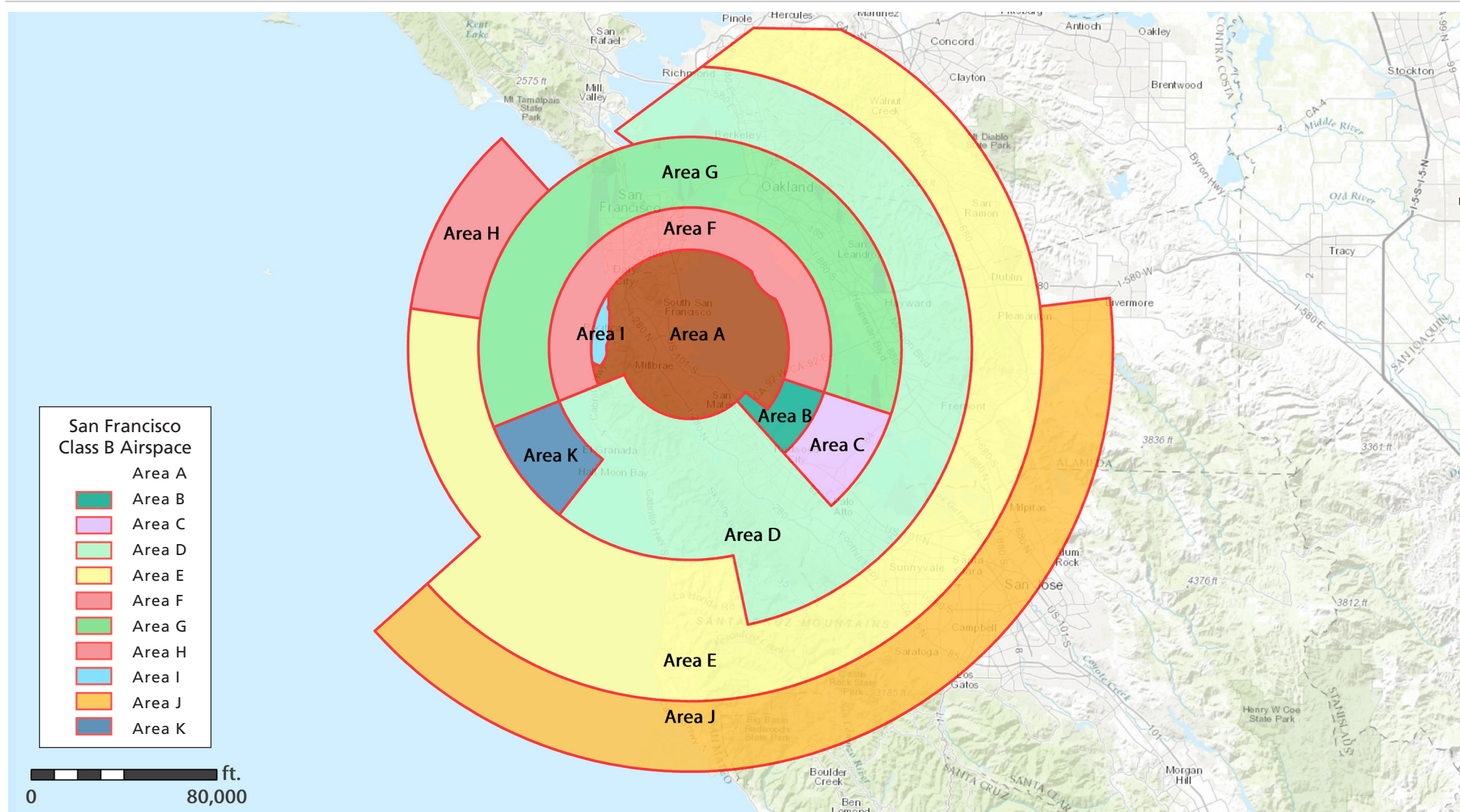
ACRONYMS

B/A	Boarding Area
CUP	Central Utility Plant
RCC	Rental Car Center
MOC	United Airlines San Francisco Maintenance Center

Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014; Landrum & Brown, Inc., 2016



Exhibit 3.2-1 | San Francisco Class B Airspace



Sources: National Flight Data Center database, September 2015; Landrum & Brown, Inc., 2015

The San Francisco Bay Area is served by various airways and is part of the National Airspace System. The en route airspace structure of the National Airspace System consists of three categories:

- Low altitude – Victor airways<sup>5</sup> – 1,200 feet above ground level (AGL) up to, but not including, 18,000 feet AMSL
- High altitude – Jet routes – 18,000 feet AMSL to Flight Level 450 (approximately 45,000 feet AMSL)
- Special operations – Above Flight Level 450

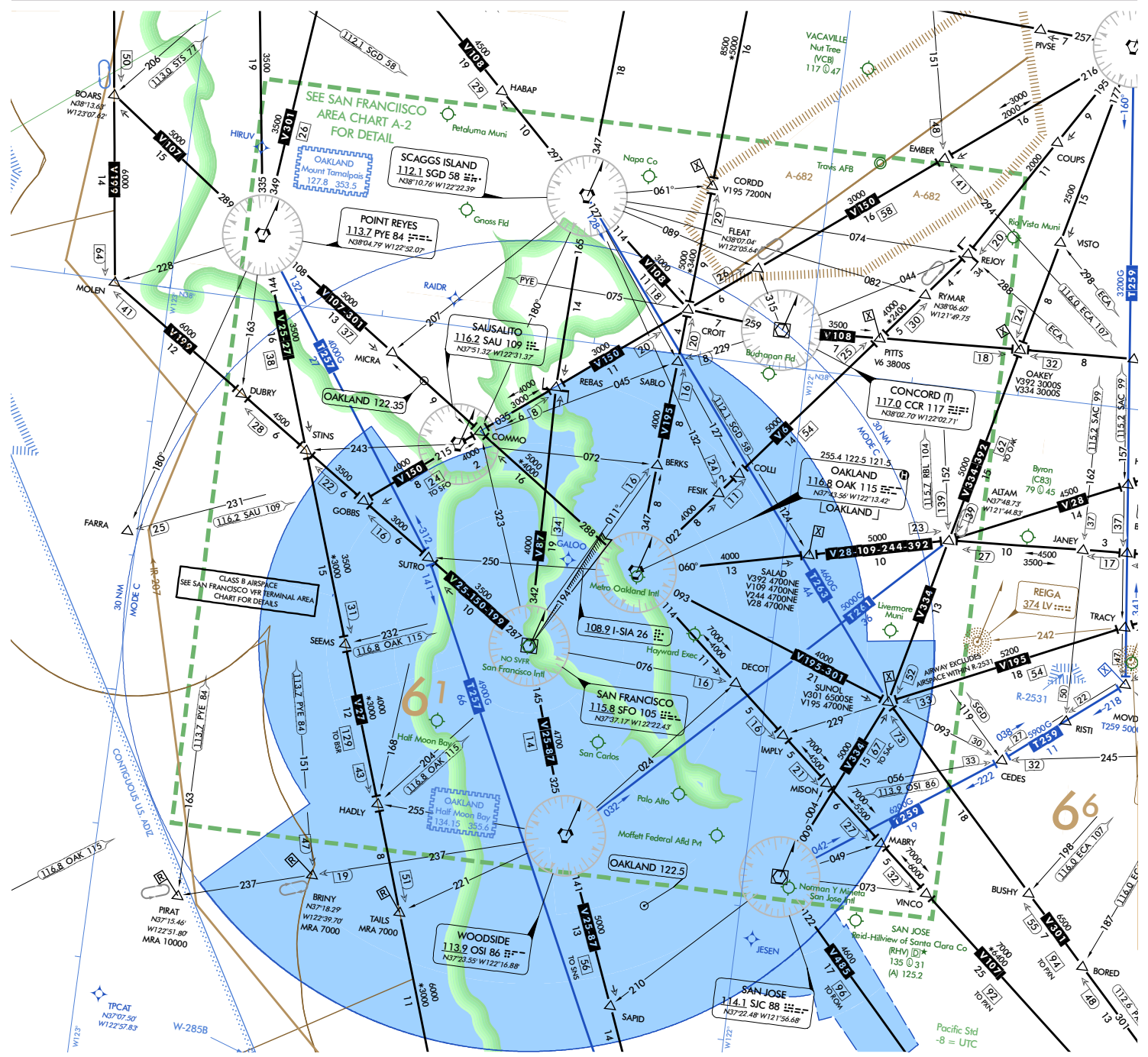
**Exhibit 3.2-2** depicts the low altitude instrument flight rules (IFR) airspace enroute chart, which illustrates the SFO Class B airspace and the Victor airway system in the San Francisco Bay Area.

**Exhibit 3.2-3** depicts the high altitude IFR airspace enroute chart and the Jet routes that encompass the San Francisco Bay Area. Similar to Victor airways, Jet routes are defined as straight-line segments between two very high frequency (VOR) navigational aid stations. The airways are only available during IFR operations.

<sup>5</sup> Victor airways are defined as straight-line segments between two very high frequency (VHF) omnidirectional range (VOR) navigational aid stations. These airways are available under either instrument flight rules or visual flight rules.

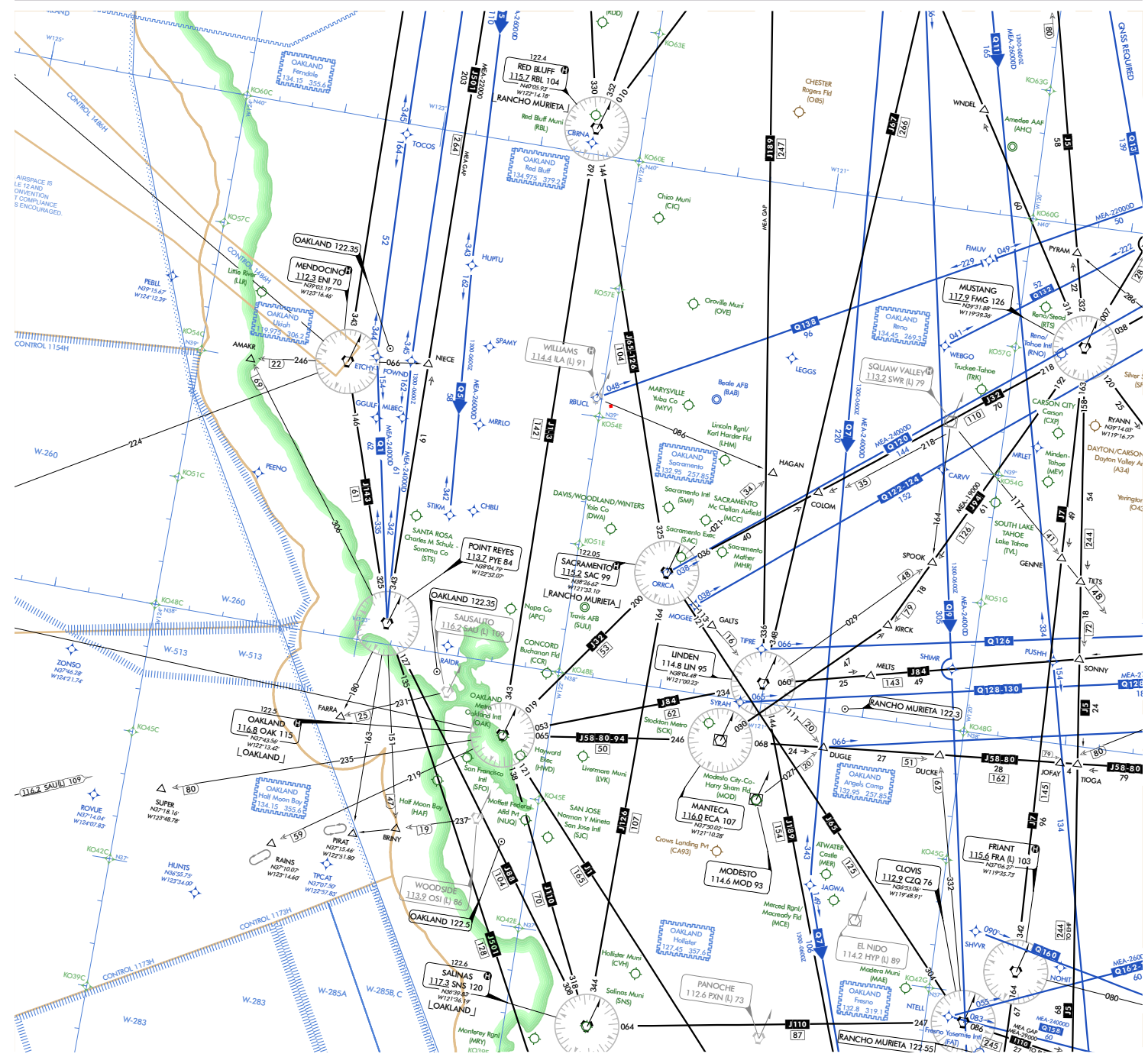


Exhibit 3.2-2 | San Francisco Bay Area Low Altitude IFR Enroute Chart



Source: FAA IFR Enroute Aeronautical Charts, September 2016.

Exhibit 3.2-3 | San Francisco Bay Area High Altitude IFR Enroute Chart



Source: FAA IFR Enroute Aeronautical Charts, September 2016.



### 3.2.2 Regional Airspace Environment

The Airport is generally operated in one of two configurations, referred to as the West Plan and the Southeast Plan. The use of either Plan is primarily dictated by weather conditions. **Exhibit 3.2-4** and **Exhibit 3.2-5** show the arrival and departure routes within the terminal airspace for the West Plan and Southeast Plan, respectively.

The West Plan is the predominant operating configuration at SFO. For most of the year oceanic weather flows inland through the largest gap in the Santa Cruz Mountains located between Sweeney Ridge and San Bruno Mountain, known as the San Bruno Gap. Wind and fog from the Pacific Ocean blow through the San Bruno Gap to SFO, affecting air traffic conditions. Because aircraft must take off and land into the prevailing wind, the location of the San Bruno Gap creates a nearly year-round west-northwest wind that requires the overwhelmingly predominant use of the West Plan. Often, during summer afternoons, the wind speed through the San Bruno Gap is so high that aircraft must arrive on and depart from the longer east/west runways, Runways 28L and 28R, rather than Runways 1L and 1R.

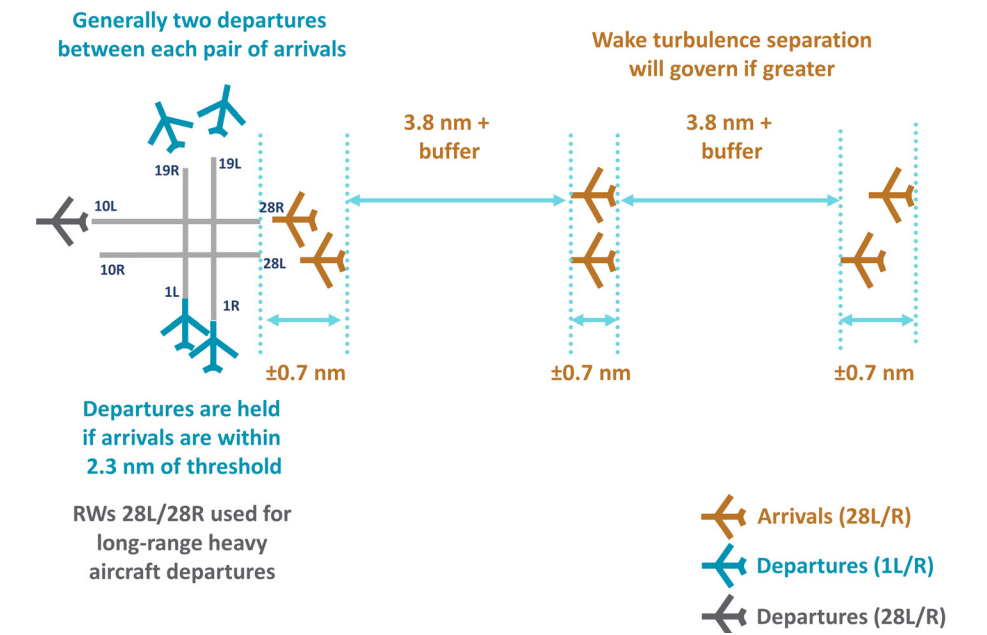
When the West Plan operating configuration is used during visual meteorological conditions (VMC), aircraft can land side by side on Runways 28L and 28R (with

the aircraft landing on Runway 28L slightly ahead of the aircraft landing on Runway 28R) because pilots are able to maintain visual separation. This operating configuration provides for up to 54 arrivals per hour. **Exhibit 3.2-6** depicts the 28-1<sup>6</sup> West Plan arrival and departure runway separation and sequencing procedures typically used at SFO. The standard 28-1 operation consists of paired arrivals on Runways 28L and 28R and departures from Runways 1L and 1R. Paired arrivals are separated by 3.8 nautical miles (nm) (plus a buffer) to ensure that departure pairs from Runways 1L and 1R can depart once the arrival(s) have cleared the intersections of the runways.

The 28-28 runway configuration is used by ATC as a secondary West Plan operation. When operating in this configuration, arrivals are staggered on Runways 28L and 28R by a minimum of 2.6 nm, which allows departures from the adjacent departure runway to be sequenced when the landing aircraft cross the runway threshold. This configuration achieves a rate of approximately 45 arrivals and 45 departures in VMC.

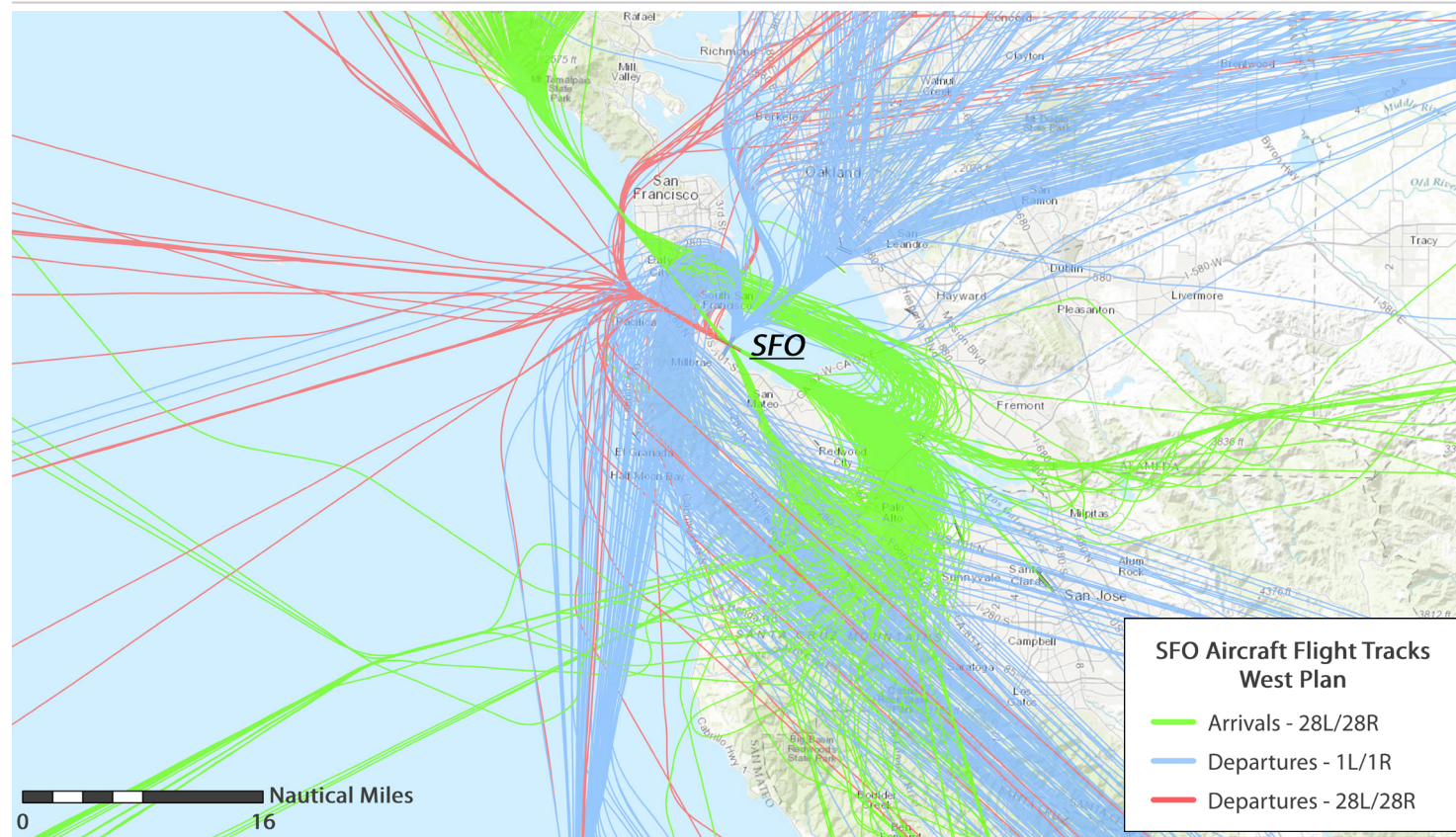
<sup>6</sup> Operational plans are named using the format “x-y,” where “x” is the primary arrival runway pair and “y” is the primary departure runway pair.

**Exhibit 3.2-6 | West Plan 28-1 Runway Configuration**



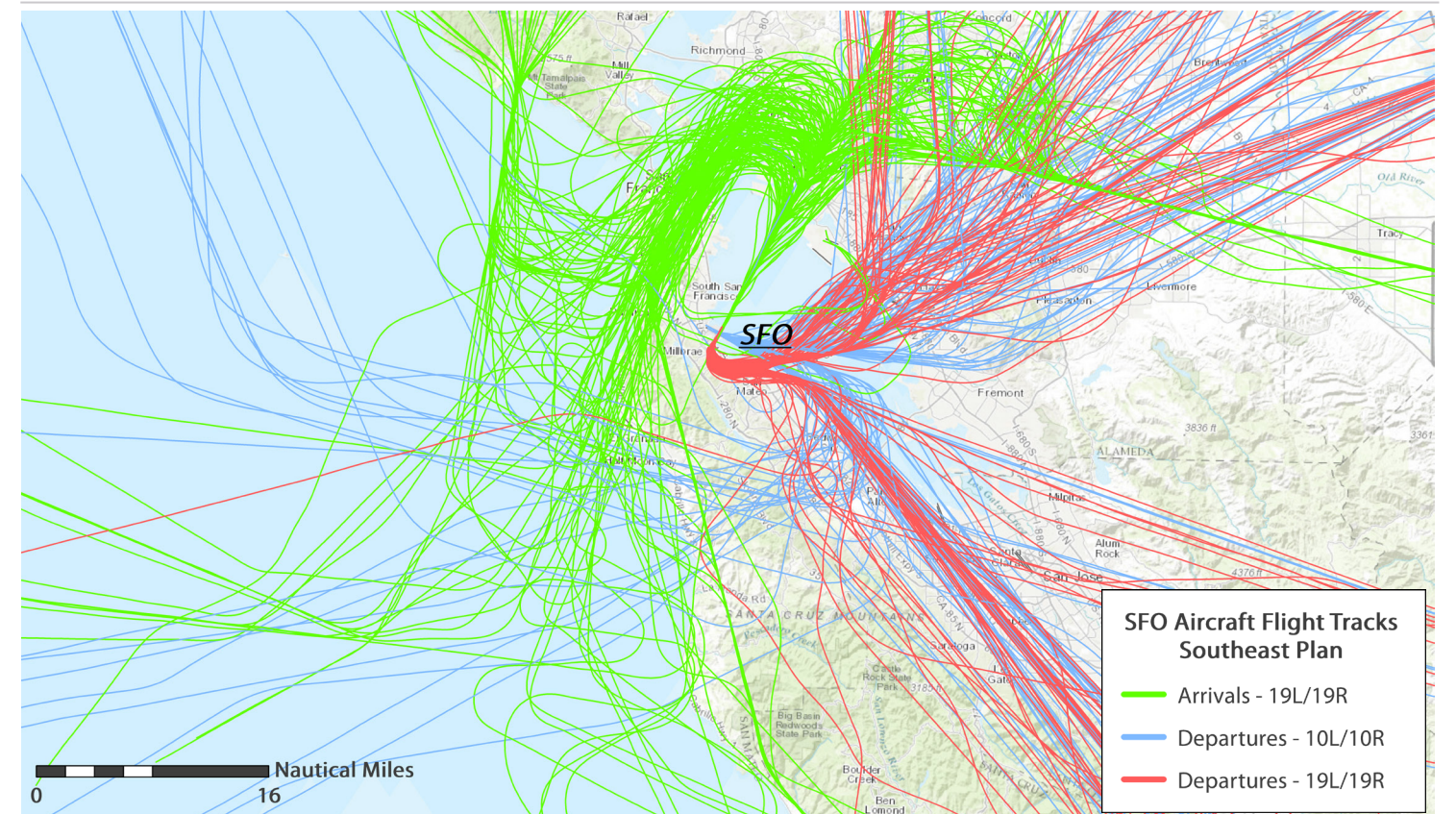
Source: SFO Airfield and Airspace Simulation Calibration and Validation, Landrum & Brown, Inc., 2011

**Exhibit 3.2-4 | West Plan, Bay Area Arrival and Departure Routes**



Sources: Flight track data obtained from the SFO Noise Office; Landrum & Brown, Inc., 2016

**Exhibit 3.2-5 | Southeast Plan, Bay Area Arrival and Departure Routes**



Sources: Flight track data obtained from the SFO Noise Office; Landrum & Brown, Inc., 2016



During instrument meteorological conditions (IMC), aircraft are not able to land side by side and are limited to landing on either Runway 28L or 28R, which reduces the capacity of the airfield to approximately 30 arrivals per hour. When visibility is 4 miles and the cloud ceiling is 2,100 feet AMSL or higher, the use of a precision runway monitor and simultaneous offset instrument approach procedure (IAP) can increase runway capacity from 30 to 38 arrivals per hour. Runways 28L and 28R are also used for departures when there are strong westerly winds, or for fuel-laden aircraft that require additional takeoff distance.

Cyclonic winds in the northern hemisphere circulate around low-pressure systems in a counterclockwise rotation. When a low-pressure weather system affects the Bay Area, prevailing winds shift to the south-southeast and SFO and other local airports switch to the Southeast Plan operating configuration. At SFO, Runways 10L and 10R are primarily used for departures and Runways 19L and 19R are used for arrivals when operating under the Southeast Plan.

To address nighttime aircraft noise (between the hours of 10:00 p.m. and 7:00 a.m.), SFO management enacted a voluntary Nighttime Preferential Runway Use Program for aircraft operators. The intent of this program is for pilots to maximize the use of flight tracks over water, which results in the following three preferential runway use procedures (in order of preference):

1. Departures on Runways 10L and 10R
2. Departures on Runways 28L and 28R using the Shoreline or Quiet Departure, which both incorporate an immediate right turn after departure
3. Departures on Runways 1L and 1R

**Table 3.2-2** provides a summary of annual runway use configurations at SFO from January 2010 through June 2015. The data in this table show that the 28-1 West Plan runway operation is the primary operating configuration at SFO, used approximately 81 percent of the time. The secondary West Plan operation, 28-28, is used approximately 15 percent of the time. When weather conditions require a switch to the Southeast Plan at SFO, historical data indicate that the 19-10 runway configuration is used approximately 4 percent of the time annually. The remaining runway configurations identified in the historical data accounted for less than 1 percent of annual use at the Airport.

### 3.2.3 Enroute Navigational Aids

Various enroute navigational aids are used to help pilots navigate within the Bay Area regional airspace system. For operations at SFO, these navigational aids assist pilots transitioning to and from the Airport environment and the enroute and terminal airspace via published arrival and departure procedures. **Exhibit 3.2-7** depicts the navigational aids available within 50 nm and 100 nm of SFO. These navigational aids include:

- Non-directional radio beacons (NDB)
- Tactical air navigation system (TACAN)
- VHF omnidirectional range station (VOR)
- VHF omnidirectional range/distance measuring equipment (VOR/DME)
- VHF omnidirectional range/tactical air navigation system (VORTAC)
- VOR test facility

The San Francisco VOR/DME is located on the Airport near the intersection of the four runways.

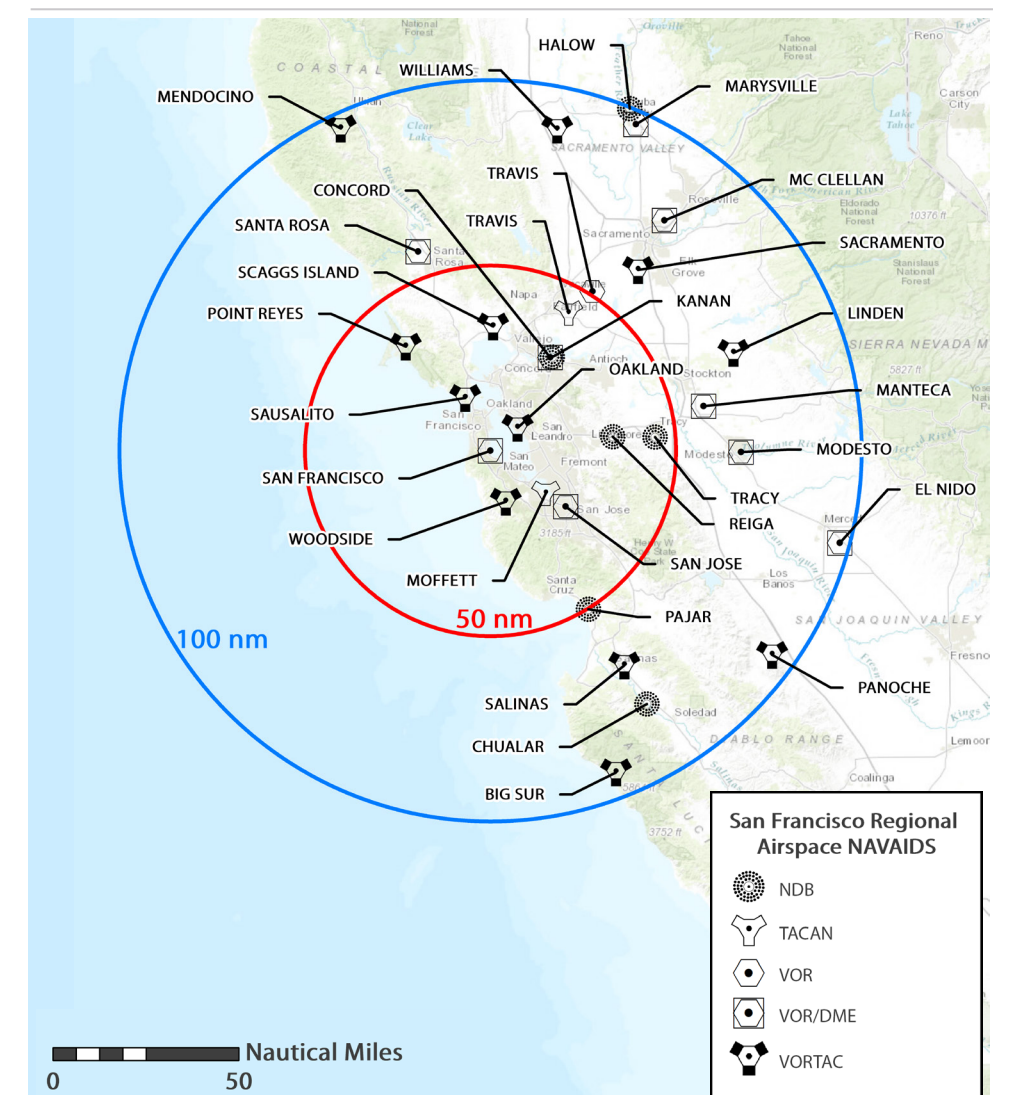
### 3.2.4 Air Traffic Control Procedures

The SFO airspace environment is complicated because of the proximity of the airspace for OAK and SJC, the two other Bay Area commercial airports. To maneuver through this airspace environment, a variety of arrival and departure instrument procedures are used at SFO:

- Instrument Landing System (ILS) Category (CAT) I/II/III Approach
- Localizer Only (LOC)
- Area Navigation (RNAV)
- Required Navigational Performance (RNP)
- Distance Measuring Equipment (DME)
- Localizer-type Directional Aid (LDA)
- Localizer Performance with Vertical Guidance (LPV)
- Precision Runway Monitor (PRM)
- VHF Omnidirectional Range Station (VOR)

**Appendix A, Acronyms and Glossary of Terms**, contains descriptions of each of these types of procedures.

**Exhibit 3.2-7 | Enroute Navigation Aids within 50 and 100 Nautical Miles of SFO**



Sources: Navigational aid data obtained from the National Flight Data Center database, September 2015; Bing Maps/ESRI, aerial imagery, 2015; Landrum & Brown, Inc., 2015

**Table 3.2-2 | SFO Runway Configuration Use (January 1, 2010 – June 30, 2015)**

Runway Configuration (Arrival - Departure)	Total Annual Hours Operating In Runway Configuration	Percent Of Time Operating In Runway Configuration
28 - 1	38,815	80.5%
28 - 28	7,180	14.9%
19 - 10	1,741	3.6%
19 - 19	346	< 0.7%
10 - 10	63	0.1%
1 - 1	21	< 0.1%
28 - 19	2	< 0.1%
<b>Total</b>	<b>48,168</b>	<b>100.0%</b>

Note: Columns may not add to totals shown because of rounding.

Source: FAA Aviation System Performance Metric airport efficiency database, Jan. 1, 2010 through June 30, 2015

**Table 3.2-3** summarizes the published arrival procedures for SFO as of October 2015. The Standard Terminal Arrival Route (STAR) procedures consist of both non-RNAV (vectored) and RNAV routes. Non-RNAV procedures use a combination of navigational aids, fixes/waypoints, and vectors via ATC instruction for pilot navigation. RNAV procedures rely primarily on specific defined routes consisting of various fixes/waypoints that pilots use to maneuver the aircraft throughout the airspace. Both the non-RNAV and RNAV procedures provide route guidance intended to position aircraft for approaches to the various runways at SFO.

**Table 3.2.3 | SFO Published Arrival Procedures**  
(September 17, 2015, to October 15, 2015)

Arrival Procedure	Type	Runway Pair(s) Served
BIG SUR TWO	NON-RNAV	28
GOLDEN GATE SIX	NON-RNAV	28
HADLY TWO	NON-RNAV	19
LOCKE ONE	NON-RNAV	19
MODESTO FIVE	NON-RNAV	28
POINT REYES ONE	NON-RNAV	28
RISTI FOUR	NON-RNAV	28
STINS TWO	NON-RNAV	28
ALWYS ONE	RNAV	19
BDEGA ONE	RNAV	28
DYAMD TWO	RNAV	28
SERFR ONE	RNAV	19, 28
STLER ONE	RNAV	19
YOSEM THREE	RNAV	28

Source: Federal Aviation Administration (publishing cycle September 17, 2015 - October 15, 2015)

**Table 3.2-4** summarizes the currently published Standard Instrument Departure (SID) procedures at SFO. SID procedures provide pilots with guidance and routing to transition aircraft from the airport environment and throughout the terminal airspace into the enroute airspace. These procedures provide required climb gradient performance, obstacle limitations, altitude restrictions, and navigational aids/fixes, among other information. The instrument departure environment consists of both non-RNAV and RNAV procedures. Every runway end at SFO is served by at least one published instrument departure procedure.

**Table 3.2.4 | SFO Published Departure Procedures**  
(September 17, 2015, to October 15, 2015)

Departure Procedure	Type	Runway Pair(s) Served
DUMBARTON EIGHT	NON-RNAV	10, 19
EUGEN ONE	NON-RNAV	1, 28
GAP SIX	NON-RNAV	ALL RUNWAYS
LUVVE FOUR	NON-RNAV	10, 19
MOLEN SEVEN	NON-RNAV	10, 19, 28
OFFSHORE NINE	NON-RNAV	1, 28
PORTE SEVEN	NON-RNAV	ALL RUNWAYS
QUIET SEVEN	NON-RNAV	1, 28
REBAS EIGHT	NON-RNAV	1, 28
SAN FRANCISCO THREE	NON-RNAV	1, 28
SHORELINE SEVEN	NON-RNAV	28
AFIVA ONE	RNAV	1, 28
CIITY THREE	RNAV	10, 19
FOGGG TWO	RNAV	10, 19
GNNRR TWO	RNAV	28
NIITE THREE	RNAV	1, 28
SAHEY THREE	RNAV	10, 19
SNTNA TWO	RNAV	28
SSTIK THREE	RNAV	1
TRUKN TWO	RNAV	1, 28
WESLA THREE	RNAV	28

Source: Federal Aviation Administration (publishing cycle September 17, 2015 - October 15, 2015)

**Table 3.2-5** summarizes the types of published IAPs and the SFO arrival runway pairs each IAP serves. There are currently no published IAPs for Runways 1L/1R because of the natural terrain west of the arrival ends of the runways. These runway ends are rarely used for arrivals; however, when the need arises, the typical arrival procedures involve flying the approach to Runway 28L and then performing a circling approach to land on Runways 1L/1R.

**Table 3.2.5 | SFO Published Instrument Approach Procedures**  
(September 17, 2015, to October 15, 2015)

Approach Procedure	Runway							
	1L	1R	10L	10R	19L	19R	28L	28R
ILS CAT I							●	●
ILS CAT II							●	●
ILS CAT II & III								●
ILS or LOC					●		●	●
ILS PRM							●	
LDA PRM								●
LDA/DME								●
PRM Approach AAUP							●	●
QUIET BRIDGE VISUAL							●	●
RNAV (GPS)			●		●	●	●	
RNAV (GPS) PRM							●	
RNAV (GPS) PRM X								●
RNAV (GPS) X								●
RNAV (GPS) Y				●				
RNAV (GPS) Z								●
RNAV (RNP) Y								●
RNAV (RNP) Z				●				
TIPP TOE VISUAL							●	●
VOR								

Source: Federal Aviation Administration (publishing cycle September 17, 2015 - October 15, 2015)



### 3.2.5 Protected Airspace Surfaces

At SFO, airspace protection surface criteria have different purposes and functions. Composite airspace protection surfaces and contours were developed and are maintained by the SFO Bureau of Planning and Environmental Affairs. Composite airspace mapping identifies the lowest airspace surfaces that surround SFO in an effort to establish a maximum allowable height restriction for existing and future development in the communities surrounding the Airport. The composite airspace includes four surface categories: Part 77 imaginary surfaces,<sup>7</sup> one-engine inoperative (OEI) departure procedures, *United States Standard for Terminal Instrument Procedures* (TERPS), and regional airspace surfaces.

#### FAR Part 77 Imaginary Airspace Surfaces

The Part 77 surfaces<sup>8</sup> set forth requirements for notifying the FAA of proposed construction, define obstruction criteria, and describe aeronautical studies required to assess hazard status. These surfaces are defined to protect the airspace from objects that may adversely affect the operation and safety of an airport.

The five FAR Part 77 imaginary airspace surfaces at SFO include:

- Primary Surface
  - longitudinally centered on a runway, the horizontal surface
  - a flat plane of swinging arcs extending outward from the end of the primary surface
- Conical Surface
  - extending outward from the edge of the horizontal surface elevation, the approach surface
  - extending outward from the primary surface with dimensions defined by the runway's approach procedures
- Transitional Surface
  - consisting of an inner transitional surface that slopes outward at right angles to the runway centerline and an outer transitional surface for those portions of a precision instrument approach surface that project through and beyond the limits of the conical surface

**Exhibit 3.2-8** depicts the overall and close-in views of the FAR Part 77 imaginary airspace surfaces for SFO with 50-foot elevation contours.

<sup>7</sup> 14 Code of Federal Regulations Part 77, Civil Airport Imaginary Surfaces.

<sup>8</sup> FAR Part 77 surface definitions and descriptions are found in Appendix A, Acronyms and Glossary of Terms.

#### One-Engine Inoperative Surfaces

OEI surfaces provide a protected corridor and lateral guidance for aircraft that experience a malfunctioning engine on takeoff. OEI vertical protection<sup>9</sup> states that the obstacle-limited takeoff weight shall allow a takeoff path for an aircraft that clears all obstacles by a minimum of 35 feet. At SFO, protection for OEI is critical because of airspace obstacles in the surrounding obstruction environment, which include both manmade structures and natural terrain.

When an airline develops its calculations for OEI protection, comprehensive obstacle data for the departure corridor are needed to identify any obstacles that penetrate the surface. Critical or controlling obstacles are identified and used by the airlines to determine the allowable aircraft takeoff weights.

The SFO OEI surfaces are based on the International Civil Aviation Organization Annex 6 OEI surface splay, which is generally used by foreign-flag airlines. For Runways 28L and 28R, the OEI departure corridor provides protection for a straight out departure routing aircraft through the San Bruno Gap. For departures on Runways 19L and 19R, the OEI procedure requires a left turn immediately after takeoff because of the natural terrain located a few miles beyond the departure end of the runways. This turning OEI procedure corridor provides coverage through the cities of Millbrae, Burlingame, San Mateo, and Foster City. **Exhibit 3.2-9** depicts the protected OEI departure corridors at SFO for departures from Runways 28L and 28R and Runways 19L and 19R. OEI protection areas are not shown for Runways 1L, 1R, 10L, and 10R since aircraft using these runways depart over San Francisco Bay, where fixed manmade objects and natural terrain are not prevalent or do not represent obstacles.

<sup>9</sup> 14 Code of Federal Regulations, Part 121.189.

#### United States Standard for Terminal Instrument Procedures

Protection for TERPS<sup>10</sup> procedures is necessary to ensure that the airspace is clear of incompatible objects that may adversely affect aircraft safety and limit the ability to achieve the lowest possible approach and departure minima at an airport. The FAA prefers that the TERPS surfaces be clear of any penetrations; however, if the clearance of obstacles is not feasible, the airport sponsor is expected to provide documentation of its efforts to evaluate the effects on procedure minima and the FAA typically tracks the item as an open issue to pursue when a future opportunity arises. At SFO, the published non-precision and precision instrument procedures for arrivals include protection for the following TERPS procedures: ILS, LPV, lateral navigation (LNAV), LNAV/vertical navigation (VNAV), LOC, LDA/glideslope (GS), VOR, RNP 0.1/0.2/0.3, and circling approaches.

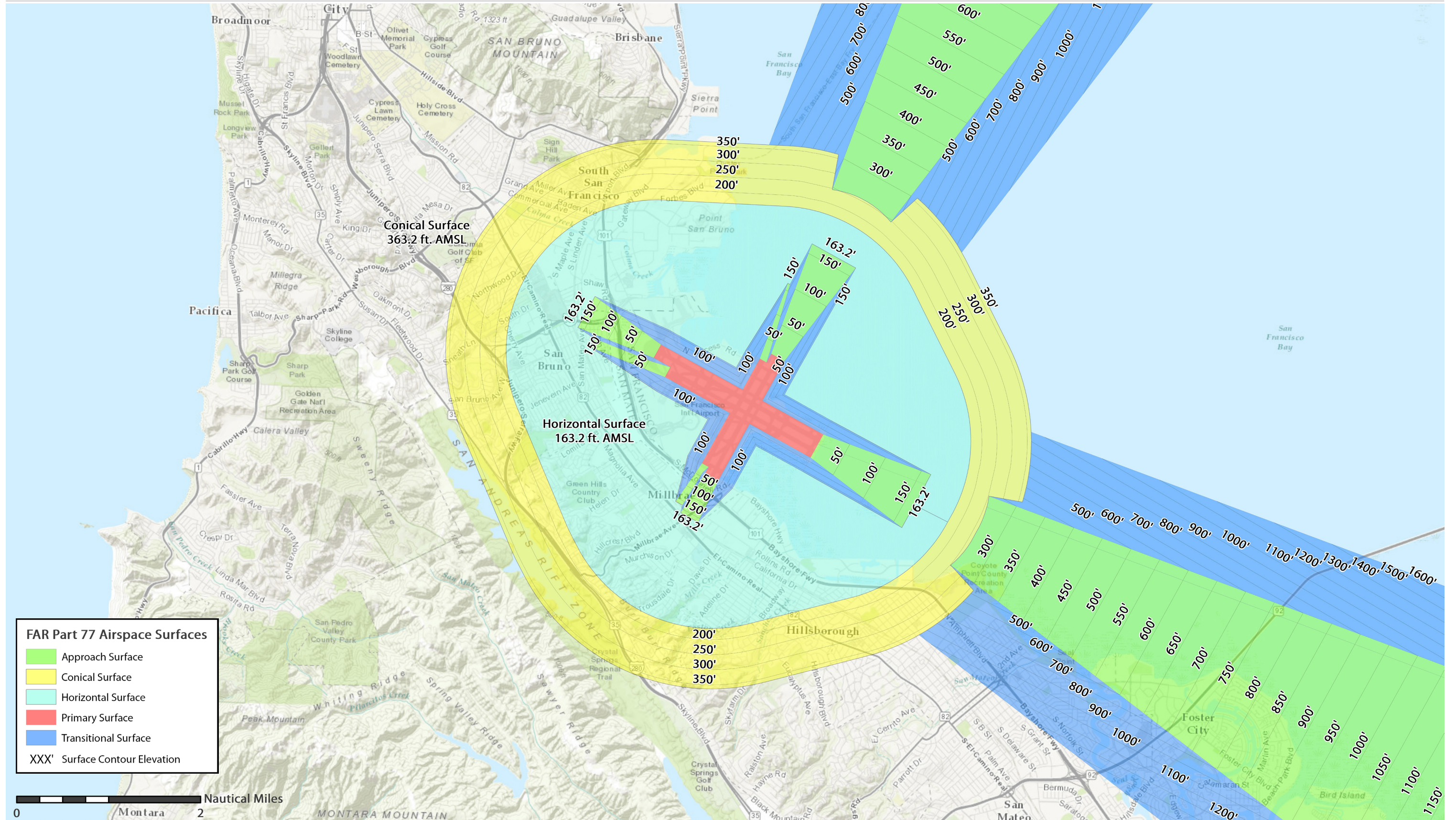
#### Composite Protected Airspace Surfaces

**Exhibit 3.2-10** depicts the various critical airspace surfaces included in the composite airspace protection surfaces. The contours represent the lowest elevations for the various protected airspace surfaces surrounding SFO and encompass a large area.

<sup>10</sup> TERPS procedures are defined in Appendix A, Acronyms and Glossary of Terms.



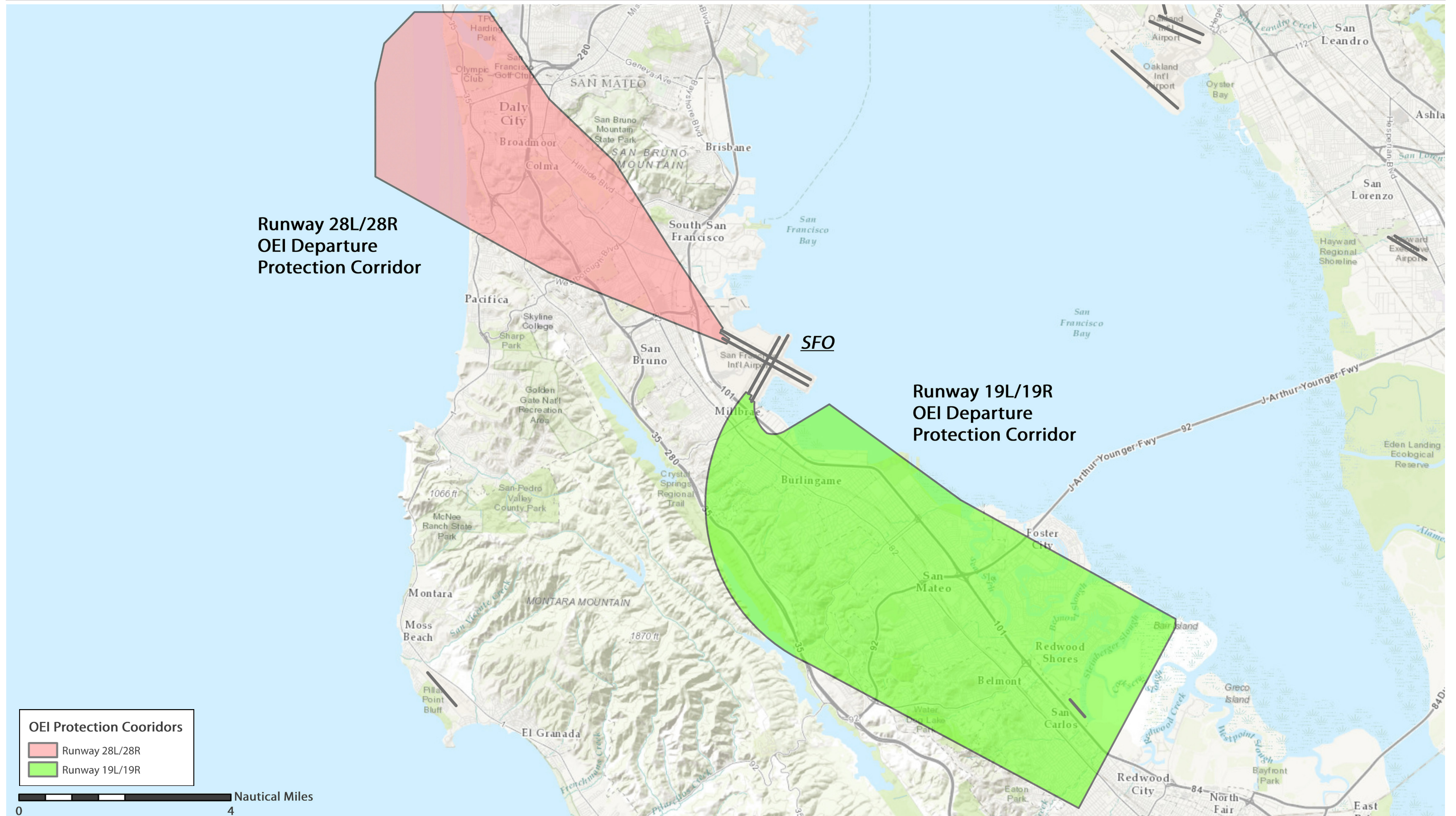
Exhibit 3.2-8 | San Francisco International Airport Overall FAR Part 77 Imaginary Airspace Surfaces



Sources: FAR Part 77 data provided by SFO Bureau of Planning and Environmental Affairs, 2015; Bing Maps/ESRI, aerial imagery 2015; Landrum & Brown, Inc., 2015



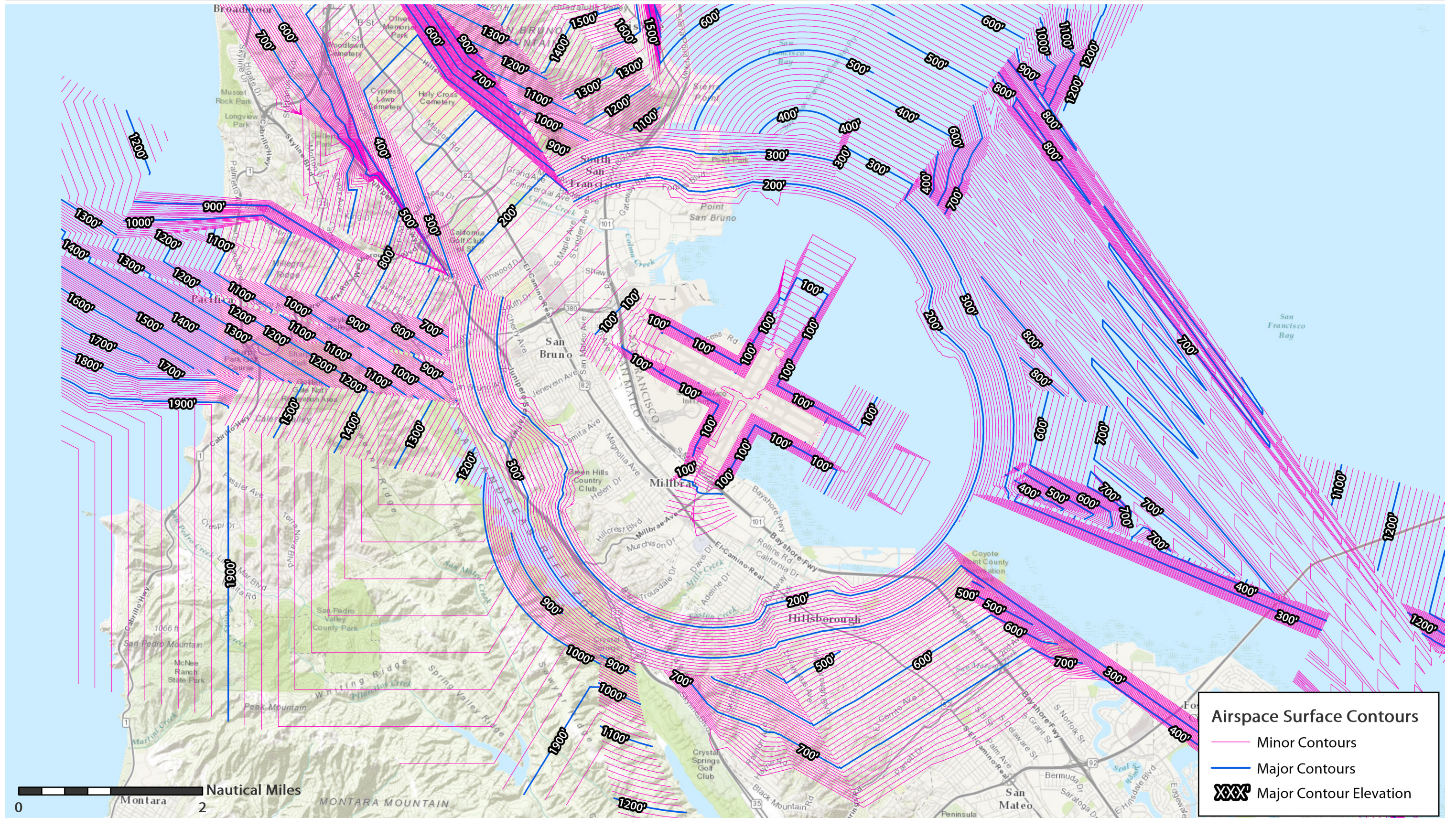
Exhibit 3.2-9 | San Francisco International Airport One-Engine Inoperative Departure Protection Corridors



Sources: SFO Bureau of Planning and Environmental Affairs, one-engine inoperative data, 2015; Bing Maps/ESRI, aerial imagery, 2015; Landrum & Brown, Inc., 2015



Exhibit 3.2-10 | Composite Airspace Surface Contours



Sources: Composite airspace contour data provided by SFO Bureau of Planning and Environmental Affairs, 2015; Bing Maps/ESRI, aerial imagery, 2015; Landrum & Brown, Inc., 2015



## 3.3 AIRFIELD

The airfield is the dominant feature of an airport and typically encompasses the largest land area. The airfield system includes the runways and taxiways, the runway hold aprons, associated safety areas, and pilot navigational aids.

The Airport Reference Code (ARC) is the FAA coding system used to relate airport design criteria to the operational and physical characteristics of the aircraft types that will operate at a particular airport. The ARC has two components related to the design aircraft at an airport. The first component, indicated by a letter, is the aircraft approach category (AAC), which is based on aircraft approach speed. The second component, indicated by a Roman numeral, is the Airplane Design Group (ADG), which is based on aircraft wingspan. Generally, aircraft approach speed applies to runways and runway length-related features. Aircraft wingspan primarily relates to separation-of-aircraft criteria and width-related features.

The ARC is for planning and design purposes only and does not limit the aircraft types that can operate safely at an airport.

The current ARC for SFO is D-V, meaning the Airport has an AAC of D (approach speed less than 166 knots) and an ADG of V (tail height less than 66 feet and wingspan less than 214 feet). The critical (design) aircraft for SFO, or the most demanding aircraft with at least 500 annual operations, is the Airbus A380-800, which is an ADG VI aircraft. In 2013, there were 593 Airbus A380-800 operations at SFO, which increased to 2,000 operations in 2014. Although the Airport was designed to accommodate ADG V aircraft, ADG VI aircraft (i.e., Boeing 747-8 and A380-800) are able to operate at the Airport with special operational procedures and FAA-approved Modifications of Standards (MoSs).

The inventory of the SFO airfield is grouped into seven components:

- Runways
- Taxiways
- Modifications of Standards
- Runway and Airfield Lighting
- Airfield Signage
- Taxiway Pavement Conditions
- Ongoing Airfield Projects

The inventory also identifies ongoing projects affecting the airfield. These projects do not address long-term airfield capacity and are considered existing facilities for the purposes of the ADP.

### 3.3.1 Runways

The existing runways at SFO consist of two pairs of closely spaced parallel runways oriented in an east-southeast/west-northwest direction (Runway 10R-28L and Runway 10L-28R) and a north-northeast/south-southwest direction (Runway 1R-19L and Runway 1L-19R). Both pairs of parallel runways are separated by 750 feet, centerline to centerline. The SFO runways range in length from 7,650 feet to 11,870 feet. All four runways are 200 feet wide, meeting ADG VI runway width design standards (see **Table 3.3-1**).

An overview of the Airport is provided in **Exhibit 3.3-1**. **Exhibit 3.3-2** and **Exhibit 3.3-3** provide additional information about the runways and adjacent taxiways, and the distance from landing thresholds to the taxiways that are used to access or exit from the runways. These exhibits also show runway safety areas (RSAs), object free areas (OFAs), obstacle free zones (OFZs), and arrival and departure runway protection zones (RPZs).

#### Runway Safety Areas

In 2005, the federal government required that all RSAs at commercial service airports be brought into compliance with FAA standards by the end of 2015.<sup>11</sup> From 2012 to 2014, SFO completed several construction projects to meet that mandate. These projects set the current runway alignments. In 2012 and 2013, the thresholds for Runways 28L and 28R were displaced 300 feet and Runway 10R was extended 781 feet to preserve the effective takeoff lengths. These projects provided a standard RSA for these runways through the use of declared distances. The taxiways used to access Runways 10L, 28R, and 28L were not modified. Taxiway Z1 was added to access the relocated Runway 10R threshold. Existing Taxiways R, S, and S1 remain, which has resulted in fragmented taxiways at the end of Runway 10R.

In mid-2014, the final RSA-related construction on Runways 1R-19L and 1L-19R was completed. These runways were shifted to the south-southwest, and Engineered Material Arresting System (EMAS) beds were installed beyond the four runway ends. Taxiways to the four runway ends were reconfigured and taxiways were added around the EMAS beds at the ends of Runways 1L and 1R. An EMAS bed under construction at SFO is shown in **Exhibit 3.3-4**.

<sup>11</sup> Public Law 109-115, U.S. Congress, November 30, 2005

### 3.3.2 Taxiways

#### 3.3.2.1 Runway and Taxiway Design Group

FAA Advisory Circular (AC) 150/5300-13A, *Airport Design*, Change 1 (February 26, 2014) provides guidance on taxiway design based on ADG and the Taxiway Design Group (TDG). **Table 3.3-2** summarizes the dimensional standards published in AC 150/5300-13A.

Taxiway shoulder widths are defined by TDG, which accounts for aircraft ground-maneuvering capabilities. TDG 6 aircraft require 30-foot-wide shoulders and TDG 7 aircraft require 40-foot-wide shoulders. An MoS for the A380-800 requires 60-foot-wide shoulders for taxiways that are 75 feet wide. Most taxiway shoulders at the Airport are at least 40 feet wide to accommodate TDG 7 aircraft. Portions of Taxiways A, B, J, K, L, R, S, S1, S2, U, Z, and Z1 are less than 40 feet wide.

As depicted in **Exhibit 3.3-5**, all taxiways are at least 75 feet wide and meet the requirements for TDG 6 aircraft (e.g., Airbus A340-500, Airbus A340-600, and Boeing 777-300). Only Taxiways Q and T and portions of Taxiways B, C, E, G, H, L, M, N, R, and W are at least 82 feet wide and meet the requirements for TDG 7 aircraft (e.g., Airbus A380-800). A380-800 aircraft are able to operate on taxiways that do not meet TDG 7 requirements through the approved MoSs, which are discussed in Section 3.3.3 of this document.

The distance between the runway centerline and aircraft holding position is defined by ADG and runway visibility minimums. All four SFO runways have aircraft holding positions located 250 feet from the runway centerline. Runways 10L-28R and 10R-28L have approaches with visibility minimums less than 0.75 mile (or 4000 RVR) and require holding positions to be located 280 feet from the runway centerline. Runways 1L-19R and 1R-19L have approaches with visibility minimums greater than 0.75 mile and require holding positions to be located 250 feet from the runway centerline.

#### Exhibit 3.3-4 | Engineered Material Arresting System



Sources: San Francisco International Airport, 2014

Table 3.3-1 | Runway Characteristics, Instrumentation, Lighting, and Instrument Approach Procedures

Item	Runway							
	10R	28L	10L	28R	1R	19L	1L	19R
Length (Feet)	11,381		11,870		8,650		7,650	
Runway Width (Feet)	200		200		200		200	
Shoulder Width (Feet)	50		50		50		50	
Runway End Elevation (Feet Above Mean Sea Level)	7.2	12.7	5.6	13	11.2	10.6	10.5	8.6
Pavement	Grooved Asphalt		Grooved Asphalt		Grooved Asphalt		Grooved Asphalt	
Pavement Classification Number <sup>1</sup>	80 F/B/X/T		80 F/B/X/T		100 F/B/X/T		90 F/B/X/T	
Declared Distances (Feet)								
Takeoff Run Available	11,381	11,381	11,870	11,870	8,650	8,650	7,650	7,650
Takeoff Distance Available	11,382	11,381	11,870	11,870	8,650	8,650	7,650	7,650
Accelerate Stop Distance Available	10,704	10,981	11,193	11,870	8,650	8,650	7,650	7,650
Landing Distance Available	10,704	10,681	11,193	11,570	8,090	8,650	7,010	7,650
Instrument Approach Procedures								
Precision – Instrument Landing System		CAT I SA CAT II <sup>2</sup>		CAT I CAT II/III		CAT I		
Non-Precision	RNAV(RNP) RNAV(GPS)	LOC RNAV(GPS)	RNAV(GPS)	LOC RNAV(RNP) RNAV(GPS) LDA/DME		LOC RNAV(GPS) VOR		RNAV(GPS)
Approach Aids								
Glideslope		•		•		•		
Localizer		•		•		•		
Precision Approach Path Indicator	•	•	•	•		•		•
Approach Lighting System		MALSR		ALSF-2		MALSF		
Runway Lighting								
High Intensity Runway Edge Lights		•		•		•		•
Standard Centerline Lights		•		•		•		•
Touchdown Zone Lights				•		•		

Notes: <sup>1</sup> Pavement Classification Numbers indicate the load-bearing capacity of the runway pavement (number) with flexible pavement (F), on a medium-strength subgrade (B), allows for a high tire pressure (X), and has been calculated through technical evaluation (T).

<sup>2</sup> Special authorization (SA) CAT II Instrument Landing System (ILS) available for Runway 28L.

<sup>3</sup> ALSF-2: Approach Lighting System with Sequenced Flashing Lights, Configuration 2; CAT: Category; DME: Distance Measuring Equipment; GPS: Global Positioning System; LDA: Landing Distance Available; LOC: Localizer; MALSF: Medium Intensity Approach Lighting System with Sequenced Flashers; MALSR: Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights; RNAV: Area Navigation; RNP: Required Navigational Performance; VOR: Very High Frequency Omnidirectional Range Station.

Sources: Federal Aviation Administration, Digital-Airport/Facility Directory, effective September 18, 2014; Federal Aviation Administration, Digital-Terminal Procedures Publications/Airport Diagrams, effective September 18, 2014.

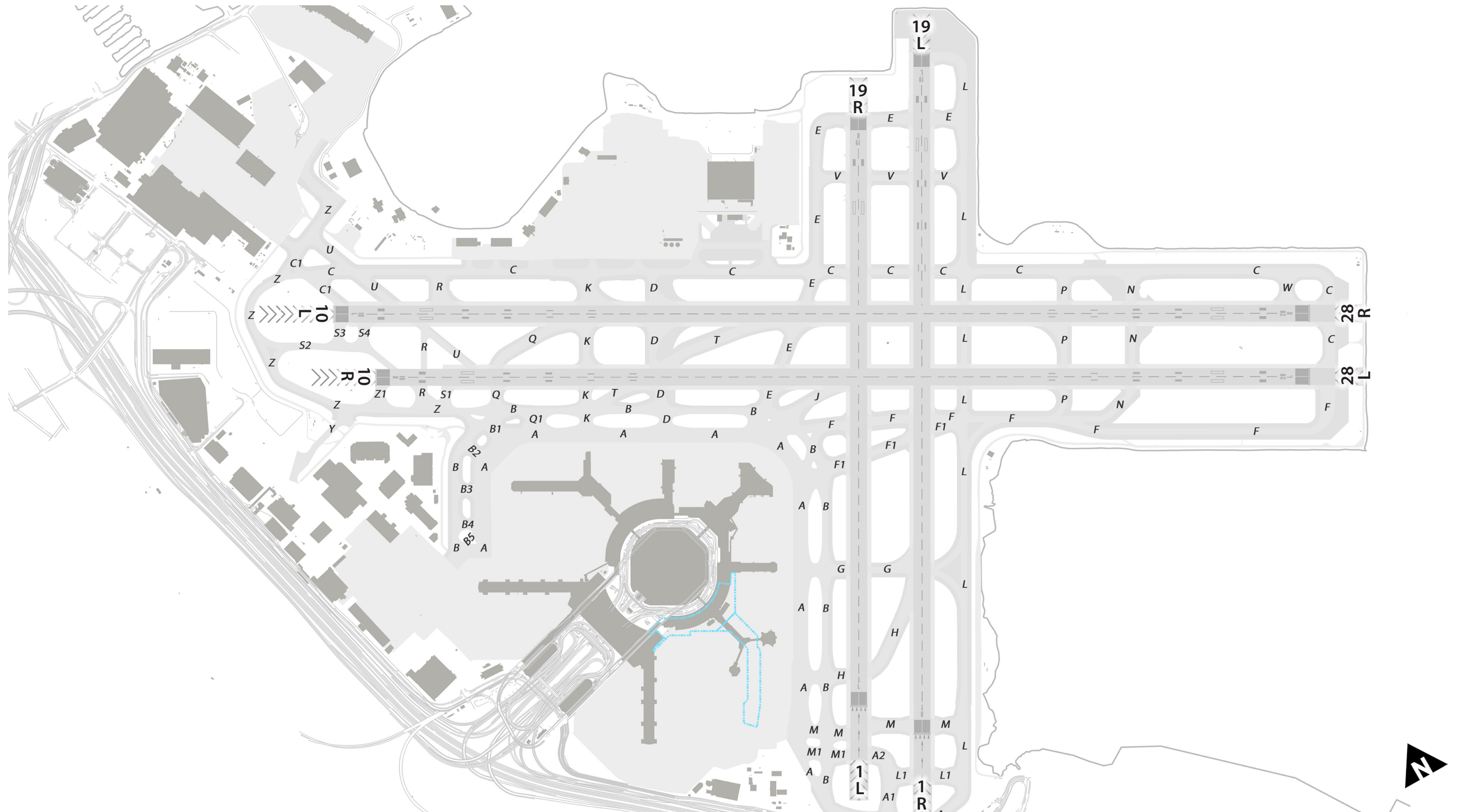
Table 3.3-2 | Taxiway Design Standards (in feet)

Item	Airplane Design Group			
	IV	V	VI	
Taxiway Protection				
Taxiway Safety Area	171	214	262	
Taxiway Object Free Area	259	320	386	
Taxilane Object Free Area	225	276	334	
Taxiway Separation				
Taxiway Centerline-to-Parallel Taxiway/Taxilane Centerline	215	267	324	
Taxiway Centerline-to-Fixed or Movable Object	129.5	160	193	
Taxilane Centerline-to-Parallel Taxilane Centerline	198	245	298	
Taxilane Centerline-to-Fixed or Movable Object	1,125	138	167	
Taxiway to Runway Separation (Aircraft Approach Category D)				
Runway Centerline-to-Taxiway Centerline	400	400	500	
Runway Centerline-to-Taxiway Centerline (Approach Visibility < ¾ Statute Mile)	400	400	500	
Runway Centerline-to-Taxiway Centerline (Approach Visibility < ½ Statute Mile)	400	500	550	
Wingtip Clearance				
Taxiway Wingtip Clearance	44	53	62	
Taxilane Wingtip Clearance	27	31	36	
Taxiway Design Group				
Item	4	5	6	7
Taxiway Width	50	75	75	82
Taxiway Shoulder Width	20	30	30	40

Source: Federal Aviation Administration Advisory Circular 150/5300-13A, Airport Design, Change 1, February 26, 2014



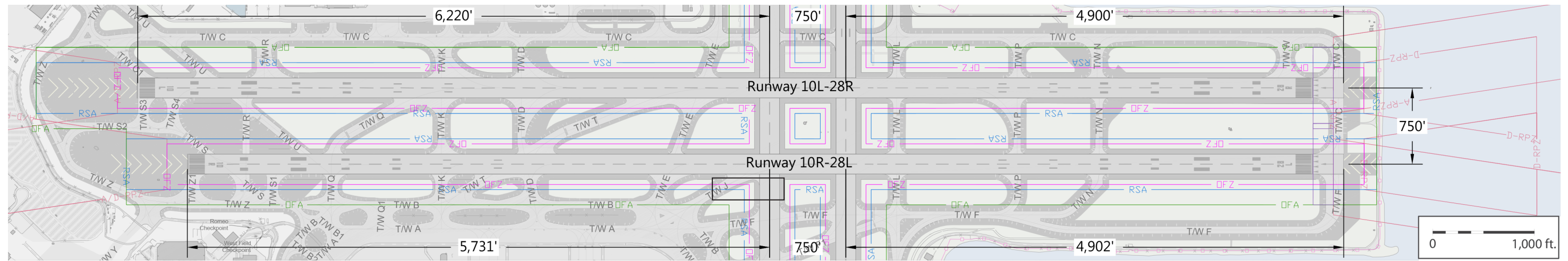
Exhibit 3.3-1 | Airfield at San Francisco International Airport



Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014; Landrum & Brown, Inc., 2016



Exhibit 3.3-2 | Runways 10R-28L and 10L-28R



Runway 10L-28R (11,870' x 200')		
Taxiway	Distance (feet) from 10L Landing Threshold	Distance (feet) from 28R Landing Threshold
S3	50	11,520
C1	219	11,351
S4	350	10,720
U	850	10,720
R(1)	1,068	10,502
R(2)	1,245	10,325
K	2,990	8,580
Q	3,230	8,340
D	3,775	7,795
E	5,542	6,028
1L-19R	6,220	5,350
1R-19L	6,970	4,600
L	7,470	4,100
P	8,657	2,913
N	9,452	2,118
W	11,296	274
C	11,820	-250

Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan 2014; Ricondo & Associates, Inc., October 2014

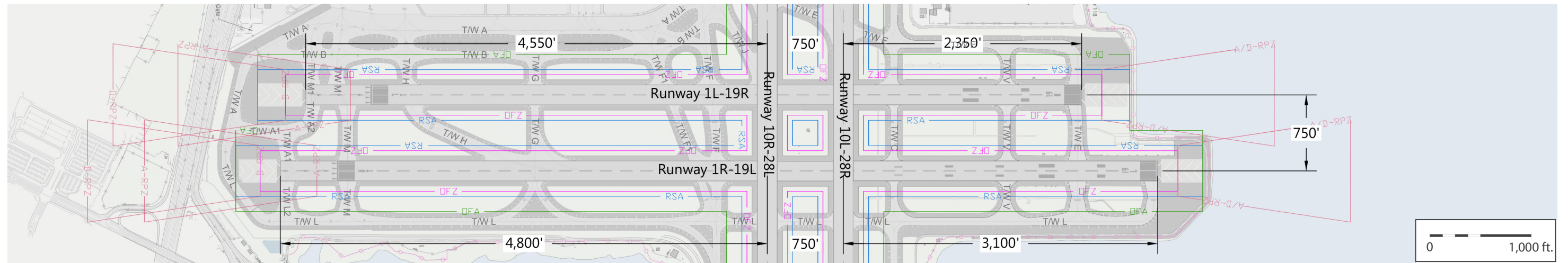
Runway 10R-28L (11,381' x 200')		
Taxiway	Distance (feet) from 10R Landing Threshold	Distance (feet) from 28L Landing Threshold
Z1	50	11,520
S	335	11,351
R	579	10,720
S1	831	10,720
U	1,287	10,502
Q	1,417	10,325
K	2,501	8,580
T	3,178	8,340
D	3,337	7,795
E	4,762	6,028
1L-19R	5,731	5,350
J	6,161	4,600
1R-19L	6,481	4,100
L	6,981	2,913
P	8,168	2,118
N	8,973	274
C	11,331	-250
FUT-N	8,973	274
FUT-F2	10,809	-250

Note: FUT = Future

Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan 2014; Ricondo & Associates, Inc., October 2014



Exhibit 3.3-3 | Runways 1R-19L and 1L-19R



Runway 1L-19R (7,650' x 200')		
Taxiway	Distance (feet) from 1L Landing Threshold	Distance (feet) from 19R Landing Threshold
M1/A2	-584	7,594
M	-287	7,297
H	347	6,663
G	1,620	5,390
F1	2,941	4,069
F	3,361	3,649
10R-28L	3,910	3,100
10L-28R	4,660	2,350
C	5,160	1,850
D	6,272	738
E	6,972	38

Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan 2014; Ricondo & Associates, Inc., October 2014

Runway 1R-19L (8,650' x 200')		
Taxiway	Distance (feet) from 1R Landing Threshold	Distance (feet) from 19L Landing Threshold
L2	-504	8,594
M	103	7,988
G	1,950	6,140
H	2,276	5,814
F1	3,562	4,528
F	3,740	4,350
10R-28L	4,240	3,850
10L-28R	4,990	3,100
C	5,490	2,600
V	6,602	1,488
E	7,229	792
L	8,049	42

Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan 2014; Ricondo & Associates, Inc., October 2014



### 3.3.2.2 Taxiway Layout

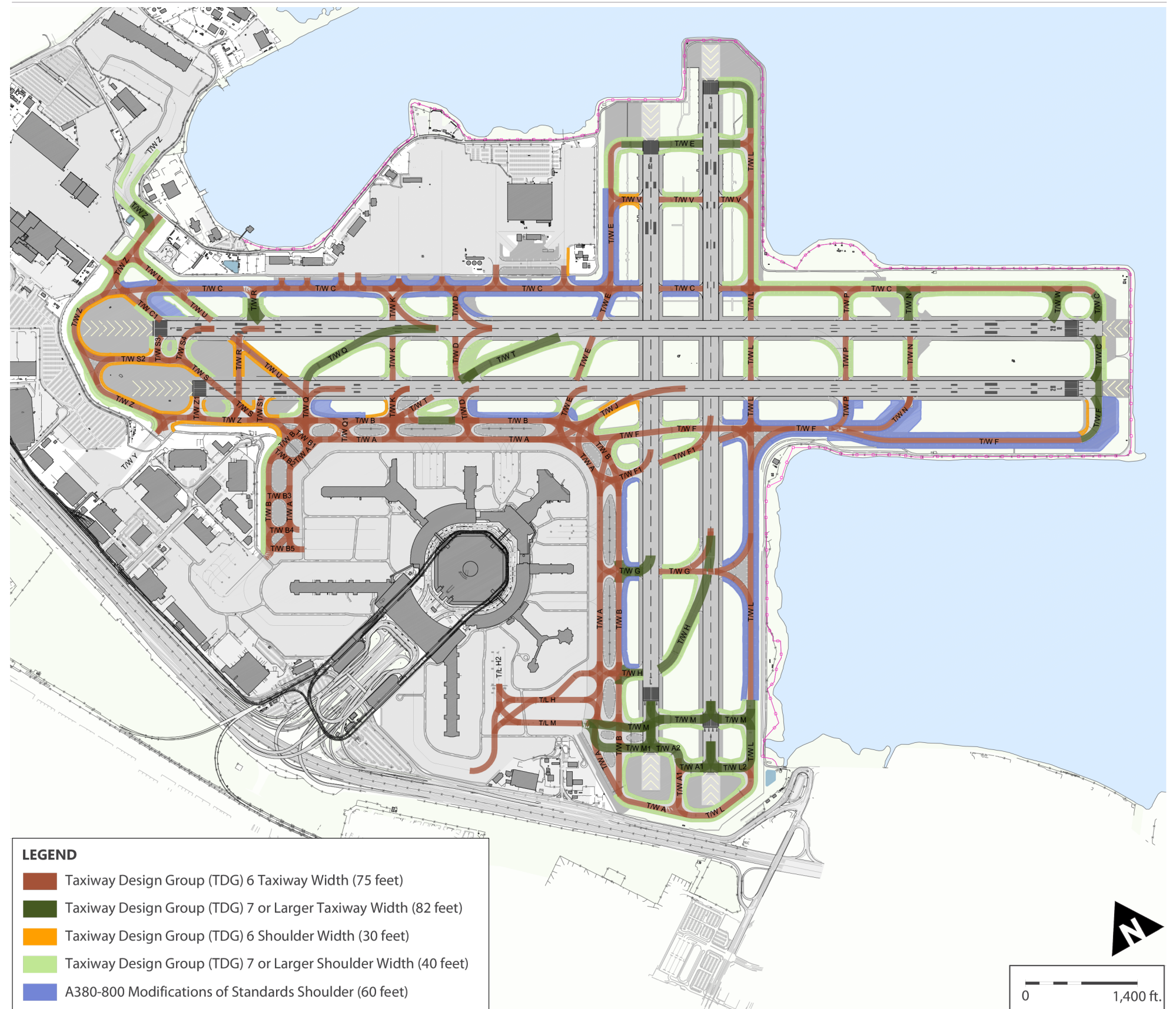
**Exhibit 3.3-5** and **Exhibit 3.3-6** illustrate the dimensions for all SFO taxiways. All runways have nearly full-length parallel taxiways. All taxiways parallel to a runway are separated by 500 feet (centerline to centerline) except Taxiway B, which is separated by 400 feet from the centerlines of Runways 10R-28L and 1L-19R. Near the end of Runway 28L, Taxiway F is separated from the runway centerline by 650 feet.

Taxiways A and B surround the terminal area and provide access to the aircraft aprons and the terminal gates. East of Taxiway Z, the taxiways are separated by 237.5 feet, which is less than the ADGV separation requirement of 267 feet. South of Taxiway Z, Taxiways A and B meet the ADGV separation requirements.

High-speed exit Taxiways T and Q are available for arrivals on Runway 28R and high-speed exit Taxiway H is available for arrivals on Runway 19L. Acute-angle exit Taxiways E, J, and T are available for arrivals on Runway 28L to provide access to the terminal area. Acute-angle exit Taxiways D, K, and R are also available on the north side of Runway 28R to parallel Taxiway C, which provides access to the cargo, general aviation, and aircraft maintenance facilities.

Existing Taxilanes H and M (which will be renamed Taxilanes M1 and M2) are planned to be shifted to the south to create more apron space for additional contact gates. This shift of Taxilanes H and M to the south is possible because several buildings south of the terminal area will be demolished. The reconfiguration of these taxilanes is estimated to be completed in 2016 or 2017. The addition of Taxilane AA along the east side of future Boarding Area (B/A) B is also planned as part of the redevelopment of this area of the airfield.

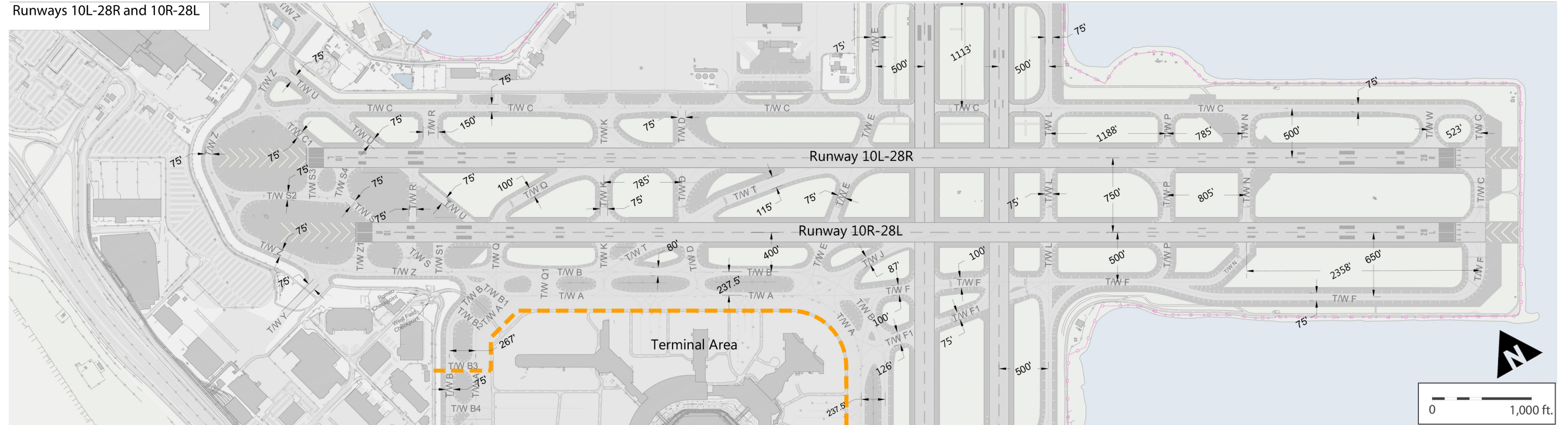
**Exhibit 3.3-5 | Taxiway and Taxiway Shoulder Widths**



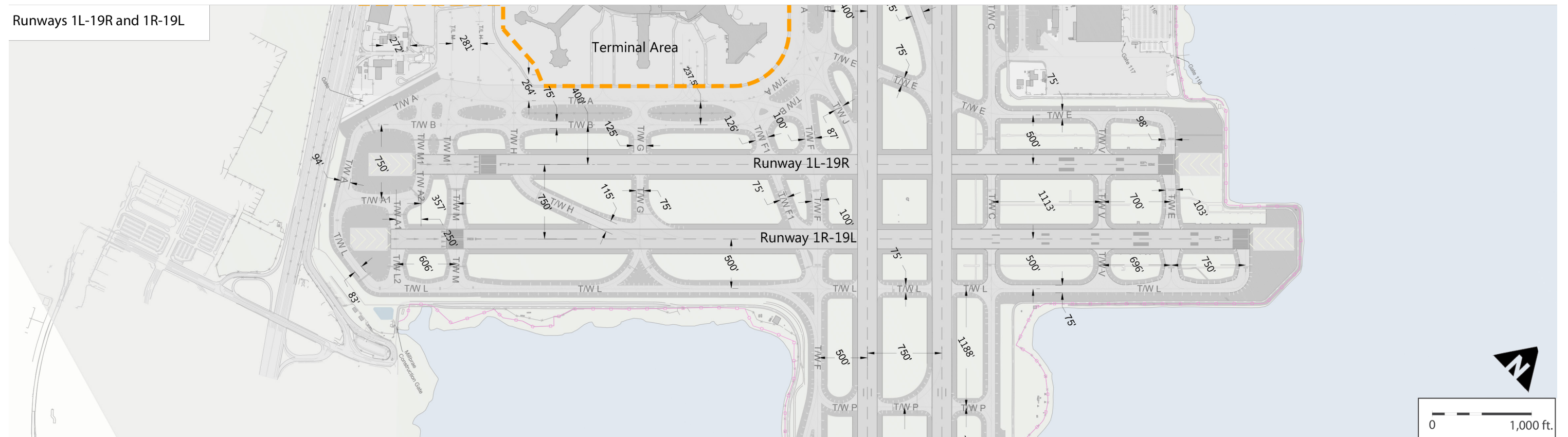
Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014; Ricondo & Associates, Inc., October 2014



Exhibit 3.3-6 | Taxiway Dimensions  
Runways 10L-28R and 10R-28L



Runways 1L-19R and 1R-19L



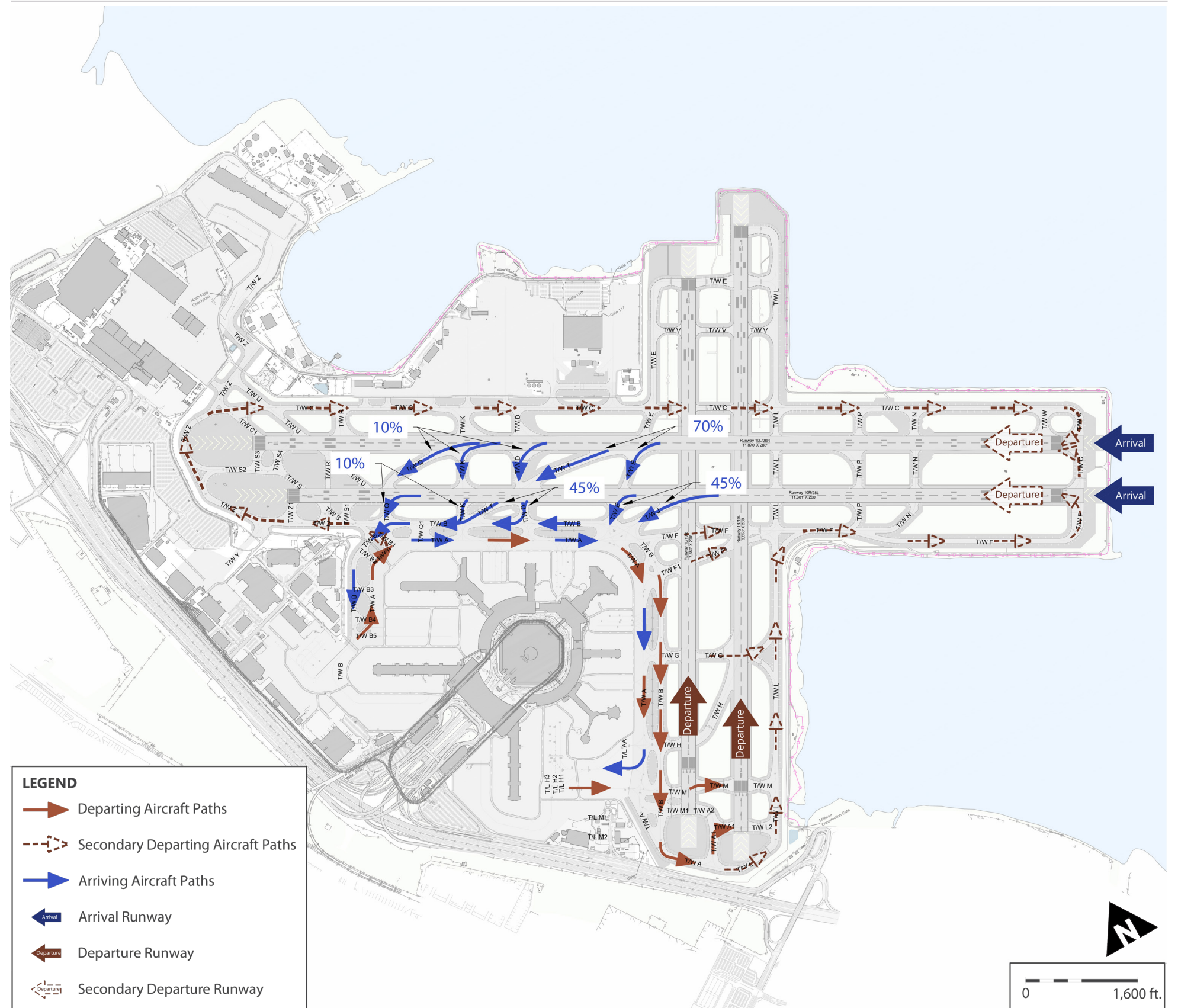
Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014; Ricondo & Associates, Inc., October 2014



### 3.3.2.3 Taxiway Flows

**Exhibit 3.3-7** depicts the taxiway flows in the West Plan. According to SFO Airport Traffic Control Tower (ATCT) staff, for arrivals on Runway 28R, approximately 70 percent of aircraft exit at either Taxiway E or Taxiway T, and 10 percent of aircraft exit at each of Taxiways D, K, and Q. For arrivals on Runway 28L, approximately 45 percent of aircraft exit at either Taxiway J or E, 45 percent exit at either Taxiway D or T, and 10 percent exit at either Taxiway K or Q. Operations on Taxiways A and B typically flow in both directions on the north side of the terminal area and in one direction on the south side of the terminal area. Aircraft departing from Runways 1L and 1R use Taxiways A and B to Taxiways M and M1 to access Runway 1L, and Taxiways A, A1, and M to access Runway 1R. A blast fence makes it possible for aircraft to use Taxiway A when departing from Runway 1L. Because no jet blast protection is provided on Taxiway L, aircraft are prohibited from crossing behind Runway 1R on Taxiway L during departure operations. Aircraft departing on Runway 28L or 28R cross Runways 1L-19R and 1R-19L at Taxiways F, F1, or G.

Exhibit 3.3-7 | Taxiway Flows, West Plan



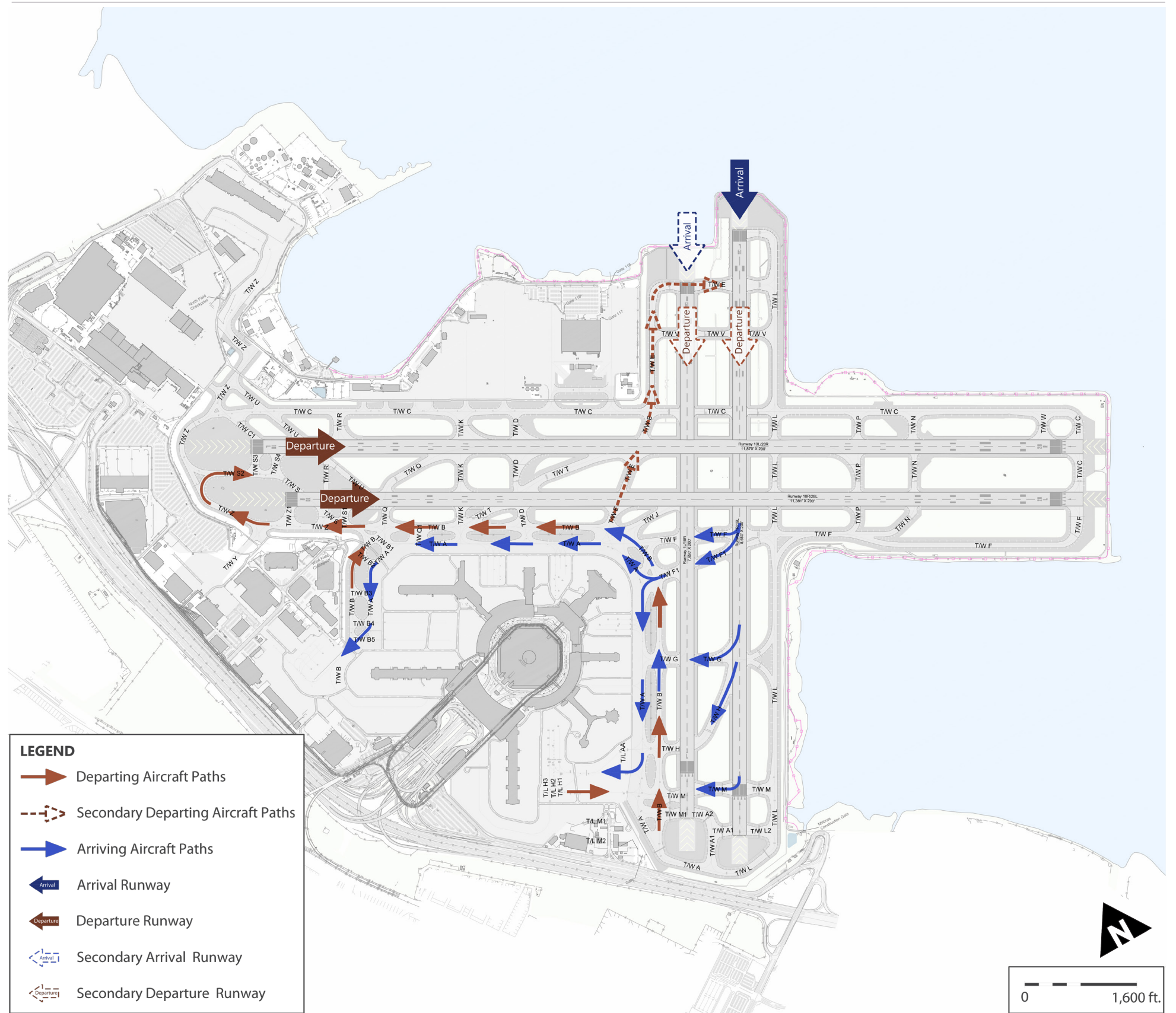
Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014; Ricondo & Associates, Inc., October 2014



**Exhibit 3.3-8** shows taxiway flows in the Southeast Plan. In this flow, aircraft typically arrive on Runway 19L with Runway 19R used as an alternate arrival runway. SFO ATCT staff stated that regional jets exit the runway at Taxiway F and heavy aircraft exit the runway at Taxiway M. The remaining aircraft arriving on Runway 19L primarily use Taxiways F1, G, and H to exit the runway. Operations on Taxiways A and B typically flow in both directions on the south side of the terminal area and in one direction on the north side of the terminal area.

Aircraft departing from Runway 10R are routed to Taxiway S or, during dual departures on Runways 10L and 10R, aircraft departing from both runways are routed around Runway 10R on Taxiways Z and S2. During dual departure operations, wake turbulence issues require aircraft departing on Runway 10L to use Taxiway S4 and aircraft departing on Runway 10R to use Taxiway S. Aircraft are able to taxi on Taxiway Z independent of departures on Runways 10L and 10R.

**Exhibit 3.3-8 | Taxiway Flows, Southeast Plan**



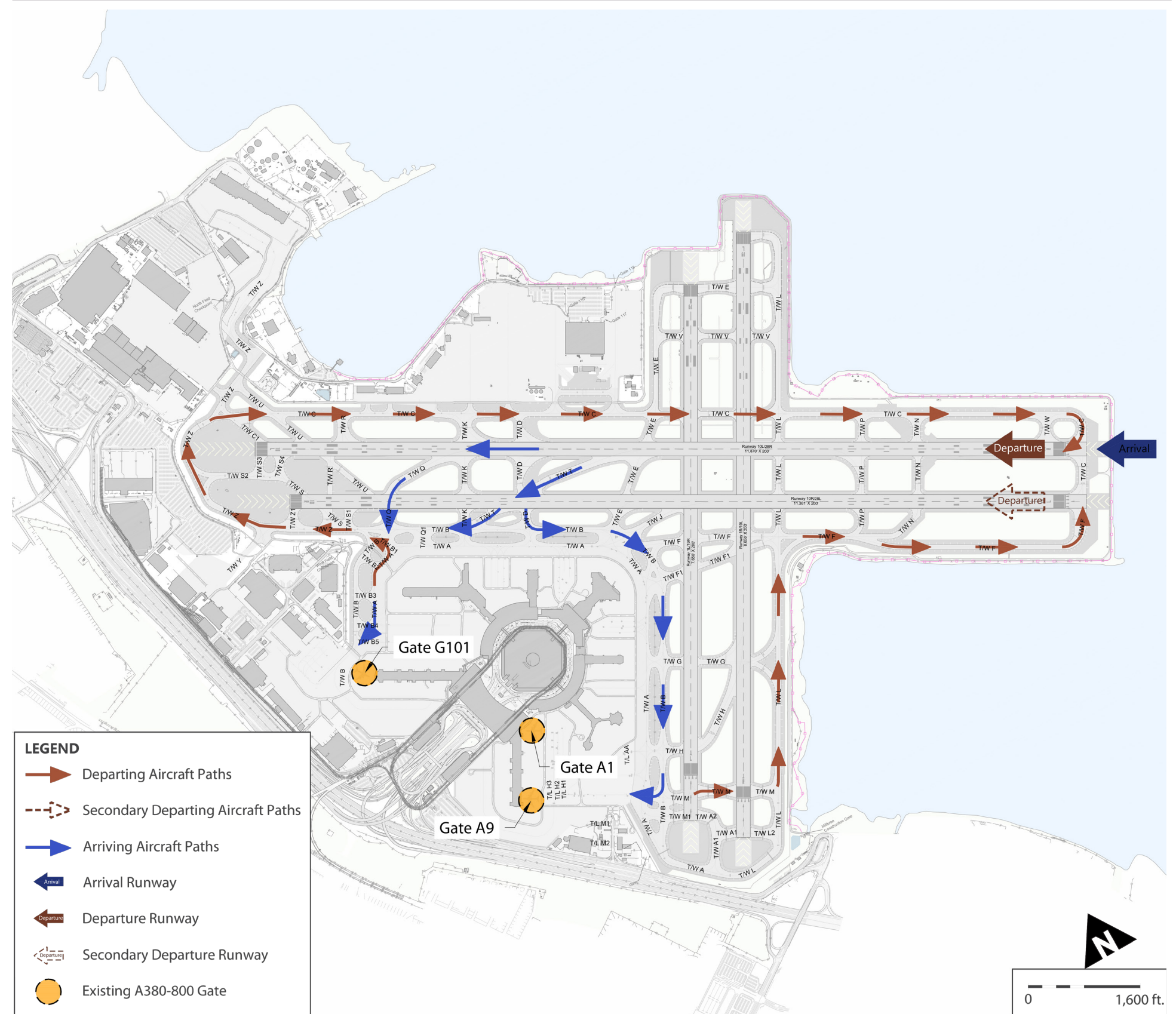
Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014; Ricondo & Associates, Inc., October 2014



A380-800 aircraft are restricted from taxiing on certain taxiways at SFO because most taxiways do not meet design standards for ADG VI and TDG 7 aircraft. An MoS for the A380-800 at SFO specifies a deviation from the established FAA standards to allow this aircraft to use certain taxiways. As depicted in **Exhibit 3.3-9**, three gates can accommodate the A380-800: Gates A1, A9, and G101.

During West Plan operations, A380-800 aircraft primarily arrive on Runway 28R, exit the runway at Taxiway T or Taxiway Q, and proceed either to Taxiway B to access ADG VI-compatible Gates A1 and A9 or to Taxiway A to access Gate G101. A380-800 aircraft depart primarily from Runway 28R and are typically routed around the runways on Taxiways Z and C or Taxiways L and F. FAA ATC uses this routing to avoid conflicts with aircraft pushing back in the terminal area. The location of a fuel vault adjacent to Taxiway Z near the intersection with Taxiway S1 requires A380-800 aircraft to be led through this area by a “follow-me” vehicle.

Exhibit 3.3-9 | Airbus A380-800 Taxiway Flows, West Plan

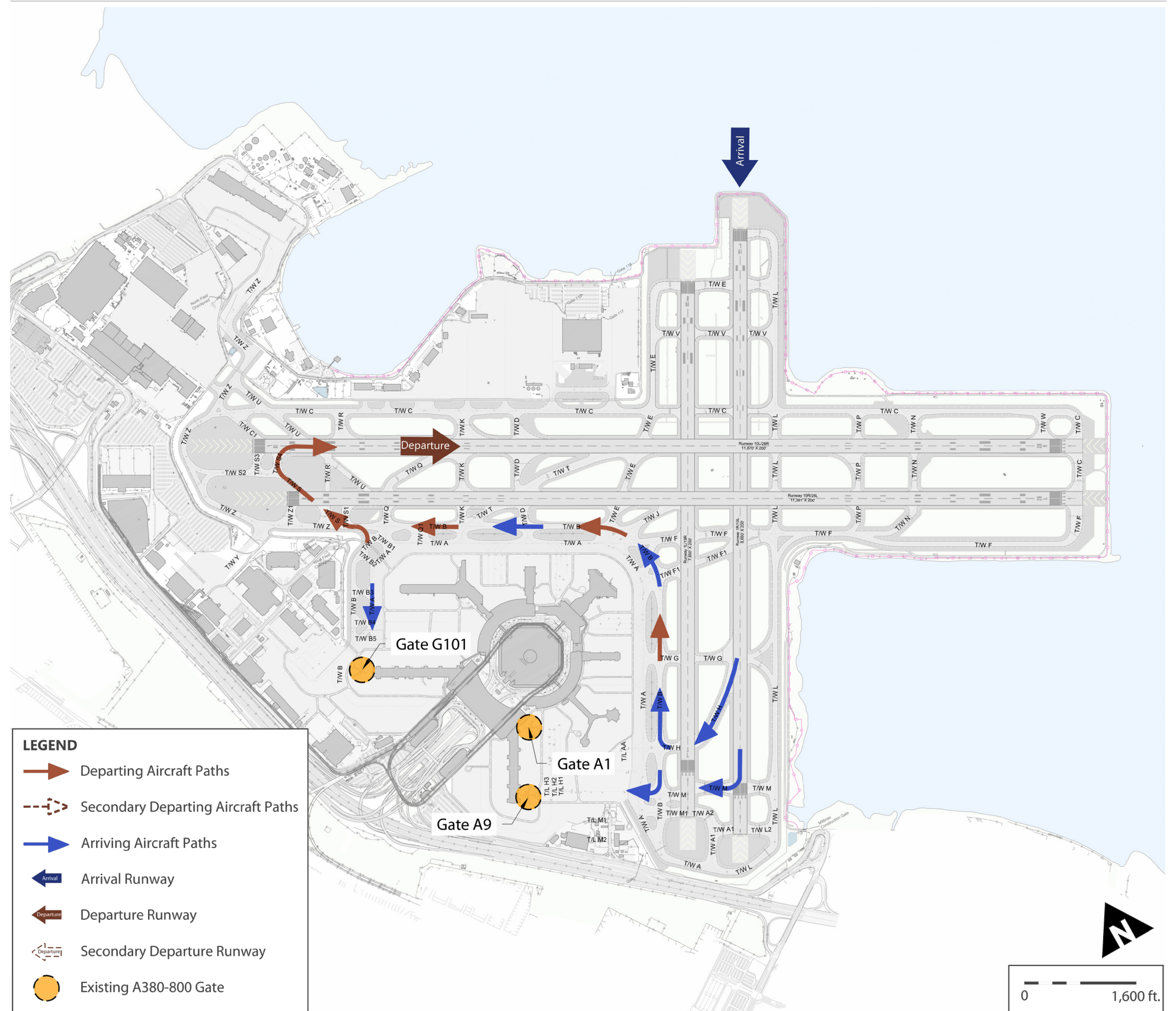


Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014; Ricondo & Associates, Inc., October 2014



During Southeast Plan operations, A380-800 aircraft arrive on Runway 19L and access the terminal area via Taxiway B from Taxiway H or M, as depicted in **Exhibit 3.3-10**. A380-800 aircraft depart from Runway 10L in the Southeast Plan, and are routed around Runway 10R via Taxiway Z or across the runway via Taxiway S to Taxiway S4.

**Exhibit 3.3-10 | Airbus A380-800 Taxiway Flows, Southeast Plan**



Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014; Ricondo & Associates, Inc., October 2014



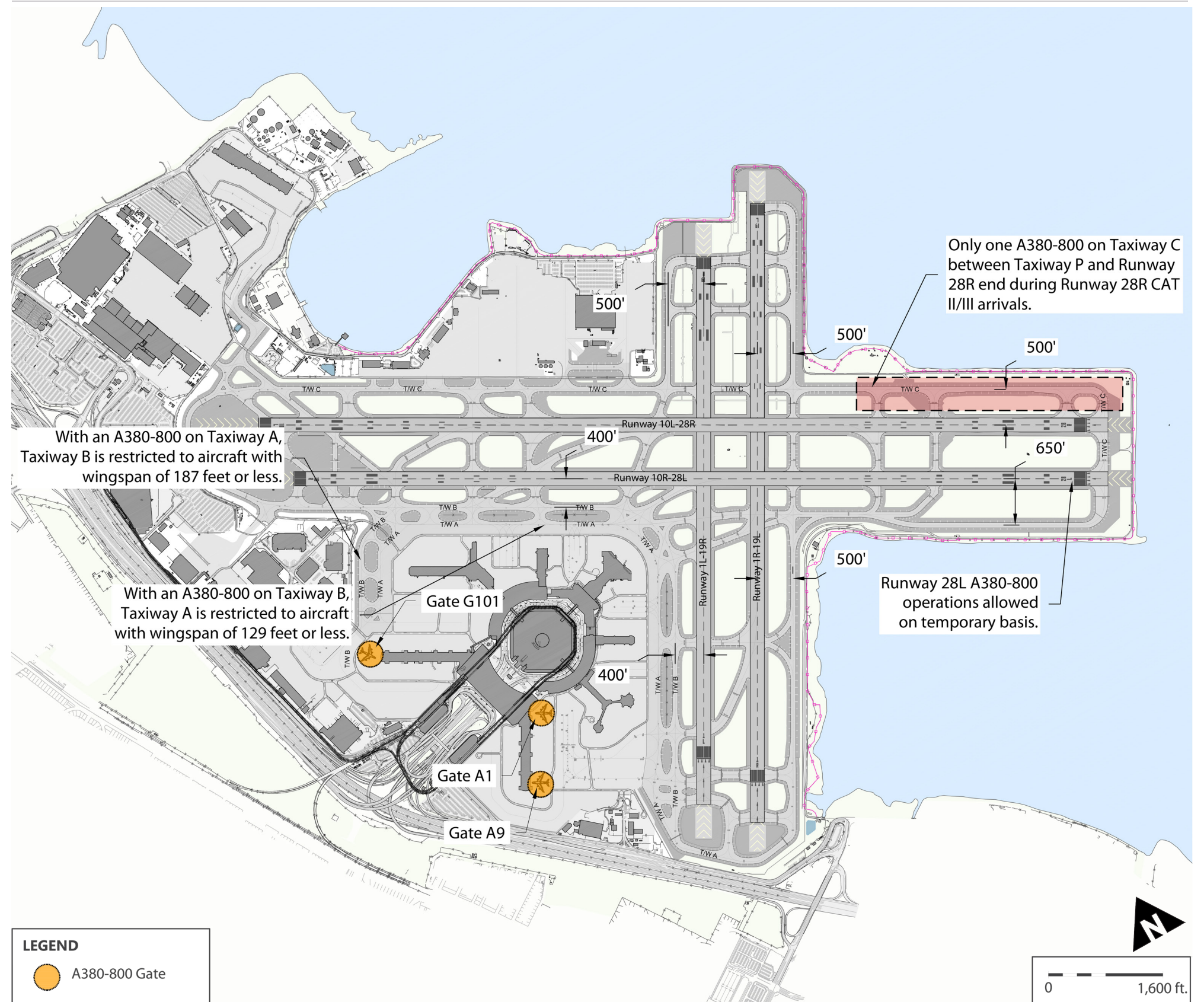
### 3.3.3 Modifications of Standards

A number of MoSs approved for SFO allow certain aircraft to operate on runways and taxiways that do not comply with the FAA design standards for those aircraft types. Primarily, these MoSs relate to the Airbus A380-800 and Boeing 747-8 aircraft that have been operating at SFO since 2005.

To accommodate operation of the Airbus A380-800 at SFO, the FAA San Francisco Airports District Office (ADO) conditionally approved a series of four MoSs in 2004 and 2011. These included approval for less-than-standard conditions related to taxiway pavement width, taxiway centerline-to-fixed or movable object separation, taxiway centerline-to-parallel taxiway centerline separation, and runway centerline-to-parallel taxiway centerline separation.

**Exhibit 3.3-11** depicts operational restrictions in place as a result of the MoSs.

**Exhibit 3.3-11 | Airbus A380-800, Modifications of Standards – Conditions for Approval**



Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014; Ricondo & Associates, Inc., October 2014

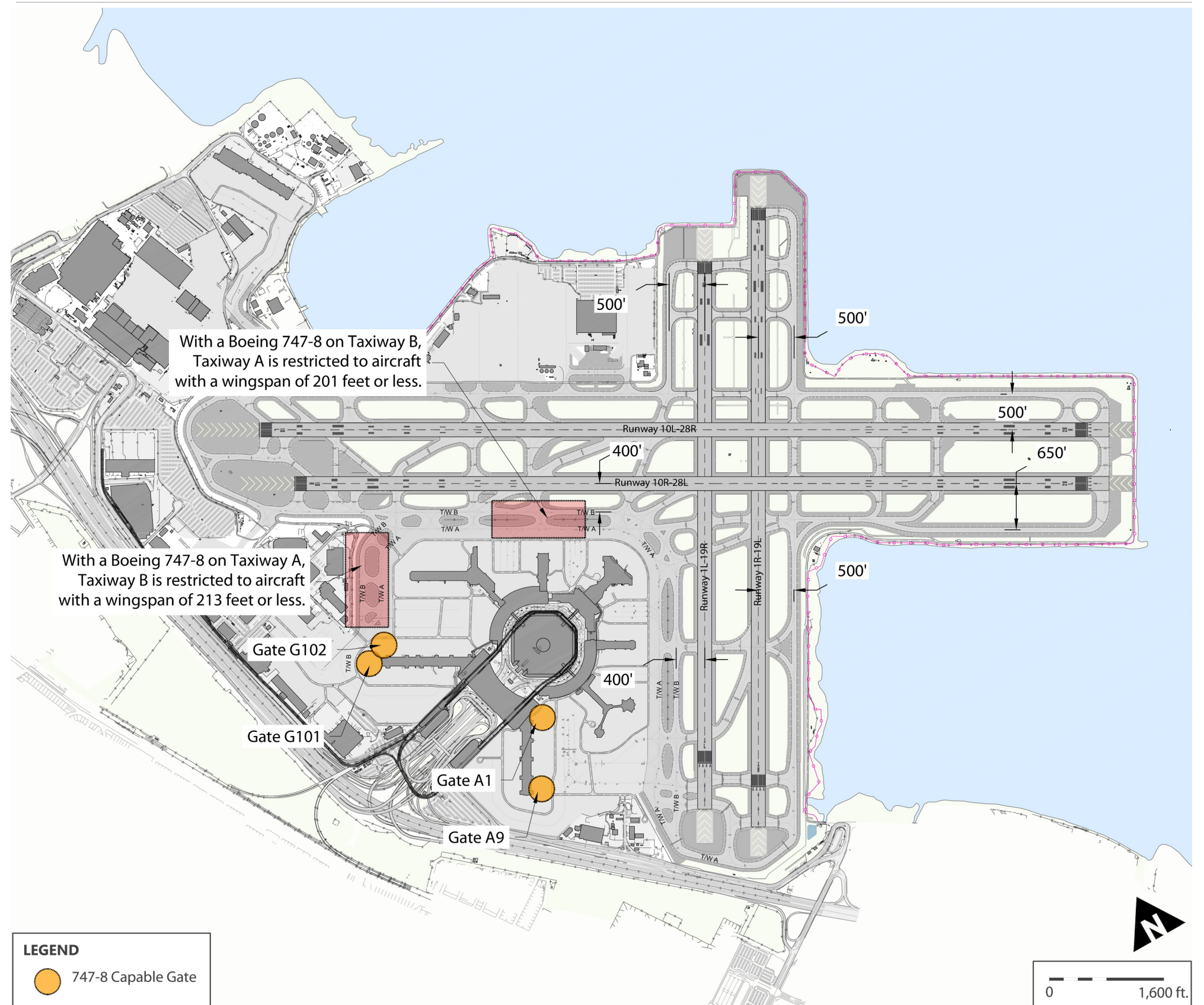


Similar to the MoSs related to the Airbus A380-800, several MoSs were conditionally approved for the Boeing 747-8 in 2011. These MoSs address taxiway pavement width, taxiway centerline-to-fixed or movable object separation, taxiway centerline-to-parallel taxiway centerline separation, and runway centerline-to-parallel taxiway centerline separation. **Exhibit 3.3-12** depicts the airfield infrastructure available for operation by the Boeing 747-8 and the operational restrictions in place as a result of the MoSs.

The following summarizes the current FAA-approved MoSs for SFO.

- Airbus A380-800
  - Provide 500 feet of separation between Runway 10L-28R/Taxiway C and Runway 1R-19L/Taxiway L
  - Provide 75-foot taxiway width and 60-foot taxiway shoulders
  - Provide separation of 267.5 feet for parallel Taxiways A and B, west of Taxiway Q, subject to wingspans of 187 feet or less on Taxiway B when an A380-800 is operating on Taxiway A
  - Provide 146.5-foot taxiway centerline-to-object separation for Taxiways A, C, F, L, M, and Z
  - Provide for A380 operations on Runway 28L on a temporary basis
- Boeing 747-8:
  - Aircraft can operate as an ADGV aircraft in accordance with SFO rules for runway to parallel taxiway separation
  - Provide 400 feet of separation (ADG V) between runway and taxiway centerlines
  - Provide 267 feet of separation between parallel taxiways
  - Provide 137 feet of separation to fixed or movable objects
  - Provide 75-foot taxiway width and 35-foot taxiway shoulders

**Exhibit 3.3-12 | Boeing 747-8, Modifications of Standards – Conditions for Approval**



Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014; Ricondo & Associates, Inc., October 2014



### FAA Hot Spots

The FAA defines a “hot spot” as an area in the airport movement area with a history of potential risk of collision or runway incursion and where heightened attention by pilots and drivers is necessary. Hot spots typically occur as a result of a combination of the following conditions:

- Deficient or unclear airfield signage, markings, or lighting
- Taxiway or runway geometry
- Human factors

The FAA identifies hot spots on airport diagrams to heighten pilot awareness of known problem areas on an airfield. **Exhibit 3.3-13** depicts and describes the three SFO hot spots (HS1, HS2, and HS3) identified by the FAA.

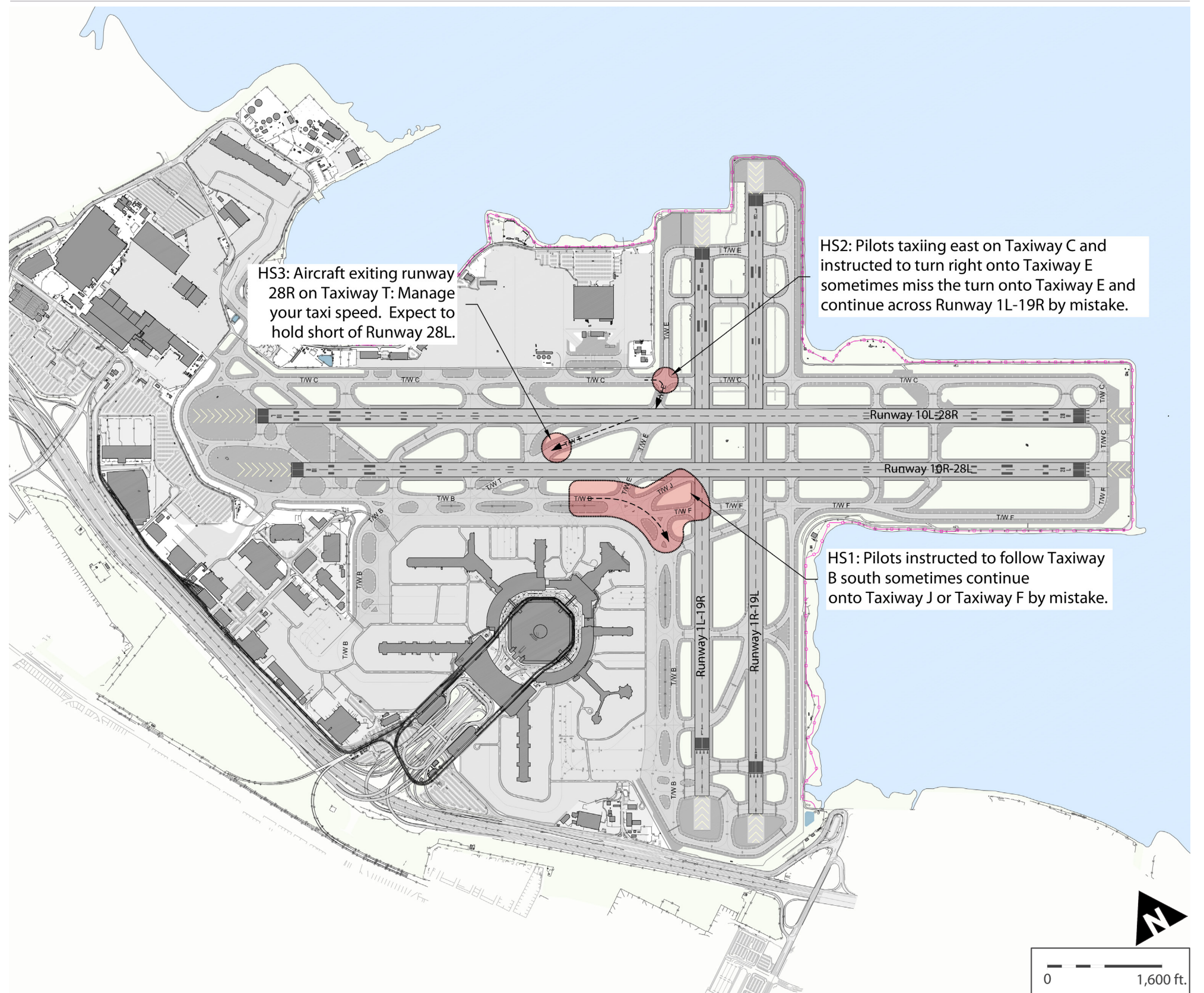
### 3.3.4 Runway and Airfield Lighting

The existing airfield has runway and taxiway lighting and other visual aids (approach lighting systems, precision approach path indicators [PAPIs]), as depicted in **Exhibit 3.3-14** and **Exhibit 3.3-15**. Runway lighting includes threshold, runway end identifier, and touchdown zone lights to facilitate aircraft arrivals and runway centerline and edge lights to facilitate aircraft arrivals and departures.

Taxiway centerline lights are located throughout the airfield to assist with pilot navigation on the taxiways. Taxiway edge lights are located along portions of the taxiways near runway access points, in the islands between Taxiways A and B, and on the north side of Taxiway C on the access taxiways to the general aviation and aircraft maintenance apron.

All taxiways that provide runway access have runway guard lights to identify the runway holding position markings for the RSAs and approach surfaces. Stop bar lights are unidirectional in-pavement yellow lights that run perpendicular across the width of the taxiway to caution pilots of runway entrance locations when traversing taxiways.

Exhibit 3.3-13 | FAA-Identified Hot Spots at SFO

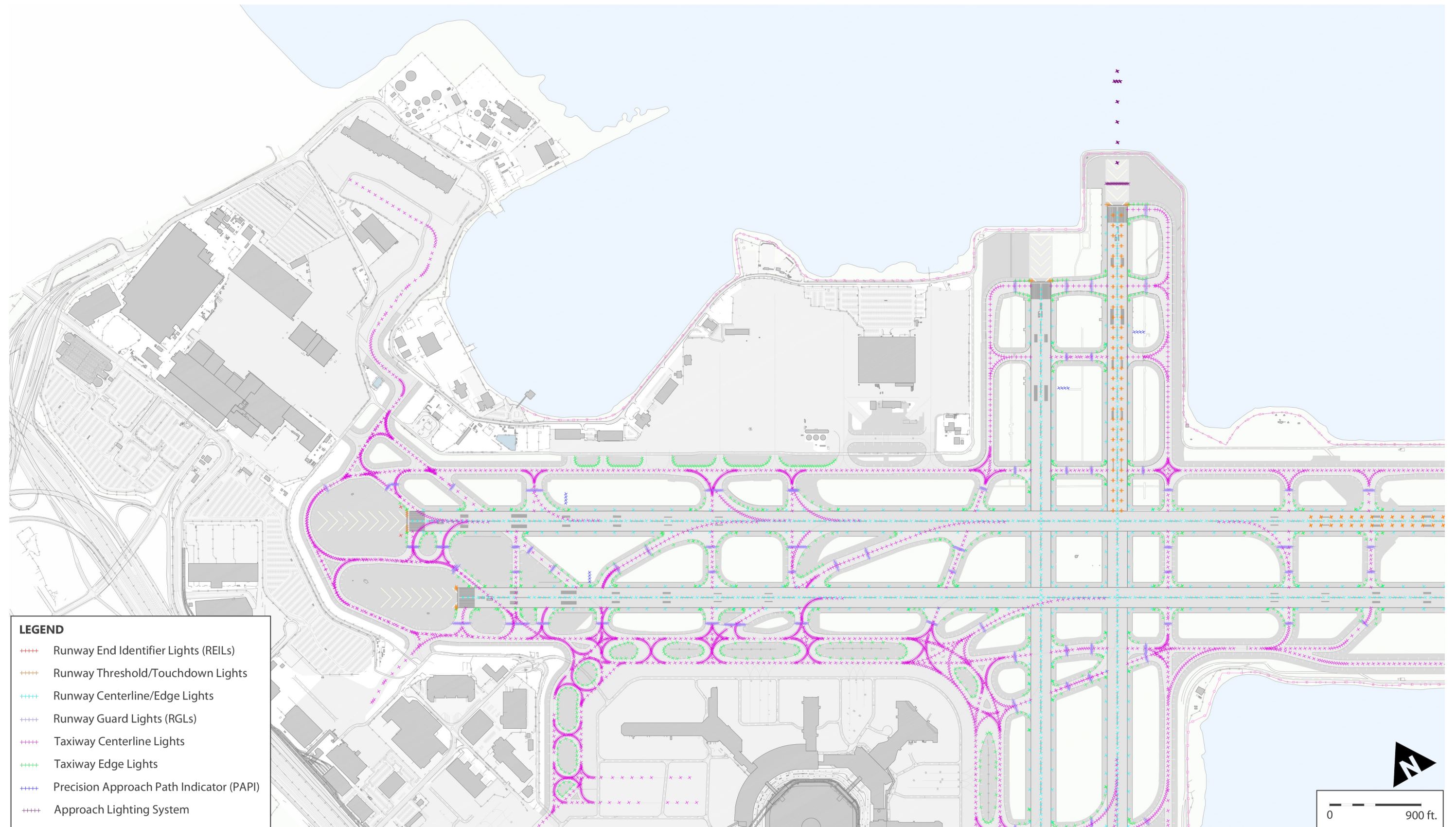


Note: Hot spot descriptions are verbatim from FAA Airport Diagram.

Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014; Ricondo & Associates, Inc., October 2014



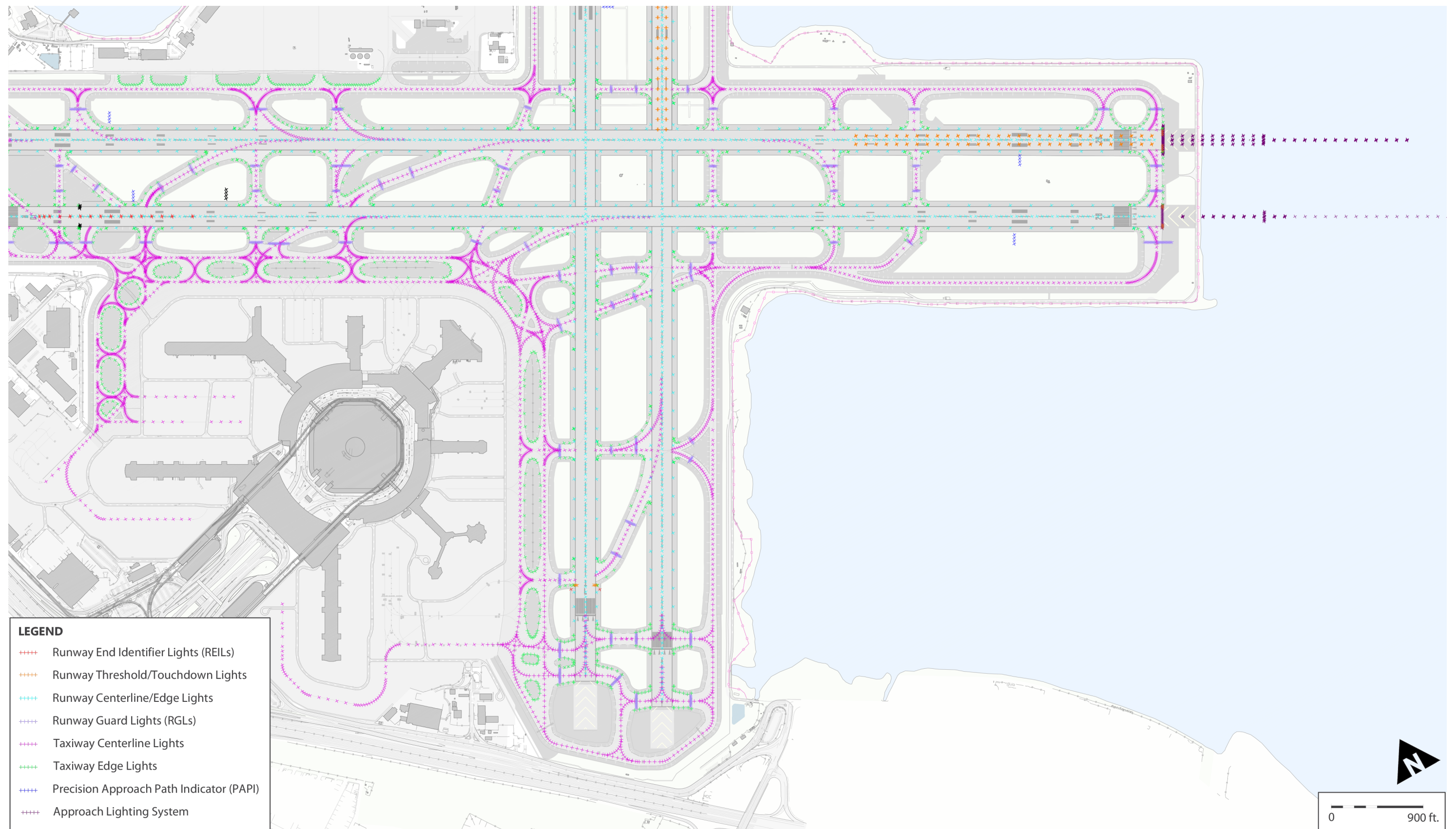
Exhibit 3.3-14 | Airfield Lighting, North Airfield (Runways 10L, 10R, 19L, and 19R)



Source: San Francisco International Airport Airfield Electrical Plan, December 2013



Exhibit 3.3-15 | Airfield Lighting, South Airfield (Runways 1L, 1R, 28L, and 28R)



Source: San Francisco International Airport Airfield Electrical Plan, December 2013



### 3.3.5 Airfield Signage

Airfield signage identifies the locations of runways, taxiways, and aprons and provides directional information for the pilot to maneuver aircraft on the airfield as directed by air traffic controllers.

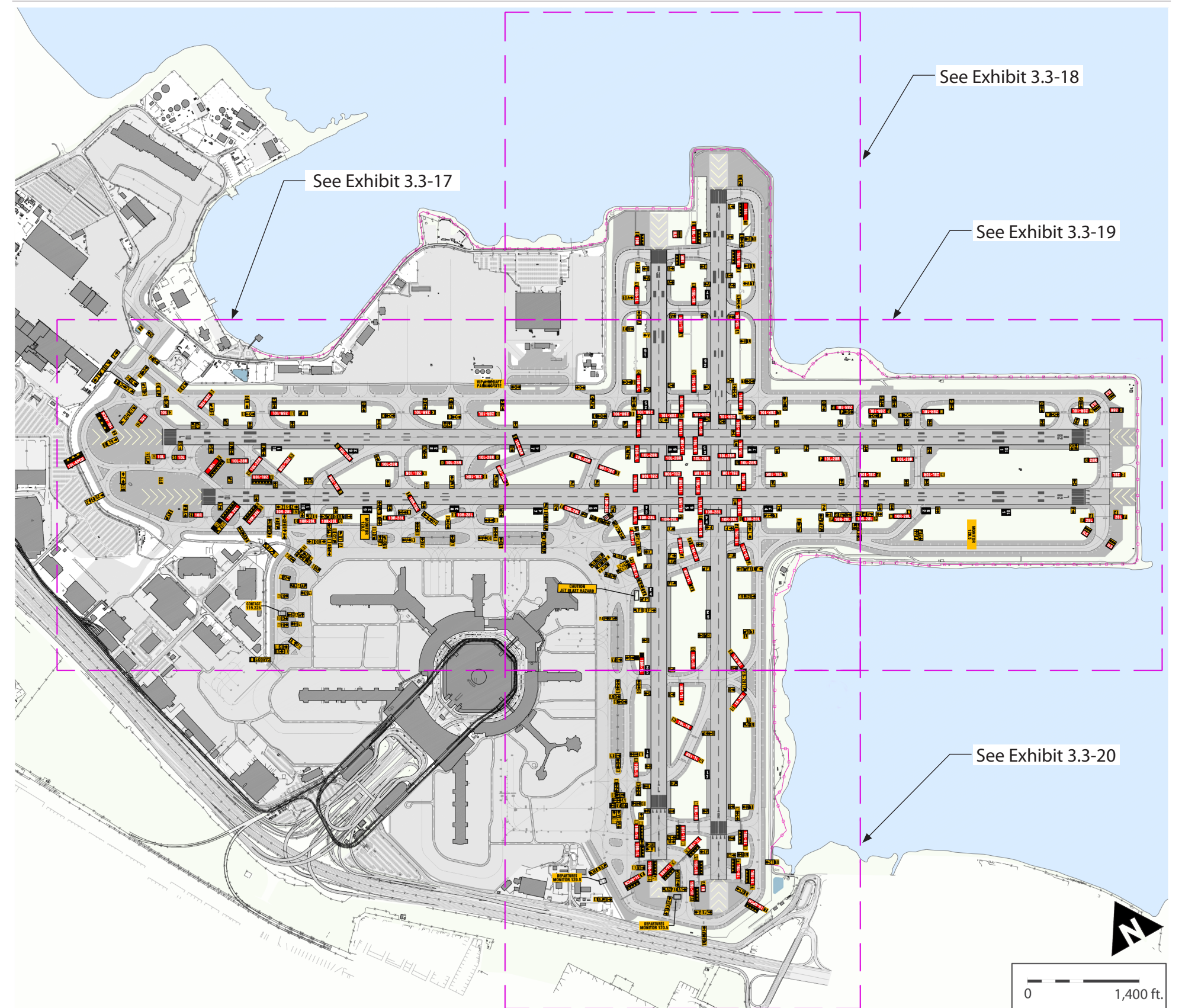
**Exhibit 3.3-16** through **Exhibit 3.3-20** depicts the locations and types of airfield signage as listed below.

	<b>Taxiway Location:</b> Yellow text on a black background identifies the taxiway on which an aircraft is moving.
	<b>Directional Guidance:</b> Black text with arrows on a yellow background directs pilots to the adjoining taxiways.
	<b>Mandatory Instruction:</b> White text on a red background designates holding positions (taxiway/runway intersection, ILS critical area, precision OFZ boundary, runway approach area, and CAT II/III operations area).
	<b>Boundary:</b> Black lines on a yellow background identify the boundary of an RSA, OFA, runway approach area (two solid horizontal lines over two dashed horizontal lines), ILS critical area, precision OFZ boundary, and CAT II/III operations (two horizontal lines with pairs of connecting vertical lines).
	<b>Informational:</b> Black text on a yellow background provides information about jet blast, radio frequencies, and other specialized information.
	<b>Runway Distance Remaining:</b> White text on a black background informs pilots of the runway distance remaining in increments of 1,000 feet.

### 3.3.6 Taxiway Pavement Conditions

A 2012 taxiway pavement survey determined the Pavement Condition Index (PCI) illustrated on **Exhibit 3.3-21**. The PCI is used to identify taxiway pavement that may need to be replaced, which could influence the implementation planning for reconfiguring taxiways. Most of the taxiway pavements are rated as fair or better, except for portions of Taxiways C and U, which are rated poor in areas depicted in the exhibits in **red**.

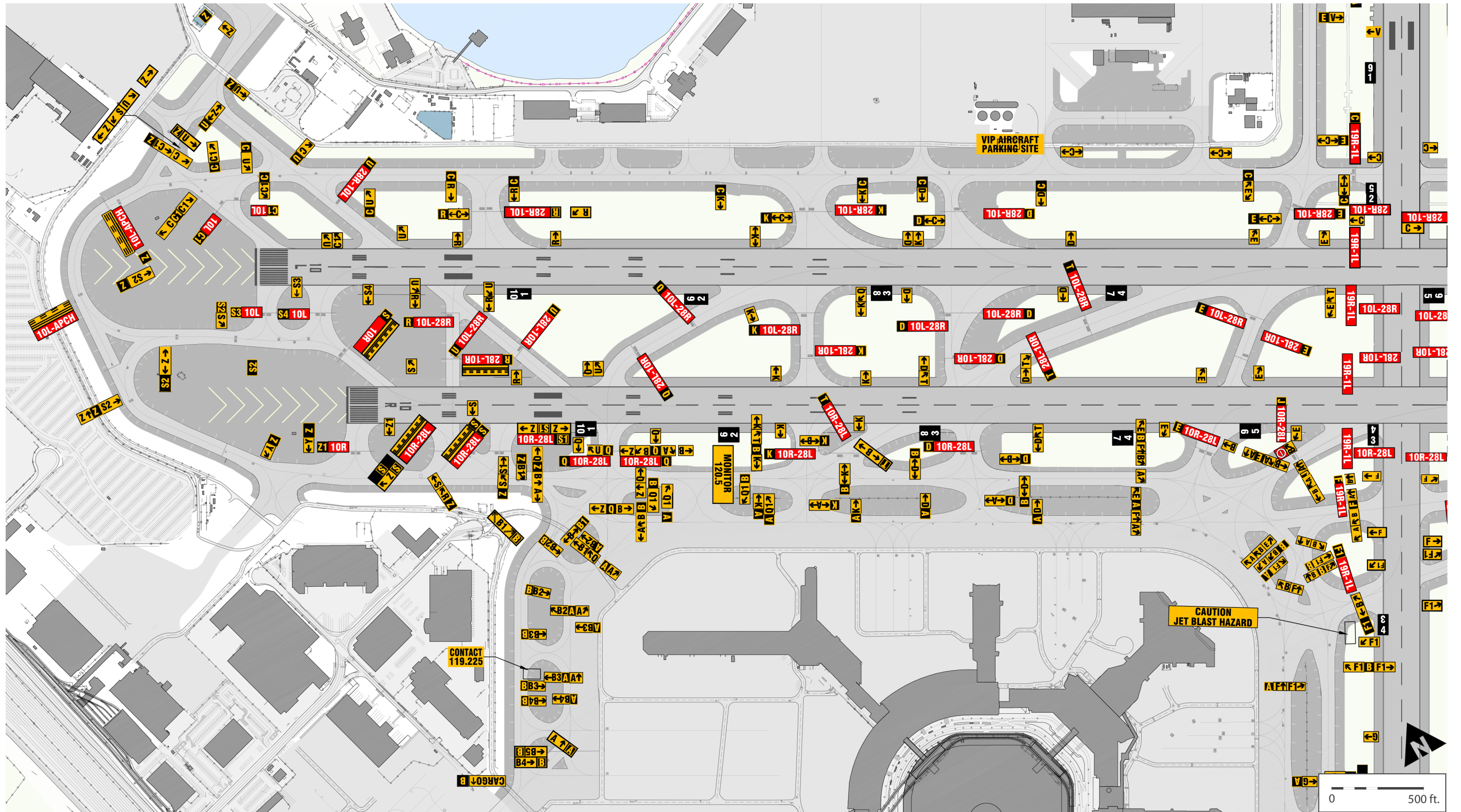
**Exhibit 3.3-16 | Airfield Signage Overview**



Source: San Francisco International Airport Airfield Signage Plan, September 2014



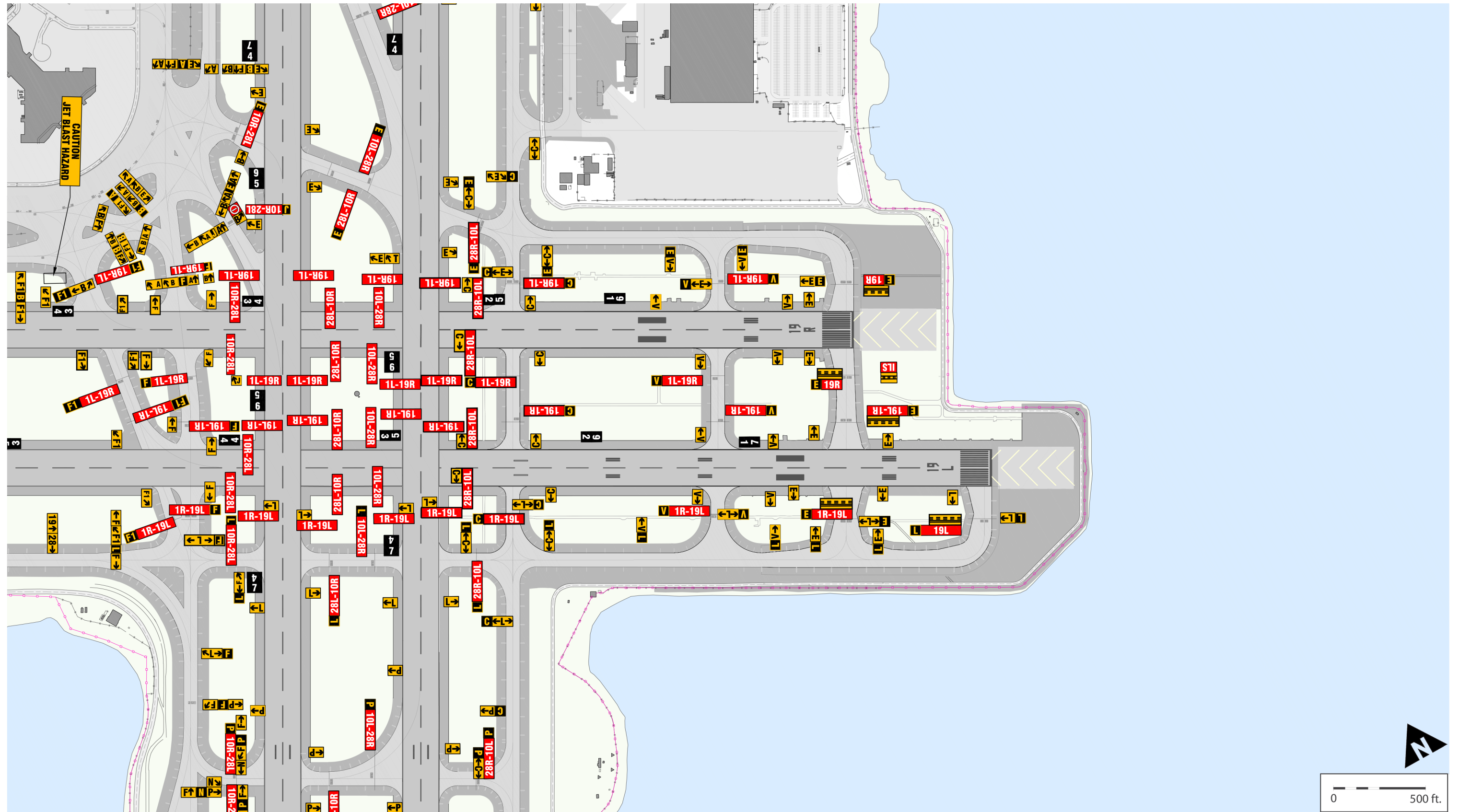
Exhibit 3.3-17 | Airfield Signage, Detail of Runways 10L and 10R



Source: San Francisco International Airport Airfield Signage Plan, September 2014



Exhibit 3.3-18 | Airfield Signage, Detail of Runways 19R and 19L



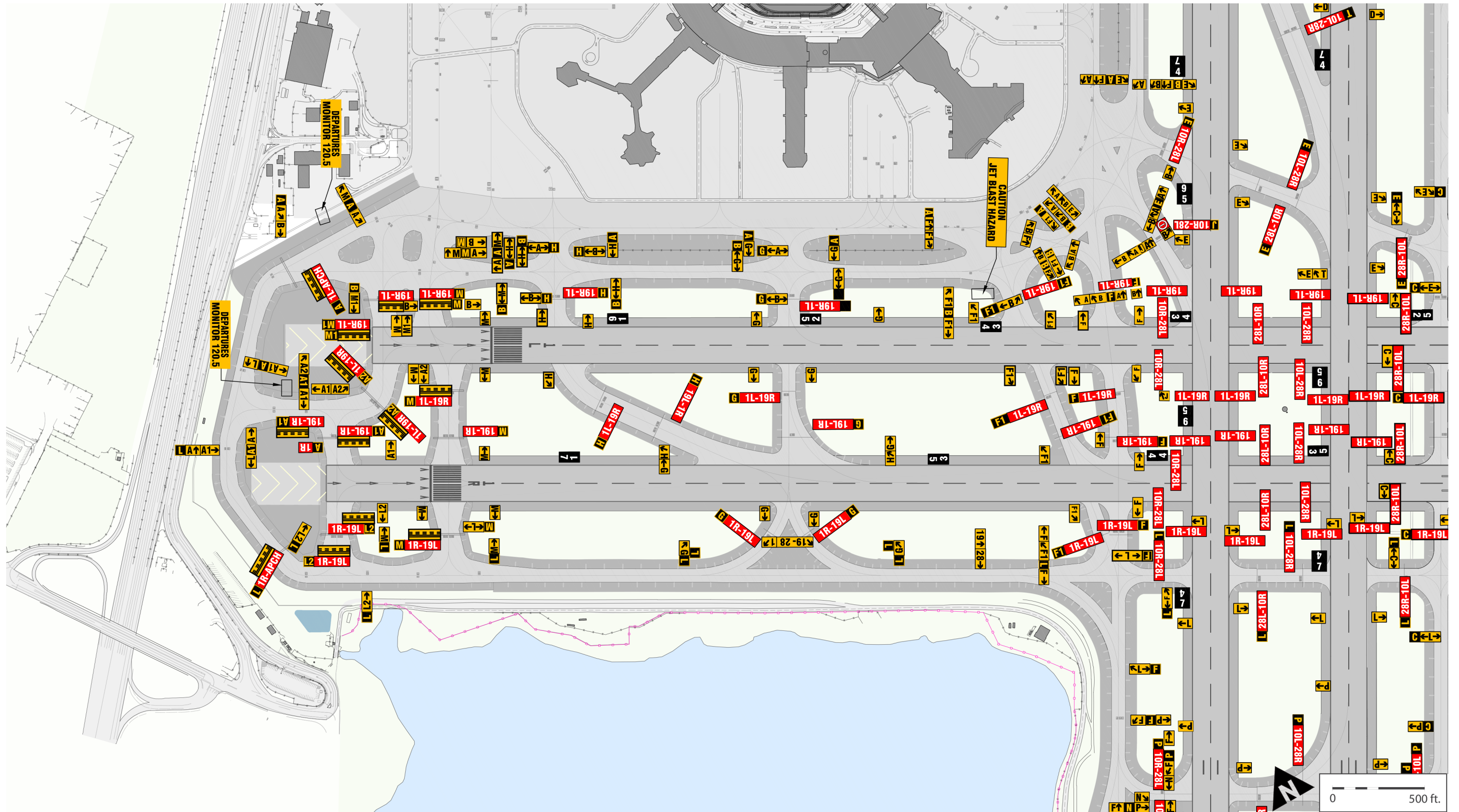
Source: San Francisco International Airport Airfield Signage Plan, September 2014







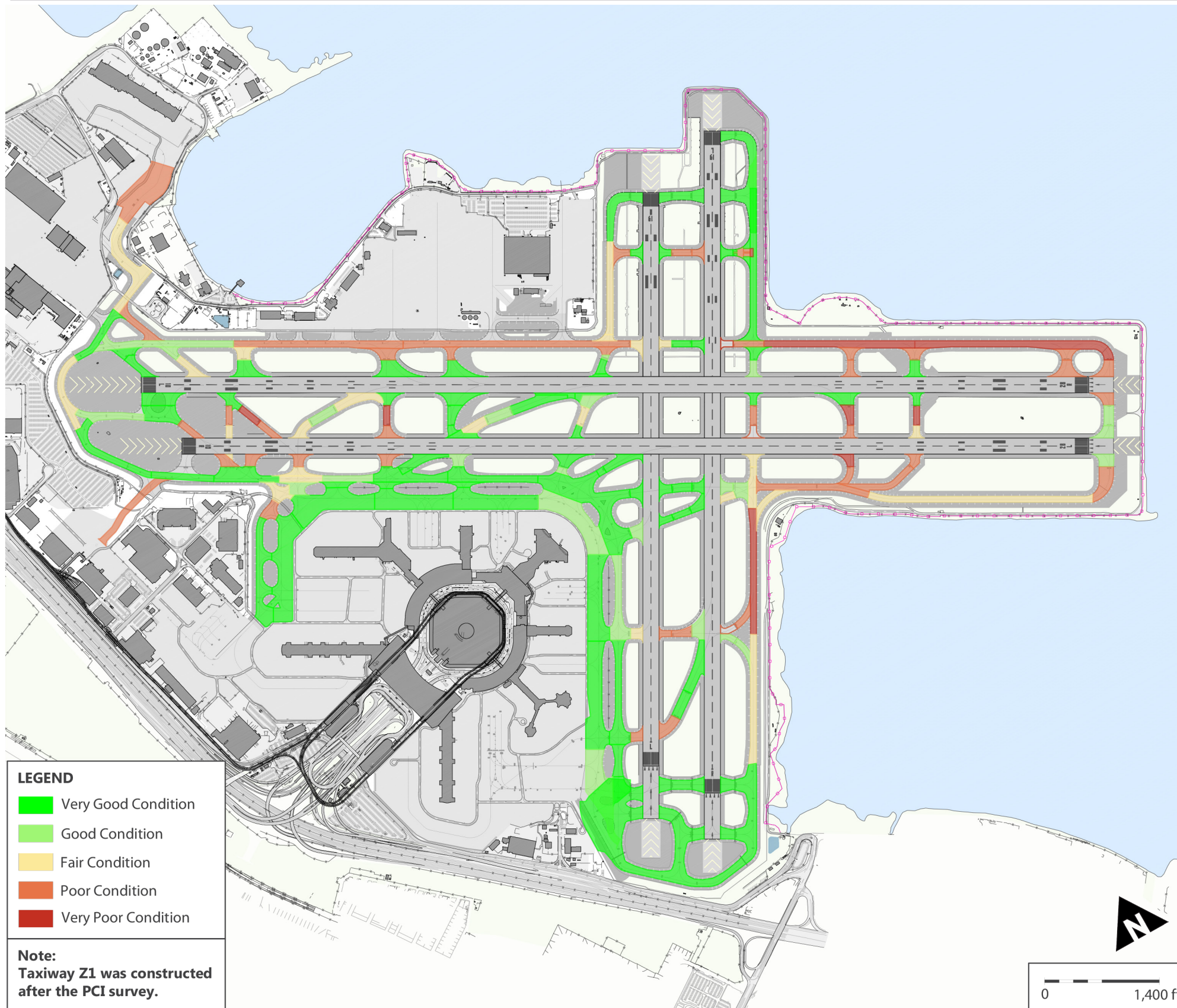
Exhibit 3.3-20 | Airfield Signage, Airfield Signage, Detail of Runways 1L and 1R



Source: San Francisco International Airport Airfield Signage Plan, September 2014



Exhibit 3.3-21 | Taxiway Pavement Conditions



Source: San Francisco International Airport Pavement Condition Index, August 2014



### 3.3.7 Ongoing Airfield Projects

A number of ongoing projects related to airfield compliance, taxiway realignment, and taxiway renaming have been authorized to proceed by the Airport Commission or have been identified by Airport management as needing to be implemented in the near future, subject to Airport Commission and other necessary approvals. The ongoing airfield projects are in various stages of planning, programming, design, or construction. Appropriate environmental reviews, as required under the California Environmental Quality Act (CEQA) or the National Environmental Policy Act (NEPA), are completed, in process, or will be conducted. These projects are proceeding, or will proceed if approved, irrespective of any ADP projects and do not address long-term demands and capacity needs. Detail regarding ongoing airfield projects alternatives evaluation and identification of recommended improvements is documented in **Appendix D, Airfield Ongoing Projects Alternatives**. The following sections describe each ongoing airfield project to provide a comprehensive understanding of the airfield inventory and these projects are illustrated in **Exhibit 3.3-22**.

#### Runways 10L and 10R End Taxiways

- **Taxiway S3:** The proposed project will realign existing Taxiway S perpendicular to Runway 10R. This alignment decreases the separation distance between existing Taxiways S and S3 to 480 feet, enabling simultaneous departures to occur on Runways 10L and 10R without incurring a wake turbulence penalty. Existing Taxiway S will be renamed Taxiway S3.
- **Taxiway N:** This project would modify the alignment of Taxiway N to enable aircraft queued for departure on Taxiway F or on Runway 28L to exit the runway and rejoin the departure queue without taxiing on the runway an extended distance to Taxiway L.

#### Runway to Taxiway Separation

- **Taxiway C East:** Taxiway C would be shifted to increase the taxiway-to-runway separation from 500 to 550 feet for approximately 6,850 feet along Runway 28R. This alignment permits ADG VI aircraft to remain clear of all airspace protection surfaces for approaches to and departures from Runway 28R. An MOS is still required to operate ADG VI aircraft on this runway because it does not meet the FAA design standard of 550 feet for the entire parallel taxiway length. This project avoids impacts to the East Field apron or the VIP parking area. This project would include the renaming of Taxiway W to Taxiway C2.

To support the Taxiway C East rehabilitation project, the existing Stormwater Pump Station SDPS-1B would be relocated, potentially northwest to the seawall bump-out and between the vehicle service road (VSR) and localizer critical area.

- **Taxiway F West:** Taxiway F between Taxiway B and Taxiway L would be shifted from its current separation distance of 500 feet from Runway 10R-28L to a separation distance of 550 feet. This shift would allow A380-800 aircraft to taxi unrestricted on Taxiway F during lower visibility (CAT II ILS) operations.
- **Taxiway F East:** Taxiway F between Taxiway L and Taxiway N would be shifted from its current separation distance of 500 feet from Runway 10R-28L to a separation distance of 550 feet. This shift would allow A380-800 aircraft to taxi unrestricted on Taxiway F during lower-visibility (CAT II ILS) operations.

#### Taxiway A/B Intersection Hotspot

- **Taxiway F1:** Existing Taxiway F1 would be realigned at a separation of 800 feet from Taxiway F to alleviate congestion and taxiway complexity and permit aircraft to cross Runways 1L-19R and 1R19L on Taxiway F and F1 simultaneously. Taxiway W would be renamed Taxiway C2 and Taxiway F1 would be renamed Taxiway W.
- **Taxiway T and D:** Taxiway T would be realigned at the same angle as Taxiway Q. The exit point would be shifted away from the Runway 28R landing threshold to accommodate a 324-foot separation between Taxiway T and a straightened Taxiway D, providing for simultaneous use of Taxiways D and T by ADG VI aircraft. This project resolves Hot Spot 3 and addresses a Runway Incursion Mitigation focus area.
- **Taxiway E and J:** Taxiway E would be reconfigured as an acute-angled exit taxiway and Taxiway J would be realigned and shifted away from Runway 1L-19R. These realignments create greater distances between Taxiways E, J, and F and their intersections with Taxiways A and B, enabling installation of signage that meets FAA design standards between intersections and improving pilot situational awareness.

#### Runway 28L End Taxiways

- **Taxiway F2:** The proposed project will provide a second runway-entrance taxiway to Runway 28L. Aircraft would be able to hold for departure closer to the runway, reducing the time required for an aircraft to taxi on to the runway and depart. Taxiway F2 will also provide the ability to bypass aircraft parked on Taxiway F adjacent to the runway.
- **Taxiway C3:** The proposed project would realign Taxiway C1 perpendicular to Runway 10L-28R and rename it Taxiway C3. This alignment creates a taxiway-runway intersection compliant with FAA design standards and increases pilot situational awareness.
- **Taxiway R North:** The proposed project would realign Taxiway R perpendicular to Runway 10L-28R and remove acute-angled Taxiway U between Runway 10L-28R and Taxiway C. This modification creates a less complex taxiway and runway intersection compliant with FAA design standards and increases pilot situational awareness.
- **Taxiway R South:** The proposed project would upgrade Taxiway R between Runways 10L-28R and 10R-28L to TDG 7 to accommodate larger widebody aircraft. This alignment is separated from the Taxiway S entrance taxiway by 495 feet, enabling departures to occur simultaneously from Runway 10R at Taxiway S and Runway 10L at Taxiway R without incurring a wake turbulence penalty. This project would include the closure of existing Taxiway U between Taxiway C and Runway 10R-28L.

#### South Field Redevelopment Taxiways:

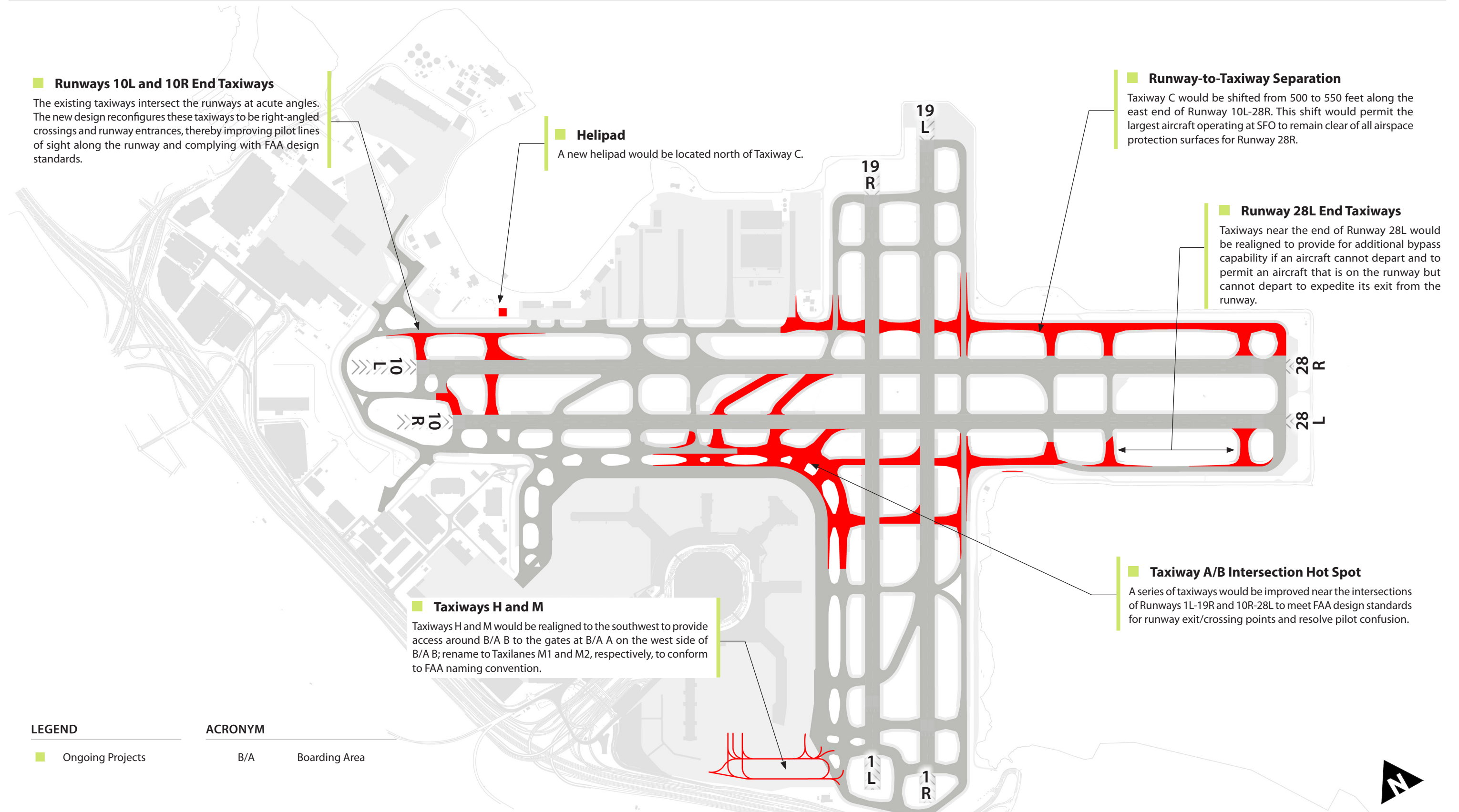
- **Taxiways H and M:** This project will realign Taxiways H and M to the southwest to provide access around B/A B to the gates at B/A A on the west side of B/A B. These taxiways will be renamed to Taxiways M1 and M2, respectively, to conform to FAA naming convention.

#### New Helipad

- **Helipad:** A dedicated helipad would be located northwest of the existing fixed base operator's Flight Operation Hangar (Building 1050) and outside of the Taxiway C ADG VI object free area. Helicopters would land on this pad and hover taxi onto Taxiway C to access the East Field aircraft apron. The center of the helipad would be located at least 747 feet from the nearest runway centerline.



Exhibit 3.3-22 | Ongoing Airfield Projects



Source: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014, Ricondo and Associates, 2015, Landrum & Brown, Inc., June 2016



### 3.4 PASSENGER TERMINAL

As of summer 2015, the Airport has four terminals, seven boarding areas, and 88 passenger aircraft contact gates. The International Terminal Building (ITB), Terminal 1, and Terminal 3 provide two boarding areas each; Terminal 2 provides one boarding area. For calendar year 2014, 46,928,856 total passengers (78 percent domestic passengers and 22 percent international passengers) were accommodated at the Airport. **Exhibit 3.4-1** shows the terminal area.

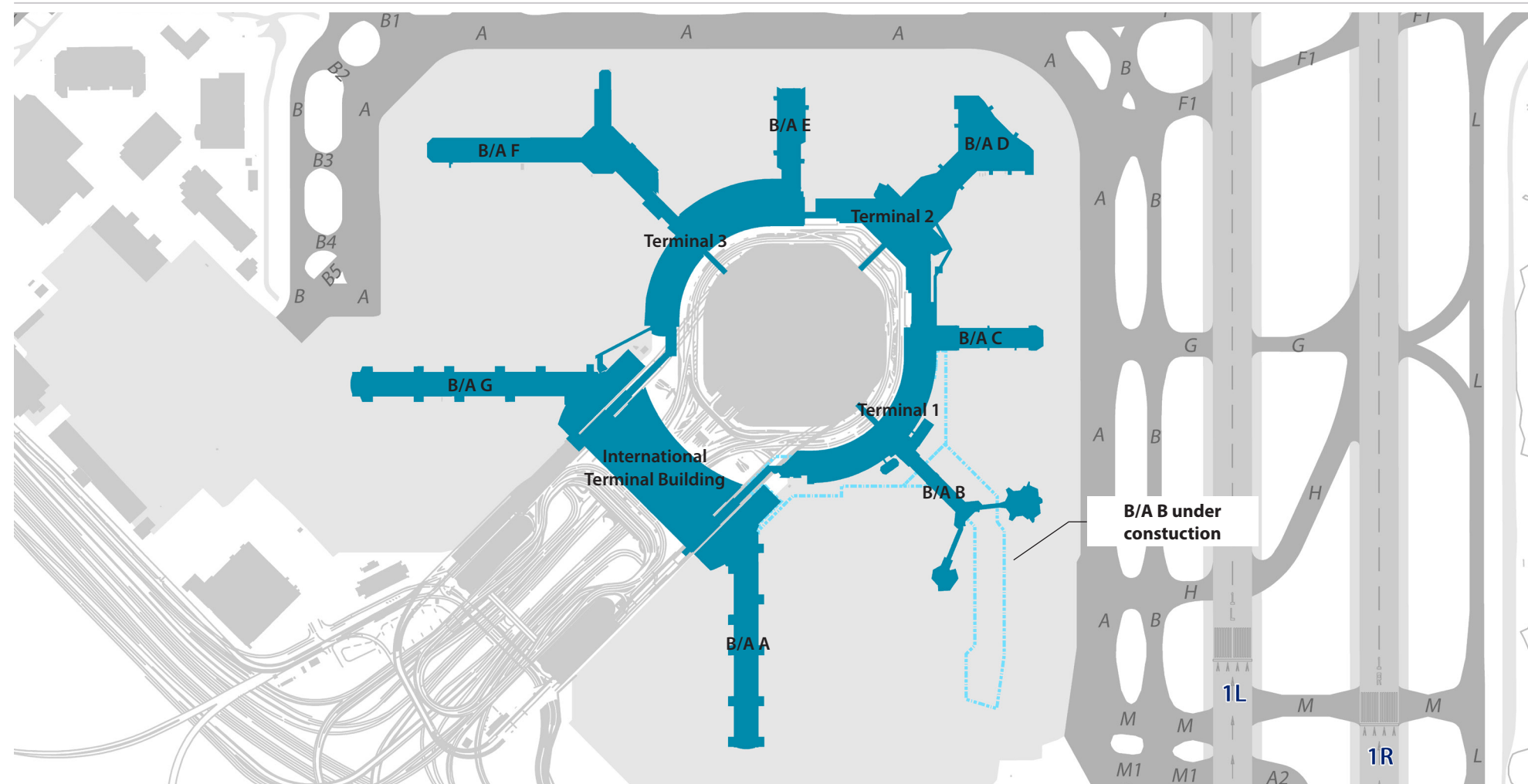
As shown in **Table 3.4-1**, United Airlines operates from Terminal 3 and B/A G in the ITB, with most of its Star Alliance partner airlines also operating from B/A G, while other airlines operate from B/A A in the ITB, Terminal 1, and Terminal 2. The terminal and boarding areas are in varying states of repair as some facilities were constructed or substantially renovated in recent years while others have been in service for decades and have not been upgraded.

The inventory of the SFO passenger terminal is grouped into five components:

- Terminal 1
- Terminal 2
- Terminal 3
- International Terminal Building
- Ongoing Passenger Terminal Projects

**Table 3.4-2** provides an inventory of the domestic terminal facilities evaluated for the ADP (Terminals 1, 2, and 3). An inventory of the International Terminal can be found later in this section.

Exhibit 3.4-1 | Airport Overview



Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014; Landrum & Brown, Inc., September 2015

Table 3.4-1 | Overview of Terminals and Boarding Areas

Terminal	Boarding Area	Year Constructed	Gates	Airlines
International	A	2000	12	Non-Star Alliance, Star Alliance overflow, domestic overflow
	G	2000	12	United Airlines, Star Alliance
1	B	1985	9	Frontier Airlines, Southwest Airlines
	C	1987	10	Delta Air Lines, American Airlines (gates only)
2	D	2011	14	American Airlines, Virgin America
3	E	2014	10	United Airlines
	F	1979	21	United Airlines

Sources: SFO Bureau of Planning and Environmental Affairs; Landrum & Brown, Inc., November 2015

Table 3.4-2 | Domestic Terminal Facilities Inventory

Component	Terminal 1	Terminal 2	Terminal 3
Ticketing Positions	116	90	116
Security Screening Checkpoint Lanes	11	6	13
Baggage Claim Carousels	Large	4	4
	Small	11	0
			7

Source: SFO Site Visit by L&B, August 2015; Landrum & Brown, Inc., September 2015



### 3.4.1 Terminal 1

Terminal 1, including B/As B and C, is an aging facility located between the ITB and Terminal 2 (see **Exhibit 3.4-2**). The terminal measures 1.2 million square feet and was designed to serve U.S. domestic airlines. Arriving passengers exit B/A B or B/A C and circulate to Level 1 to baggage claim and ground transportation while departing passengers utilize Level 2.

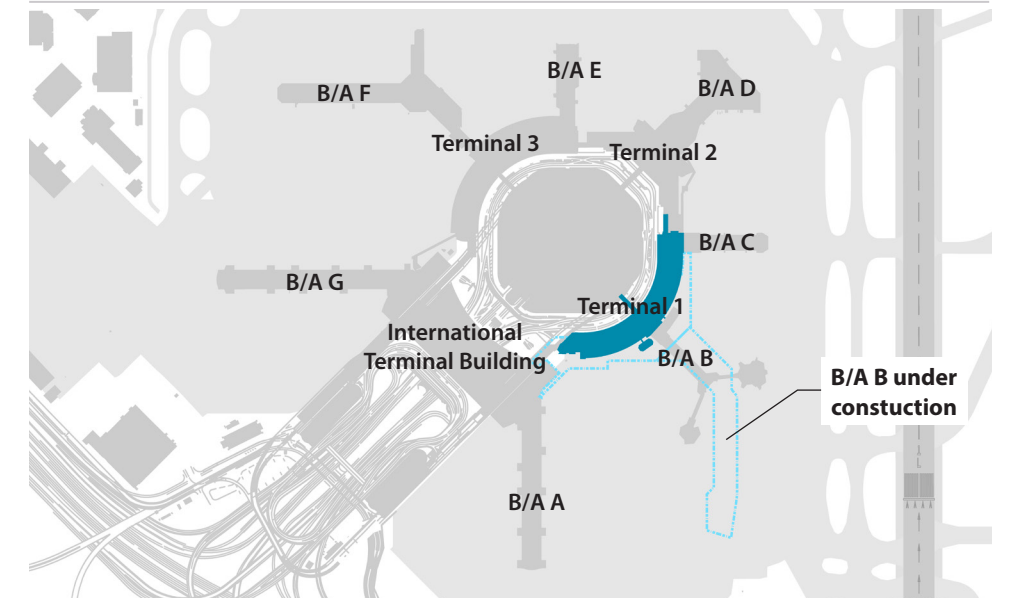
Terminal 1 has three levels and serves the following airlines: Delta Air Lines, Frontier Airlines, Southwest Airlines, and American Airlines (previously US Airways gates only).

- Level 1
  - Inbound baggage processing
  - Baggage claim carousels
  - Baggage service offices
  - Outbound baggage security screening
  - Ground transportation facilities (rental car and shuttle information kiosks, etc.)
  - “Meeters and greeters” area
  - Restrooms
  - Mechanical and electrical rooms
  - Airport police office
  
- Level 2
  - Curbside check-in counters
  - Agent-supported ticketing and check-in counters
  - Self-service kiosks
  - Shuttle information kiosks
  - Airline ticket offices
  - Concessions and concessions storage
  - Restrooms
  - Passenger security screening checkpoints (SSCPs)
  - Hold rooms

- Level 3
  - Airport offices
  - Airline offices
  - United Service Organizations (USO) lounge
  - Bridge to the AirTrain station
  - Mechanical facilities
  - Airport security offices
  - Airport administrative offices
  - Pre-security concessions include restaurants, a coffee shop, a bookstore, and the employee café

The redevelopment of Terminal 1 and B/As B and C will upgrade the existing facility to a new complex with a mix of narrowbody and widebody gates. This terminal facility will be linked to Terminal 2 B/A D and to ITB B/A A. **Exhibit 3.4-3** depicts a conceptual representation of the Terminal 1 redevelopment project.

**Exhibit 3.4-2 | Terminal 1**



Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan 2014; Landrum & Brown, Inc., September 2015

**Exhibit 3.4-3 | Terminal 1 Redevelopment Project**



Source: San Francisco International Airport

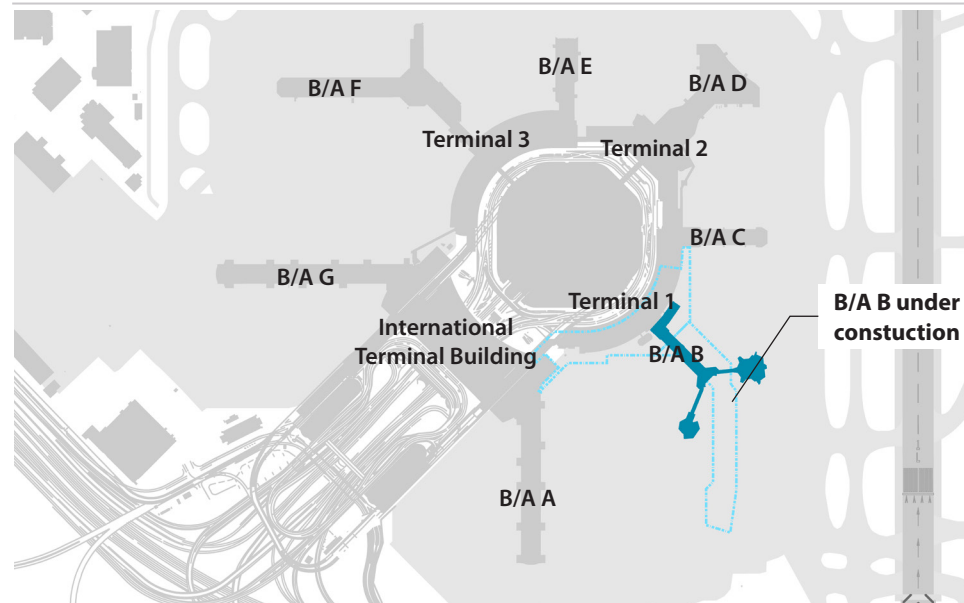


### 3.4.1.1 Boarding Area B

B/A B will be redeveloped into an 18-gate facility, replacing the 9 gates of existing B/A B while adding some gates with widebody and international capability. Redeveloped B/A B will provide several swing gates positioned between B/A A and B/A B and along the west side of B/A B. Some of these will be Multiple Aircraft Ramp System (MARS) gates sized to accommodate both narrowbody and widebody aircraft; ADG VI gates that can accommodate an A380 will also be capable of accommodating two ADG III aircraft. With the use of the MARS gates, B/A B would be able to accommodate up to 27 narrowbody aircraft parking positions. These facilities will provide for the overflow of international flights from B/A A into B/A B. The boarding area does not have any existing post-security connections to any other boarding areas, but the redevelopment plan includes secure connections to neighboring B/A A and B/A C.

**Exhibit 3.4-4** shows Terminal 1, B/A B and **Exhibit 3.4-5** shows the proposed or conceptual aircraft parking layout at B/A B.

**Exhibit 3.4-4 | Terminal 1, Boarding Area B**



Note: B/A = Boarding Area

Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014; Landrum & Brown, Inc., September 2015

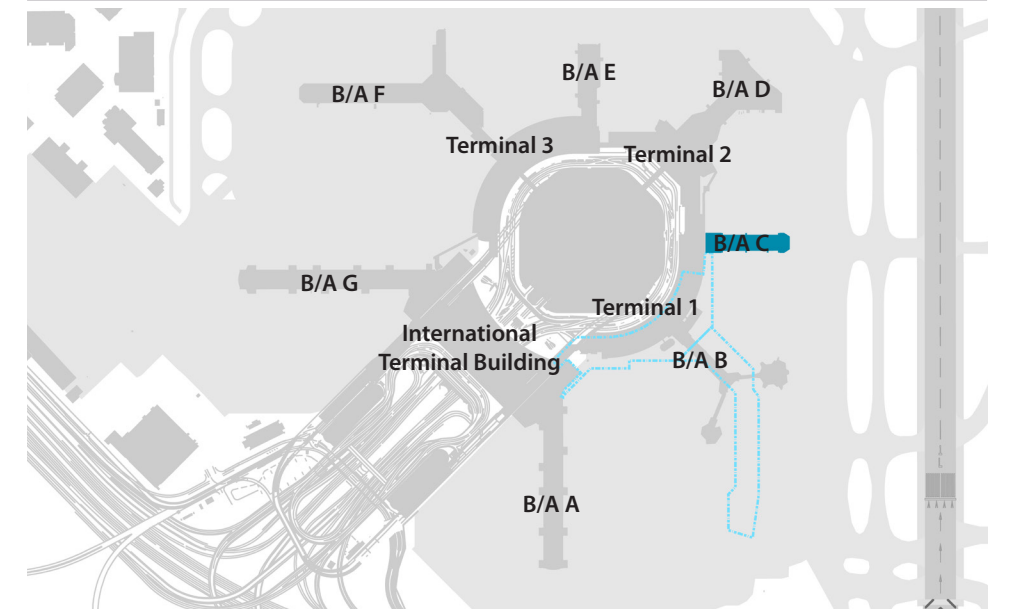
### 3.4.1.2 Boarding Area C

Built in the 1980s, B/A C is used for domestic flights operated by Delta Air Lines and American Airlines. The boarding area has four ADG IV gates, five Boeing 757 gates, and one ADG III gate. In 2014, a secure connection to B/A D was added, providing passengers in B/A C with access to the upgraded passenger amenities offered in B/A D and American Airlines passengers checking in at B/A D access to their gates at B/A C.

Since the initial construction of B/A C, the boarding area has been improved through concessions and tenant area development projects. It is in good architectural condition, and relatively minor refurbishments will be needed in the near to medium term. To bring the entire Terminal 1 complex up to the standard offered at Terminal 2, refurbishments may be phased as part of the overall Terminal 1 redevelopment program.

**Exhibit 3.4-6** depicts Terminal 1, B/A C and **Exhibit 3.4-7** depicts the aircraft parking layout at B/A C.

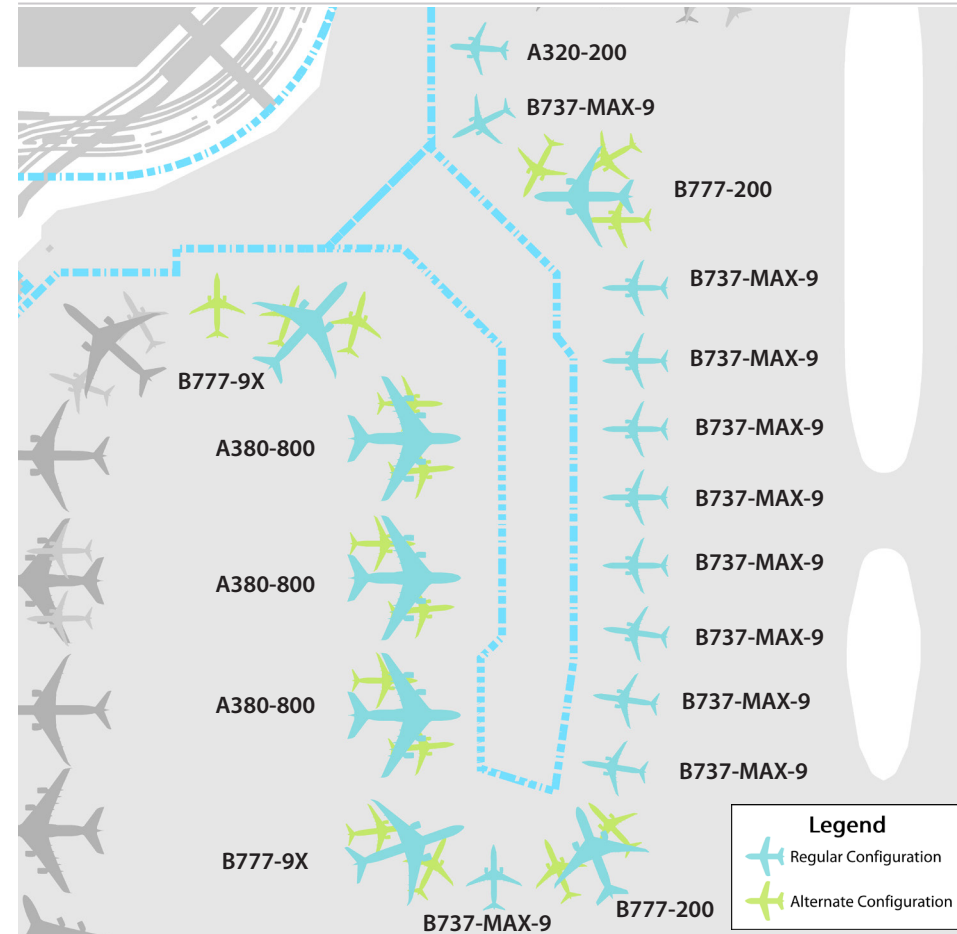
**Exhibit 3.4-6 | Terminal 1, Boarding Area C**



Note: B/A = Boarding Area

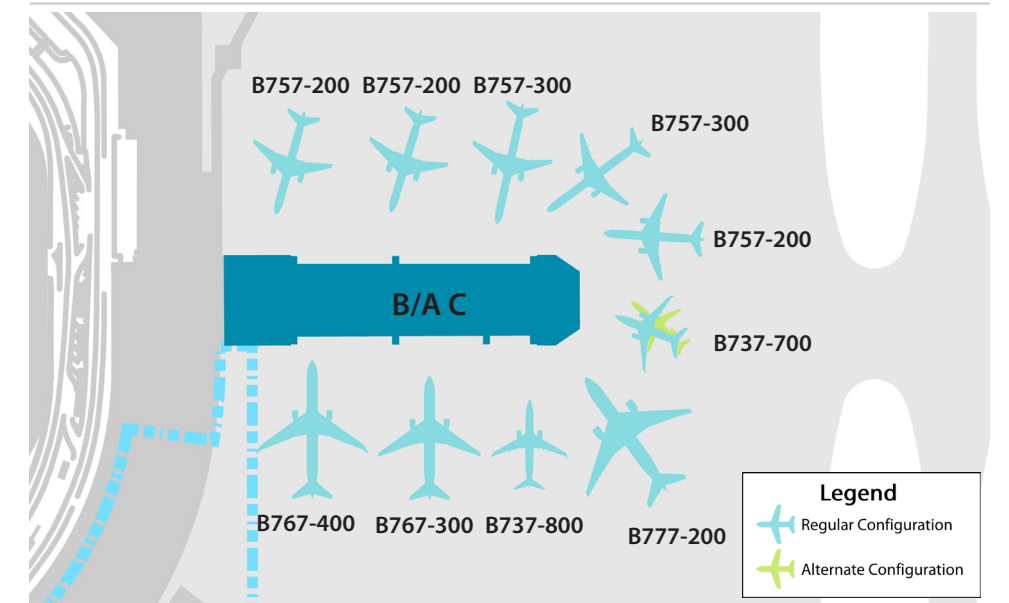
Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014; Landrum & Brown, Inc., September 2015

**Exhibit 3.4-5 | Terminal 1, Boarding Area B – Aircraft Parking Layout**



Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014; Landrum & Brown, Inc., September 2015

**Exhibit 3.4-7 | Terminal 1, Boarding Area C – Aircraft Parking Layout**



Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014; Landrum & Brown, Inc., September 2015



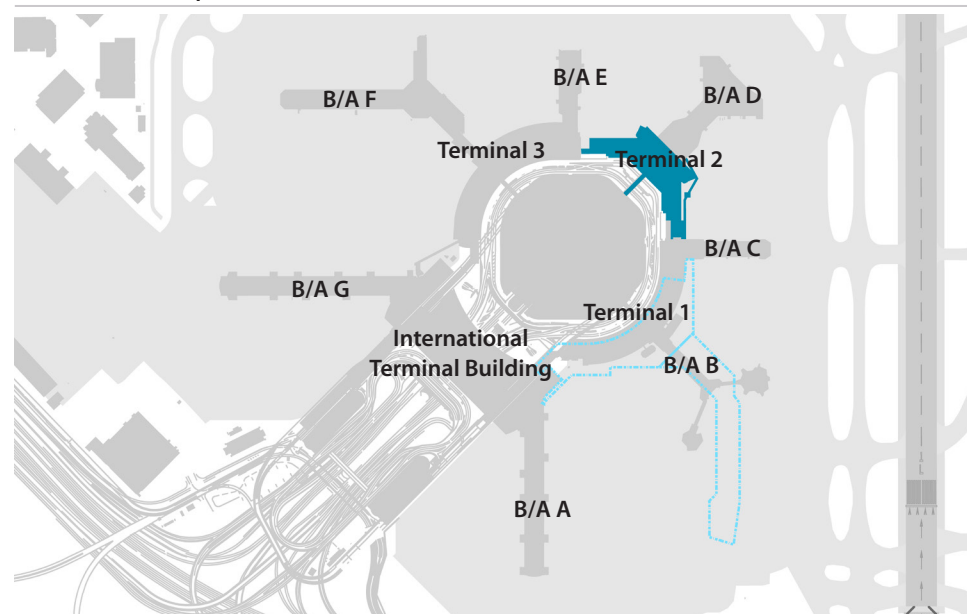
### 3.4.2 Terminal 2

Terminal 2, depicted in **Exhibit 3.4-8**, is the most recently reconstructed terminal and has become a model for other SFO terminal facilities. Terminal 2 is located between Terminals 1 and 3 and includes B/A D. The terminal measures 640,000 square feet and was designed primarily to accommodate Virgin America, a major tenant based at SFO. Terminal 2 was originally constructed in 1954 and served as the Airport's main terminal. It later served as the international terminal until 2000, when the current ITB was constructed. Because of the decline in air traffic following the September 11, 2001 terrorist attacks and the economic slowdown in the Bay Area's technology sector, the terminal remained shuttered until 2008. New service from various airlines prompted the renovation and modernization of the terminal, which reopened in 2011 with Virgin America and American Airlines as the sole airline tenants.

Arriving passengers exit B/A D and circulate to Level 1 of Terminal 2 to baggage claim and ground transportation.

- Level 1
  - Inbound baggage processing
  - Baggage claim carousels
  - Baggage service offices
  - Outbound baggage security screening
  - Ground transportation facilities (rental car and shuttle information kiosks, etc.)
  - "Meeters and greeters" area
  - Restrooms

**Exhibit 3.4-8 | Terminal 2**



Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014; Landrum & Brown, Inc., September 2015

- Mechanical and electrical rooms
- Airport police office

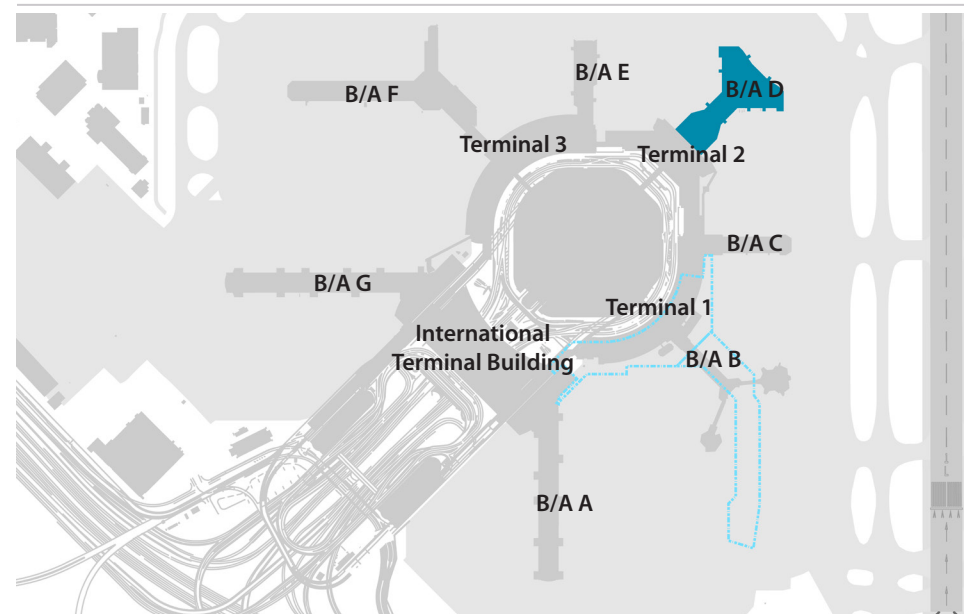
Departing passengers enter the terminal primarily from the curbside on Level 2.

- Level 2
  - Curbside check-in counters
  - Agent-supported ticketing and check-in counters
  - Self-service kiosks
  - Airline ticket offices
  - Concessions and concessions storage
  - Restrooms
  - Passenger SSCPs
  - Holdrooms

A mezzanine level (Level 3) provides a bridge to the Terminal 2 AirTrain station. With renovations completed in 2011, Terminal 2 is in excellent condition and the main terminal area and the boarding area have no major problems. However, the upper floors and ATCT structure have experienced some deterioration and have some seismic-code-related issues, mainly surrounding circulation and escape routes. The upper floors of the ATCT will be demolished as part of the new ATCT construction project.

An inventory of ticketing facilities, SSCPs, and baggage claim devices for Terminal 2 was provided earlier in **Table 3.4-2**.

**Exhibit 3.4-9 | Terminal 2, Boarding Area D**



Note: B/A = Boarding Area

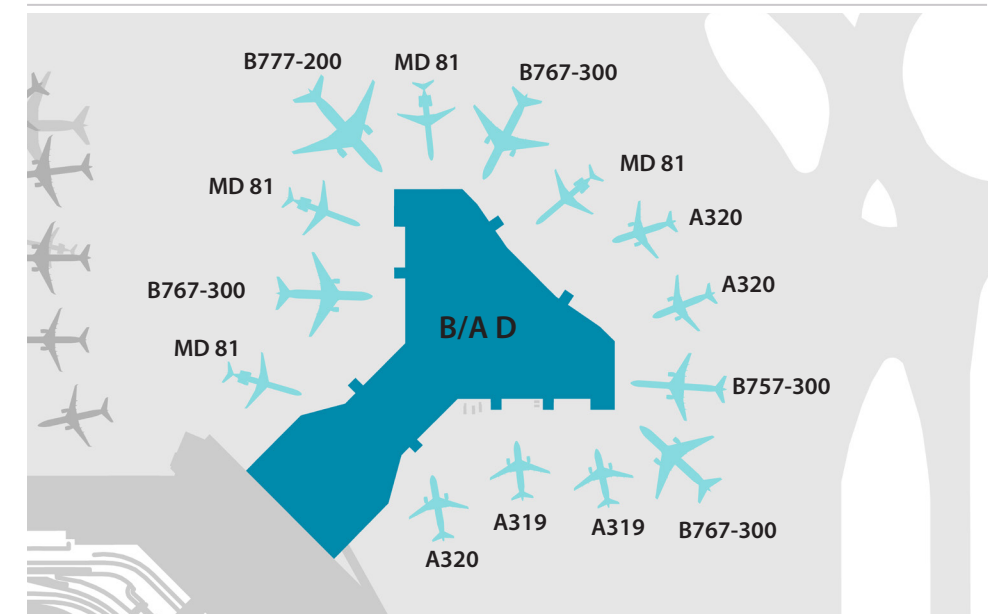
Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014; Landrum & Brown, Inc., September 2015

#### 3.4.2.1 Boarding Area D

B/A D is the only boarding area in Terminal 2 and provides 14 gates that can accommodate a varied fleet mix. A secure connection with B/A C was recently constructed. A project is under way to provide a secure connector to B/A E.

**Exhibit 3.4-9** depicts Terminal 2, B/A D, and **Exhibit 3.4-10** depicts the aircraft parking layout at B/A D.

**Exhibit 3.4-10 | Terminal 2, Boarding Area D – Aircraft Parking Layout**



Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014; Landrum & Brown, Inc., September 2015



### 3.4.3 Terminal 3

Terminal 3 is located between the ITB and Terminal 2 and includes B/A E and B/A F. Terminal 3 also includes two frontage gate areas referred to as “T3 East” and “T3 West.” The terminal building measures 1.2 million square feet and serves domestic flights in United Airlines’ hubbing operation. Terminal 3 and B/A F were constructed in 1979. An expansion and upgrade program for Terminal 3 is currently under way.

Arriving passengers exit B/A E or B/A F and circulate to Level 1.

- Level 1
  - Inbound baggage processing
  - Baggage claim carousels
  - Baggage service offices
  - Outbound baggage security screening
  - Ground transportation facilities (rental car and information kiosks, etc.)
  - “Meeters and greeters” area
  - Restrooms
  - Mechanical and electrical rooms
  - Airport police office

Departing passengers enter the terminal primarily from the curbside on Level 2.

- Level 2
  - Curbside check-in counters
  - Agent-supported ticketing and check-in counters
  - Self-service kiosks
  - Airline ticket offices
  - Concessions (newsstand and coffee shops) and concessions storage
  - Restrooms
  - Passenger SSCPs
  - Holdrooms

The larger of two SSCPs is located in T3 East because of its central location between the two boarding areas.

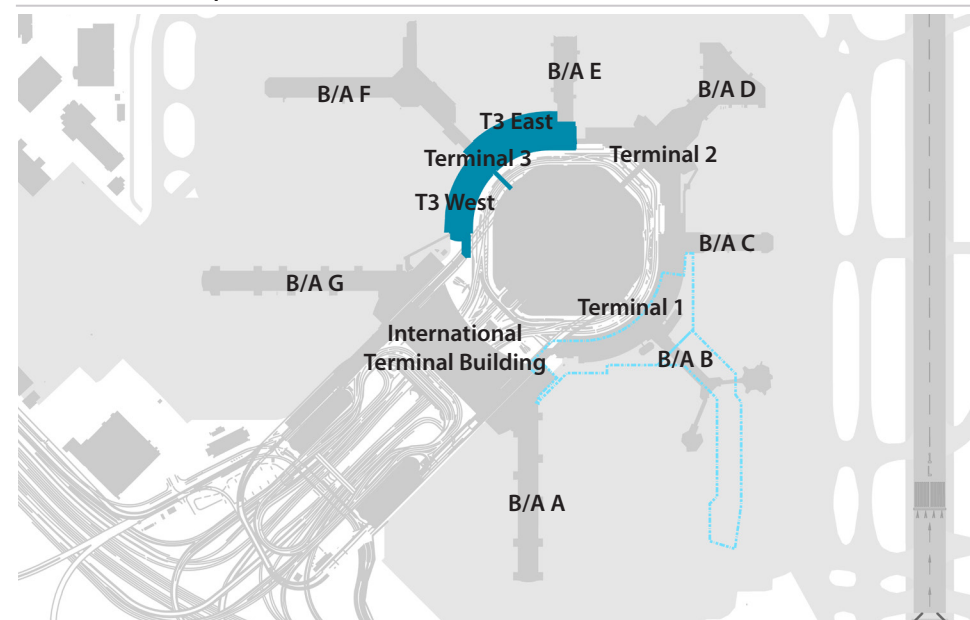
- Level 3
  - Airline offices
  - Airport offices
  - Bridge to the AirTrain station
  - Mechanical facilities

The existing facilities in Terminal 3 are listed in the earlier **Table 3.4-2**, and the location of the terminal is depicted in **Exhibit 3.4-11**.

The T3 East program at SFO opened in November 2015 and included an expansion of the terminal where three existing frontage gates were previously located. A 65-foot terminal frontage expansion into the ramp area of the airfield provided additional holdroom seating, concessions, and circulation space within the terminal. As a result, the previous aircraft parking positions were shifted and reconfigured. The new frontage Gates 70, 71A, and 71B provide narrowbody aircraft parking positions that can accommodate aircraft wingspans of 117.85 feet (Boeing 737-9 MAX aircraft). The T3 East frontage gate expansion has secure connections with B/As E and F. **Exhibit 3.4-12** depicts the aircraft parking layout.

The planned T3 West project addresses issues including undersized holdrooms, few concessions, and limited international gate capacity. This project will result in an enlarged building footprint as the terminal is expanded toward the ramp area. The expansion will result in five narrowbody aircraft parking positions or three widebody aircraft parking positions. The “swing” gates will offer the flexibility to serve both domestic and international flights. Therefore, domestic flights that cannot be accommodated in B/As E and F will be able to be accommodated at T3 West while international flights that cannot be accommodated in B/A G will also be able to be accommodated at T3 West. **Exhibit 3.4-13** depicts the future aircraft parking layout.

Exhibit 3.4-11 | Terminal 3



Note: B/A = Boarding Area

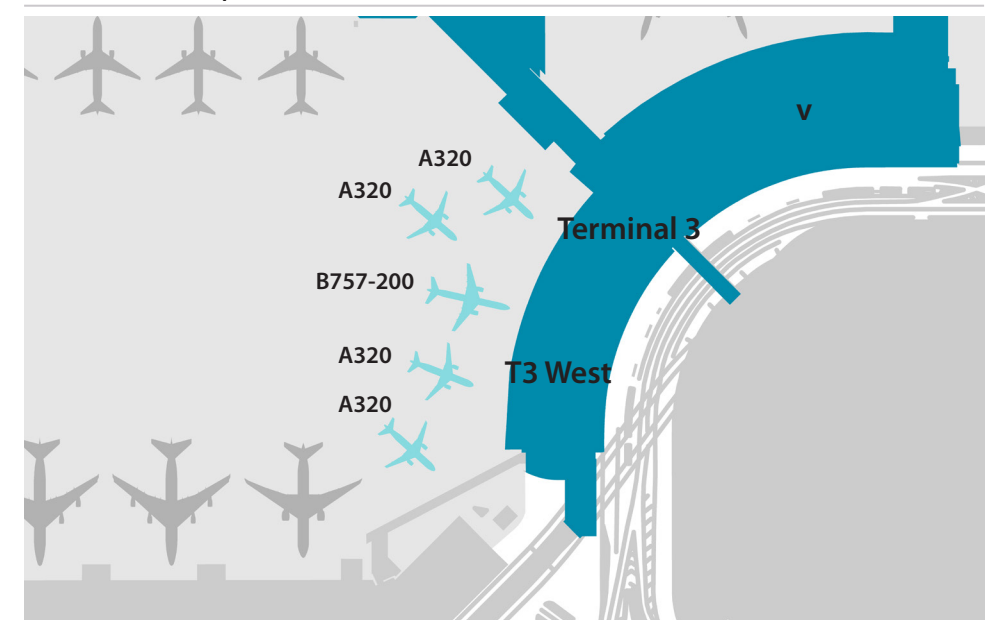
Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014; Landrum & Brown, Inc., September 2015

Exhibit 3.4-12 | Terminal 3 East Aircraft Parking Layout



Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014; Landrum & Brown, Inc., September 2015

Exhibit 3.4-13 | Terminal 3 West – Aircraft Parking Layout



Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014; Landrum & Brown, Inc., September 2015



### 3.4.3.1 Boarding Area E

B/A E was originally constructed in 1981 and was extensively renovated in 2014. The 10-gate facility measures 68,000 square feet and serves domestic flights operated by United Airlines. The \$138 million renovation resulted in a new boarding area that provides passengers with natural light, unique dining options, and architectural features that enhance the passenger experience. The boarding area accommodates mostly narrowbody aircraft, although Gates 64, 66, and 67 can accommodate widebody aircraft. The boarding area connects directly with T3 East and plans are in progress to develop a secure connector to B/A D.

**Exhibit 3.4-14** depicts Terminal 3, B/A E and **Exhibit 3.4-15** depicts the aircraft parking layout at B/A E.

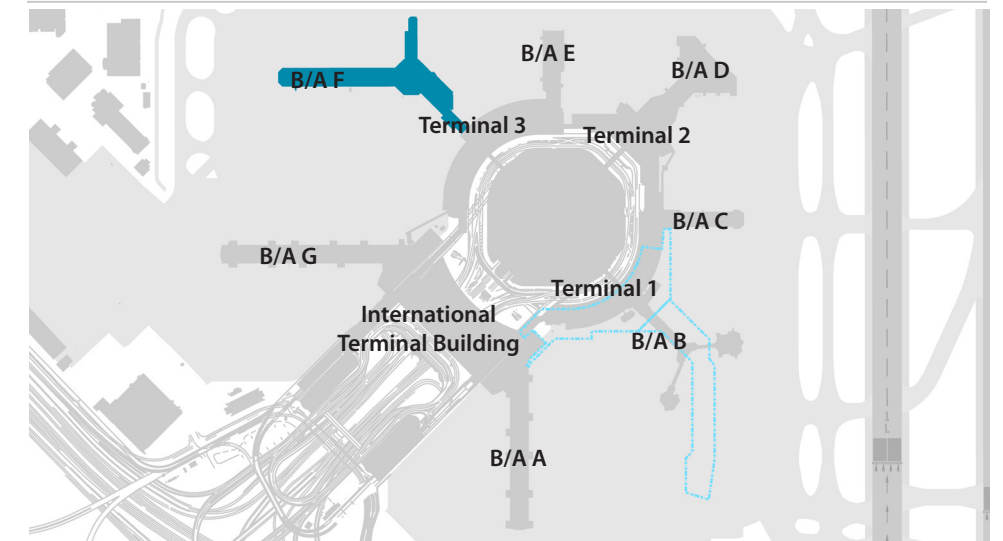
### 3.4.3.2 Boarding Area F

B/A F accommodates much of the domestic operation of United Airlines, serving numerous aircraft types ranging from regional jets to widebody ADG V aircraft. The boarding area consists of a corridor that extends from Terminal 3 leading to a central atrium. Beyond the atrium, the main pier consists of Gates 80 through 90 (“the finger”); Gates 76A through 79 are located on a secondary pier (“the thumb”). A secure connector built in 2009 connects B/A F and B/A G, providing a convenient connection between United Airlines and Star Alliance international flights.

The north side of the boarding area was previously used primarily for widebody aircraft operations, but United Airlines has reconfigured the ramp area at Gate 84 to support regional jet operations. Airport management is currently working with United Airlines representatives to reconfigure other gates in B/A F; it is projected that the resulting reconfiguration will affect narrowbody and widebody aircraft capacity and parking positions at the gates.

**Exhibit 3.4-16** depicts Terminal 3, B/A F, and **Exhibit 3.4-17** depicts the aircraft parking layout at B/A F.

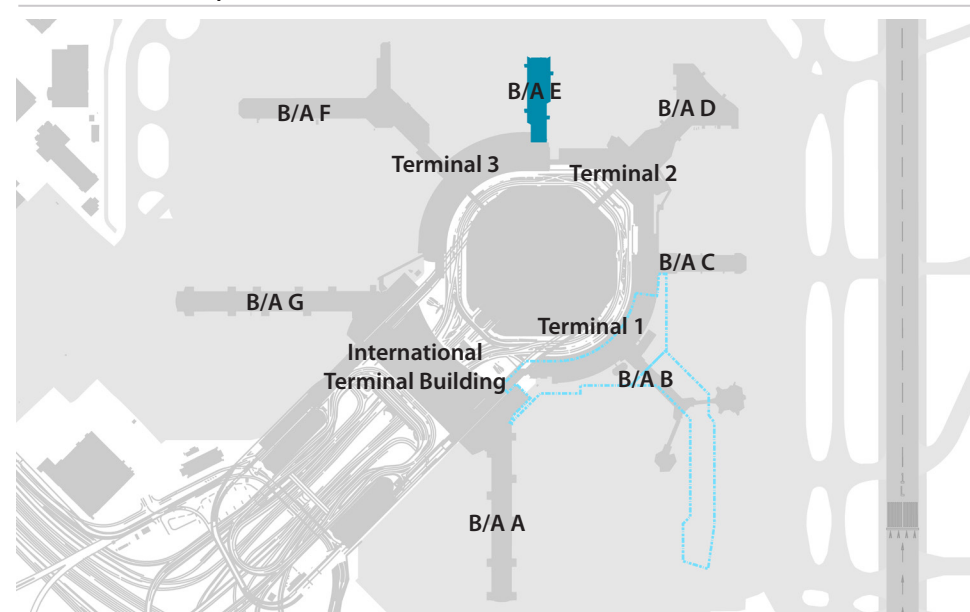
**Exhibit 3.4-16 | Terminal 3, Boarding Area F**



Note: B/A = Boarding Area

Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014; Landrum & Brown, Inc., September 2015

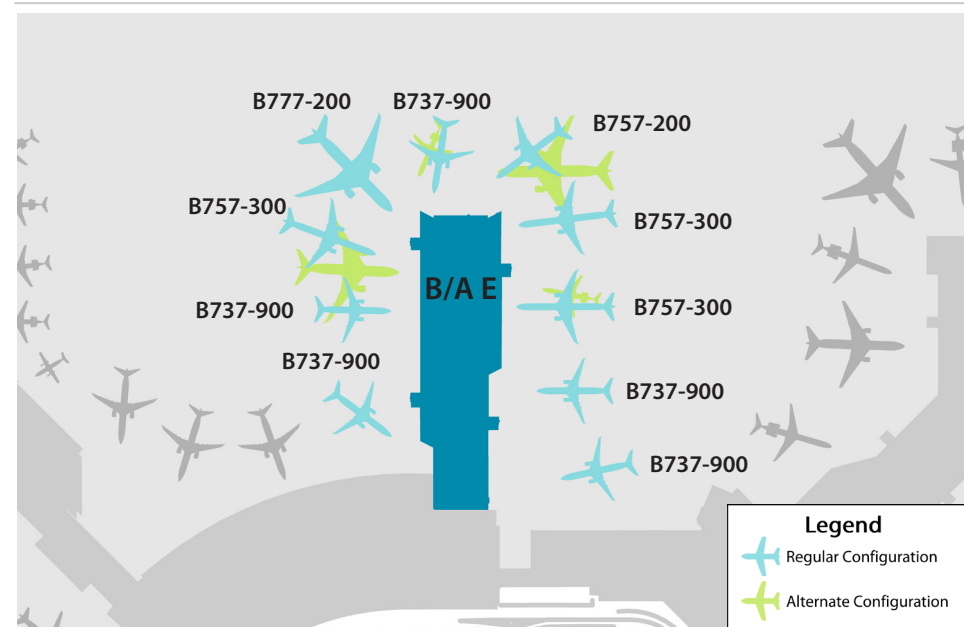
**Exhibit 3.4-14 | Terminal 3, Boarding Area E**



Note: B/A = Boarding Area

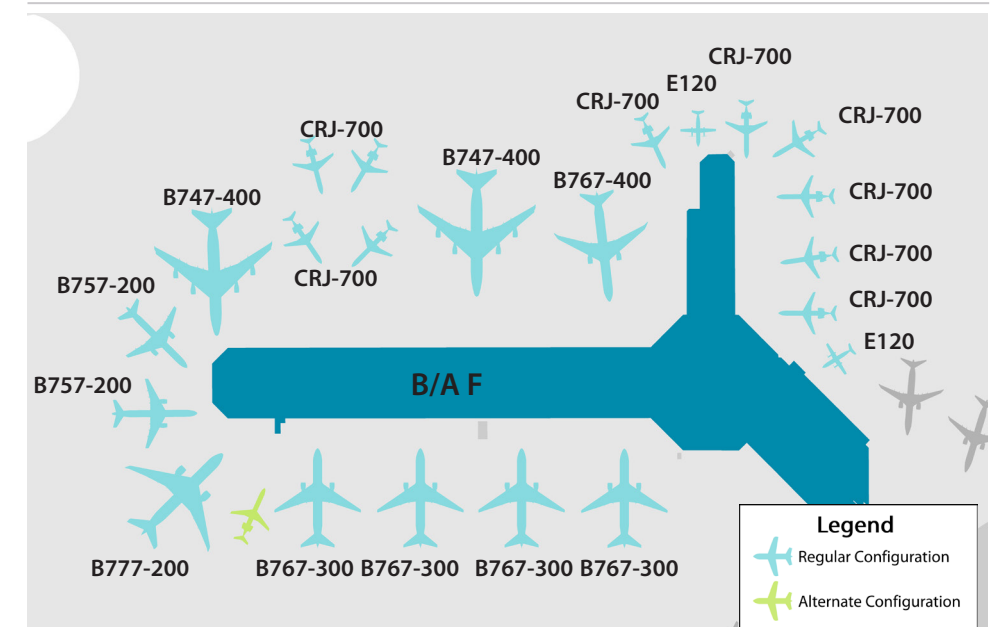
Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014; Landrum & Brown, Inc., September 2015

**Exhibit 3.4-15 | Terminal 3, Boarding Area E – Aircraft Parking Layout**



Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014; Landrum & Brown, Inc., September 2015

**Exhibit 3.4-17 | Terminal 3, Boarding Area F – Aircraft Parking Layout**



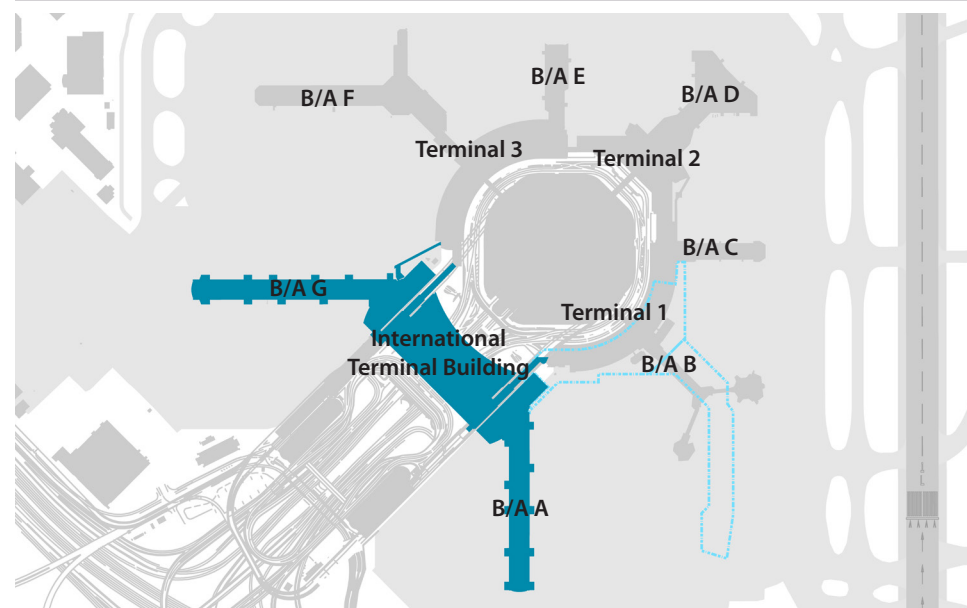
Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014; Landrum & Brown, Inc., September 2015



### 3.4.4 International Terminal Building

The ITB opened in December 2000 and was the largest international terminal by floor area in North America at the time. It consists of approximately 2.5 million square feet of total floor area, and encompasses a terminal building and B/As A and G. Each boarding area has 12 gates. B/A A serves a variety of foreign-flag and U.S.-flag airlines. B/A G serves all of United Airlines’ international flights and some of United’s domestic flights, as well as most foreign-flag Star Alliance airlines. B/A G has a post-security connection to Terminal 3 to facilitate United’s domestic-to-international connections and domestic-to-domestic connections. **Exhibit 3.4-18** depicts the ITB. **Table 3.4-3** provides an inventory of the ITB processing facilities evaluated as part of the ADP.

Exhibit 3.4-18 | International Terminal Building



Note: B/A = Boarding Area

Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014; Landrum & Brown, Inc., September 2015

#### 3.4.4.1 Main Terminal

The ITB main terminal consists of six levels and is the primary processing point for international departures and arrivals. The functions provided on each level of the main terminal include:

- Level 1 “Apron”
  - Inbound and outbound baggage processing
  - Airline baggage service offices
  - Public transit (buses), charter services, and pre-arranged vans
  - Loading docks
  
- Level 2 “Arrivals”
  - U.S. Customs and Border Protection (CBP): international arrivals processing and support space
  - International and domestic baggage claim
  - Arrivals Hall
  - Airline recheck counters
  - Arrivals roadway and curbside
  - Access to Parking Garages A and G
  
- Level 3 “Departures”
  - Public transit (Bay Area Rapid Transit [BART] rail) hotel and parking shuttles
  - Departures roadway and curbside
  - Agent-supported ticketing and check-in counters
  - Self-service kiosks
  - Airline ticket offices (mezzanine above ticketing islands)
  - SFO Museum
  - Pre-security concessions
  - Security screening checkpoints
  - Reflection Room
  - SFO Medical Clinic
  
- Levels 4 through 6
  - Airline clubs
  - Offices
  - Airport police office
  - AirTrain platforms (accessed from Level 3)

Table 3.4-3 | International Terminal Building Inventory

Component		Main Terminal	Boarding Area A	Boarding Area G
Ticketing Positions		188	-	-
SSCP Security Screening Checkpoint Lanes		-	7	7
Concessions (square feet)		35,700	32,000	33,600
Gate Holdrooms		-	12	12
U.S. CBP Primary		-	32	42
U.S. CBP APC Kiosks		-	38	48
Baggage Claim Devices	International	9	-	-
	Domestic	3	-	-

Notes: CBP = U.S. Customs and Border Protection  
APC = Automated Passport Control

Sources: SFO Bureau of Planning and Environmental Affairs; Landrum & Brown, Inc., May 2016



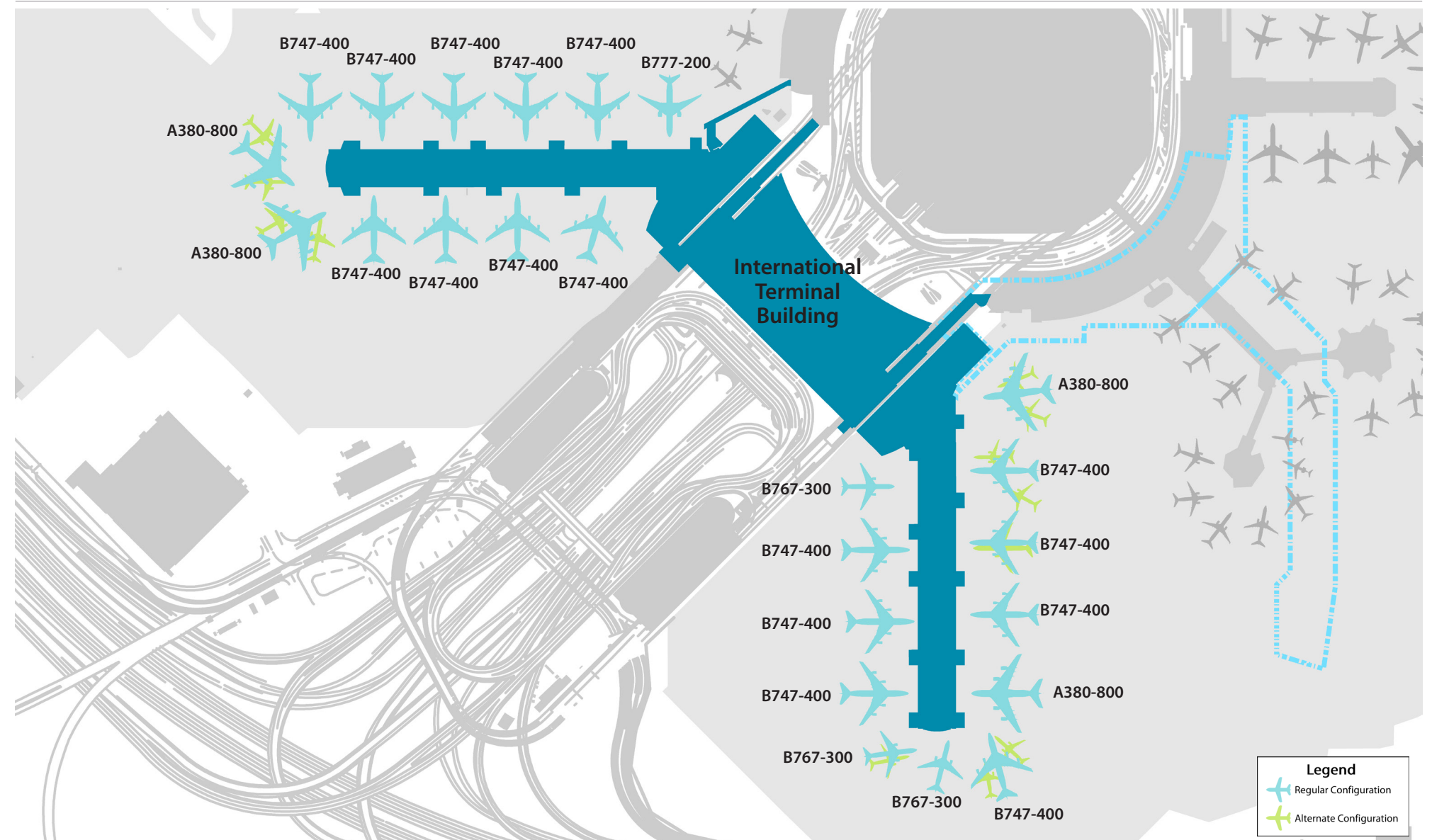
### 3.4.4.2 Boarding Areas A and G

B/As A and G have similar configurations with each boarding area having three levels. The boarding areas are capable of accommodating both international and domestic aircraft arrivals. A sterile corridor on Level 2 maintains separation between passengers arriving on international flights and passengers arriving and departing on domestic flights. The key functions provided on each level of B/As A and G include:

- Level 1 "Apron"
  - Outbound baggage make-up
  - Airline ramp support offices
  - Loading docks
- Level 2 "Arrivals"
  - Holdrooms
  - International arrivals corridor
  - Airline clubs
- Level 3 "Departures"
  - Post-security concessions/duty free
  - Airline clubs
  - Secure connector to Terminal 3 (B/A G only)
  - Hold rooms

**Exhibit 3.4-19** depicts the aircraft parking layouts for B/As A and G, respectively. **Exhibit 3.4-20** through **Exhibit 3.4-26** depicts the existing layout of the ITB.

**Exhibit 3.4-19 | International Terminal Building, Boarding Areas A and G – Aircraft Parking Layout**

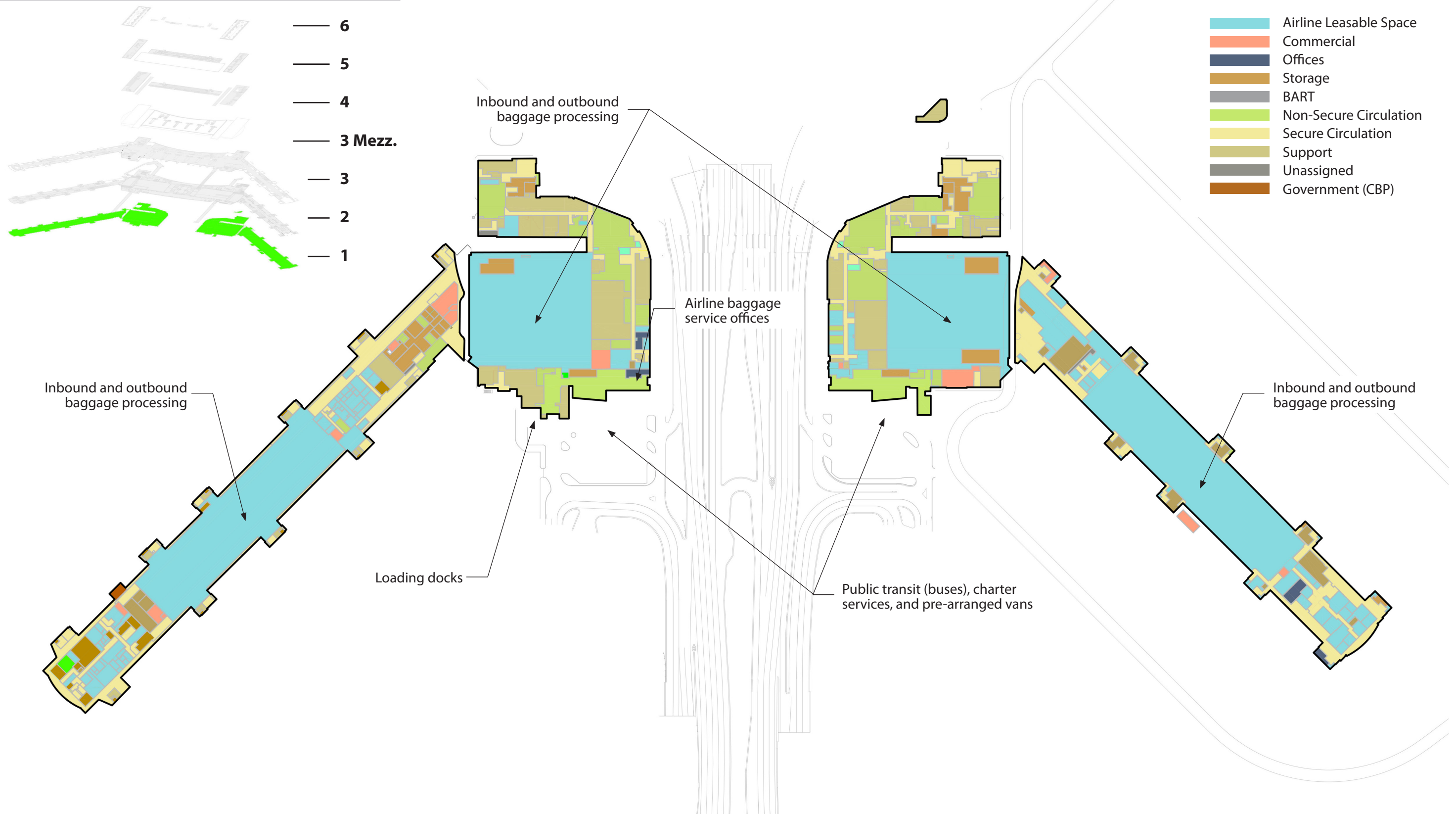


Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014; Landrum & Brown, Inc., September 2015



Exhibit 3.4-20 | ITB Level 1 Space Allocation

ITB KEY MAP

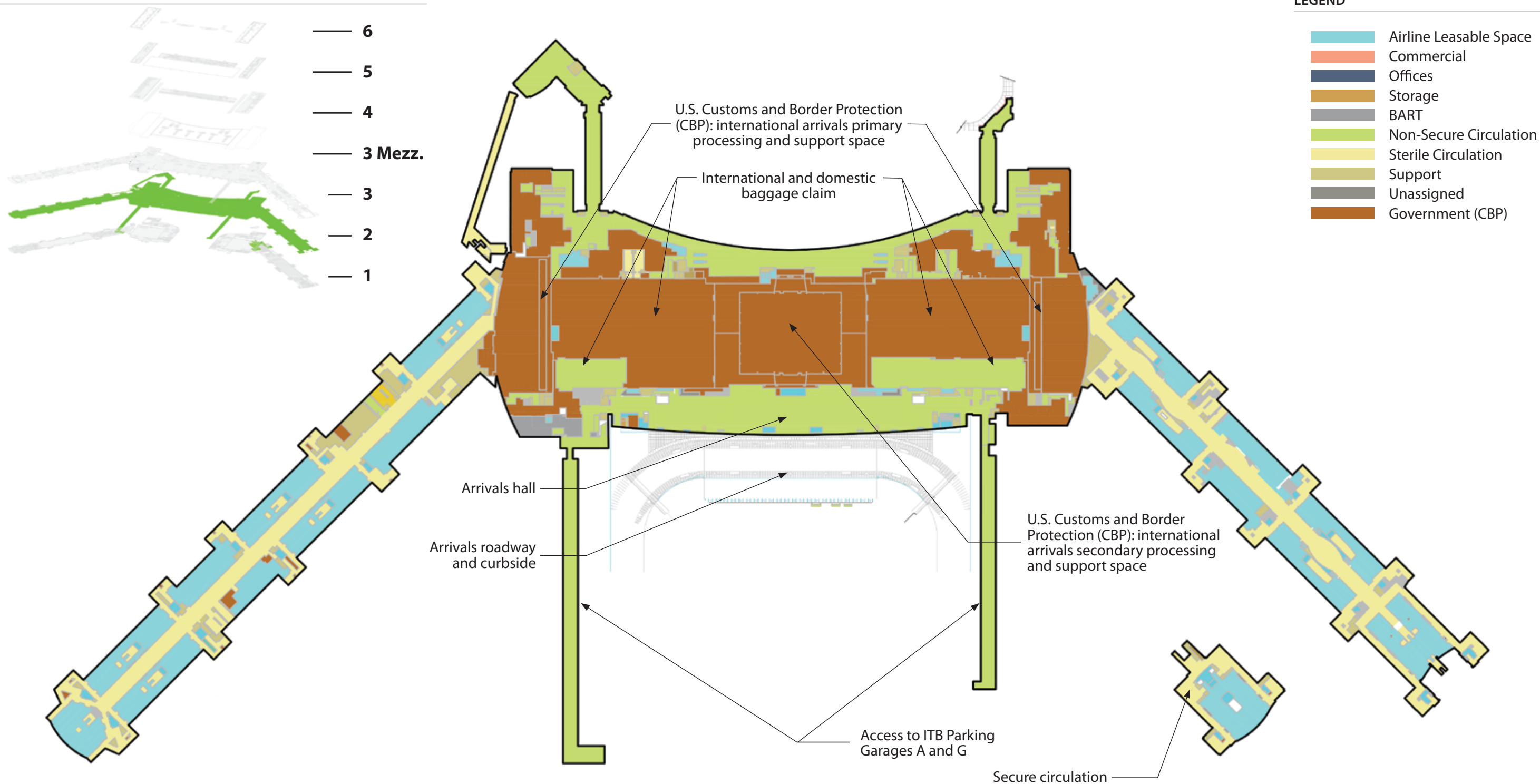


Source: SFO Bureau of Planning and Environmental Affairs, ITB Floor Plans, 2013, Landrum & Brown, Inc., July 2015



Exhibit 3.4-21 | ITB Level 2 Space Allocation

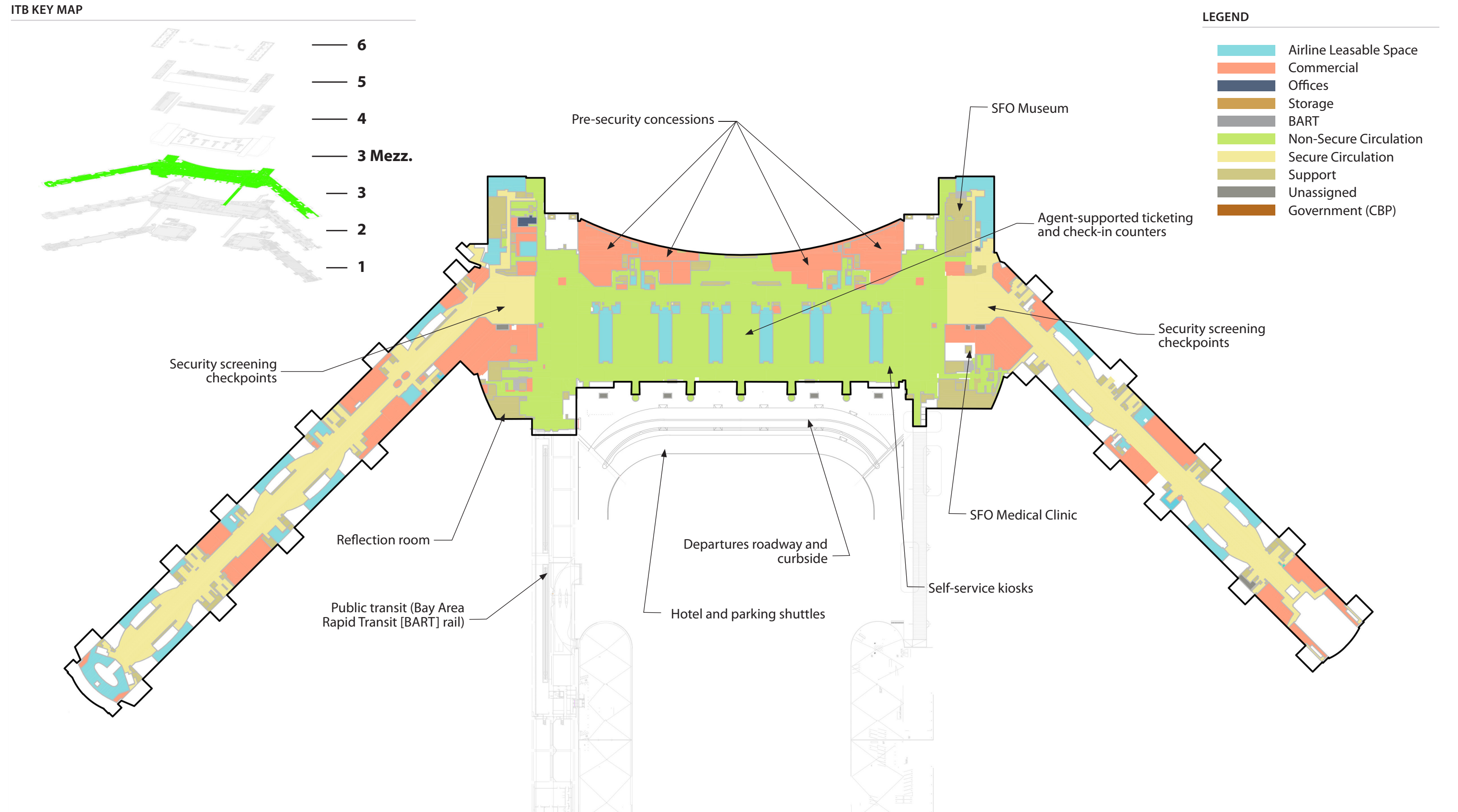
ITB KEY MAP



Source: SFO Bureau of Planning and Environmental Affairs, ITB Floor Plans, 2013, Landrum & Brown, Inc., July 2015



Exhibit 3.4-22 | ITB Level 3 Space Allocation

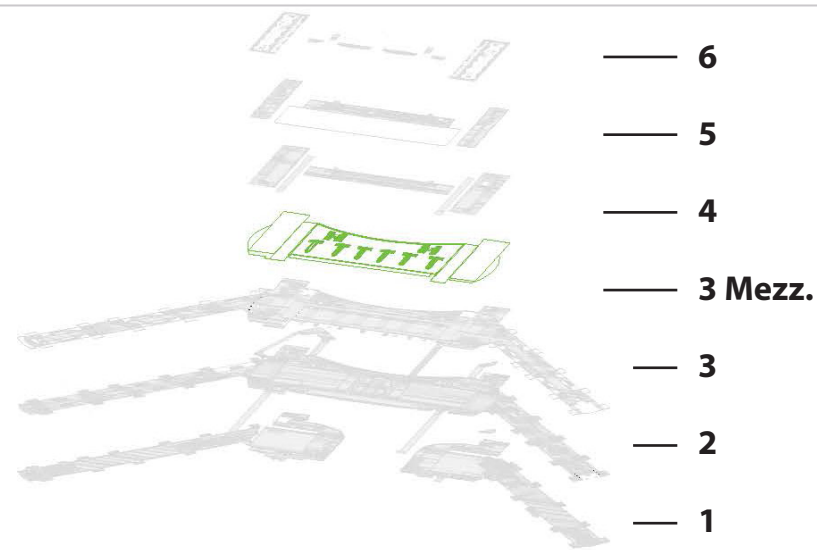


Source: SFO Bureau of Planning and Environmental Affairs, ITB Floor Plans, 2013, Landrum & Brown, Inc., July 2015

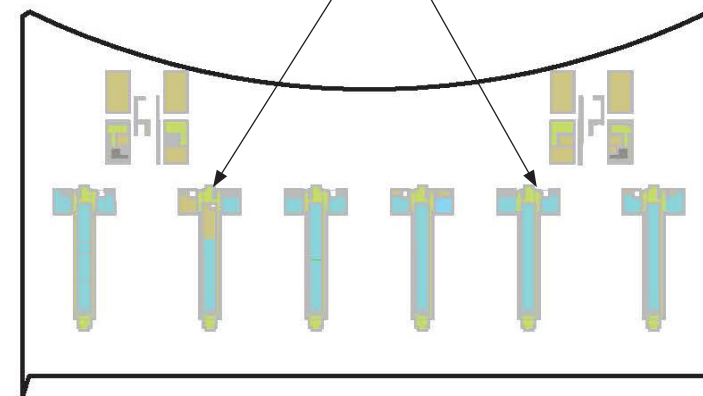


Exhibit 3.4-23 | ITB Level 3 Mezzanine Space Allocation

ITB KEY MAP



Airline ticket offices (mezzanine above ticketing islands)

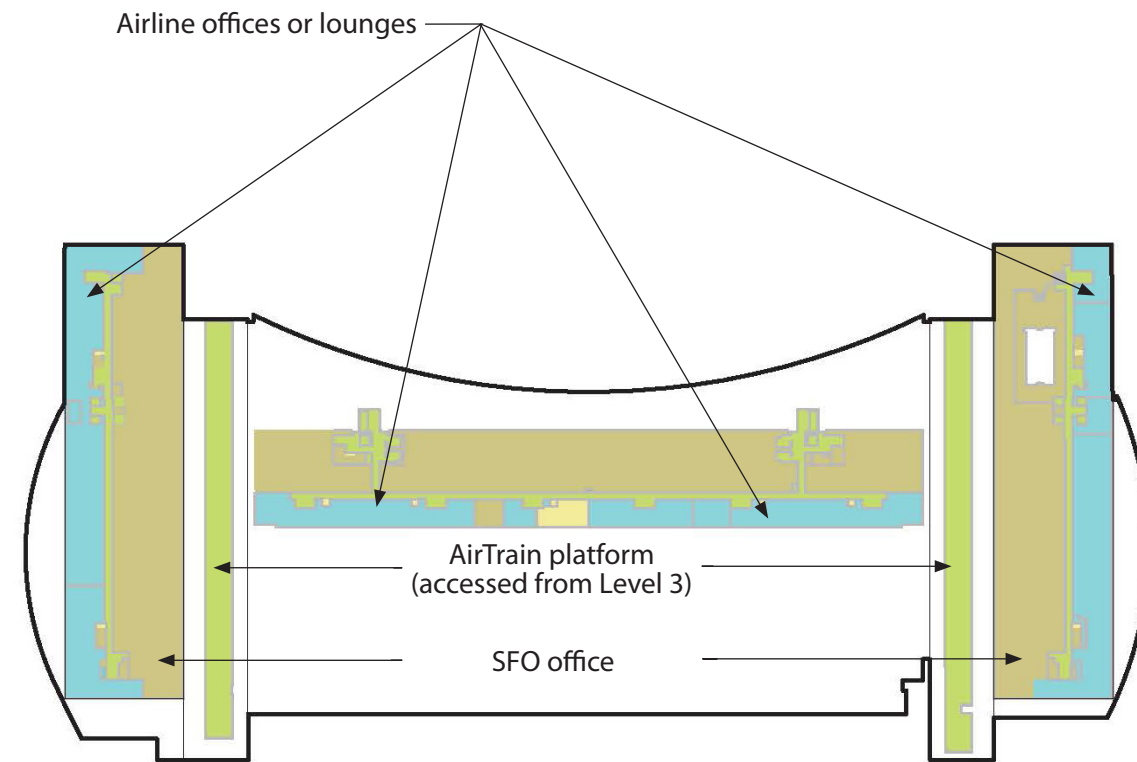
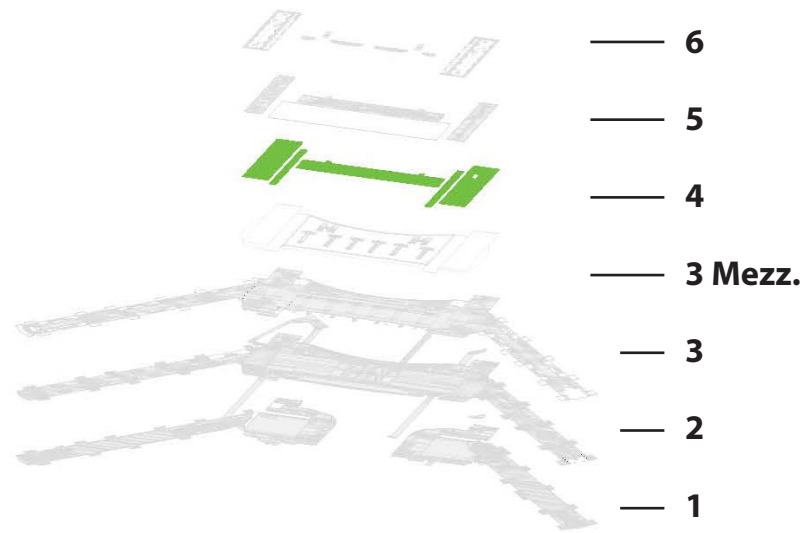


LEGEND

- Airline Leasable Space
- Commercial
- Offices
- Storage
- BART
- Non-Secure Circulation
- Sterile Circulation
- Support
- Unassigned
- Government (CBP)

Exhibit 3.4-24 | ITB Level 4 Space Allocation

ITB KEY MAP



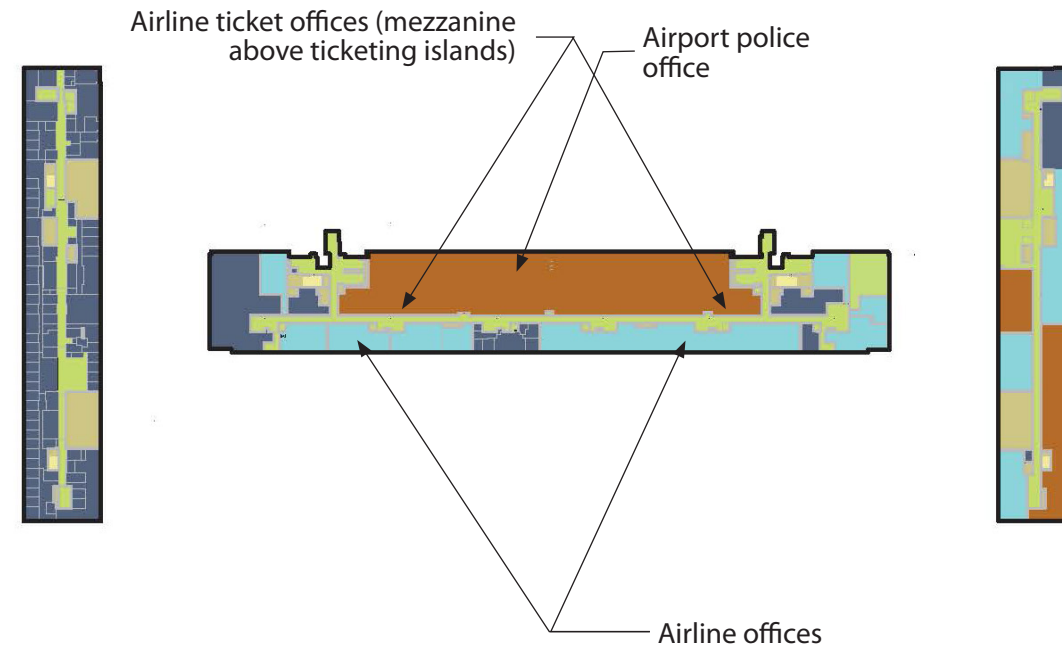
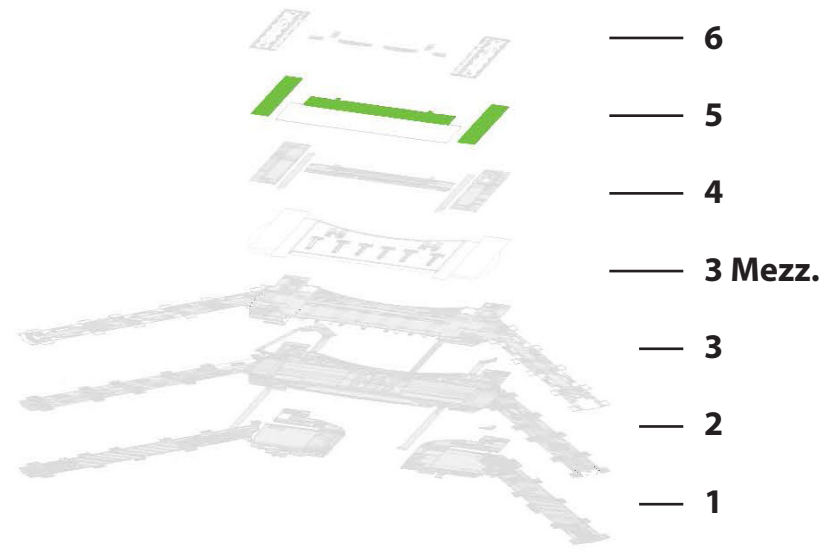
LEGEND

- Airline Leasable Space
- Commercial
- Offices
- Storage
- BART
- Non-Secure Circulation
- Secure Circulation
- Support
- Unassigned
- Government (CBP)



Exhibit 3.4-25 | ITB Level 5 Space Allocation

ITB KEY MAP

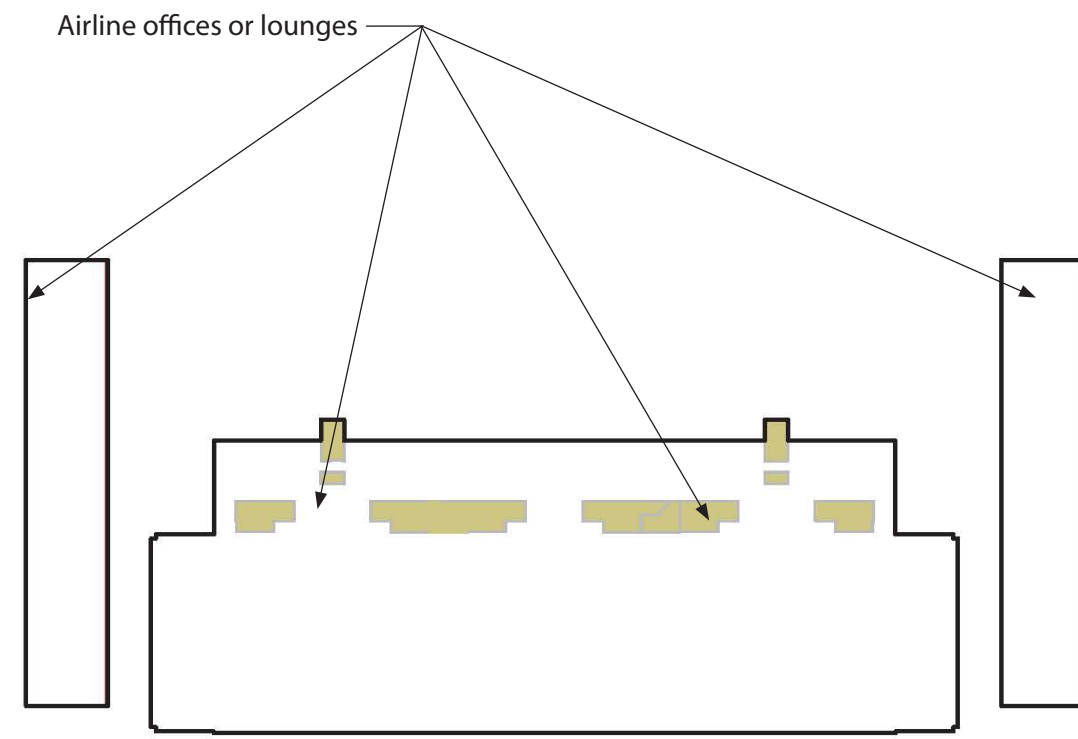
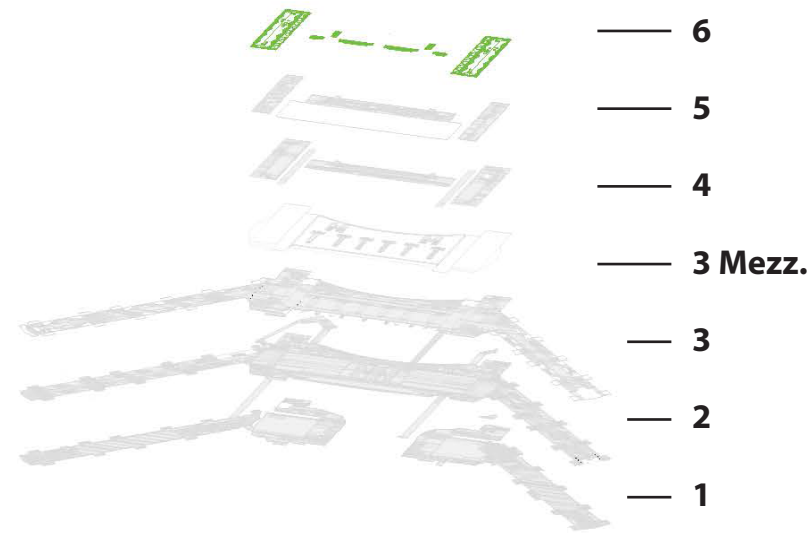


LEGEND

- Airline Leasable Space
- Commercial
- Offices
- Storage
- BART
- Non-Secure Circulation
- Sterile Circulation
- Support
- Unassigned
- Government (CBP)

Exhibit 3.4-26 | ITB Level 6 Space Allocation

ITB KEY MAP



LEGEND

- Airline Leasable Space
- Commercial
- Offices
- Storage
- BART
- Non-Secure Circulation
- Secure Circulation
- Support
- Unassigned
- Government (CBP)



### 3.4.5 Baggage Handling System

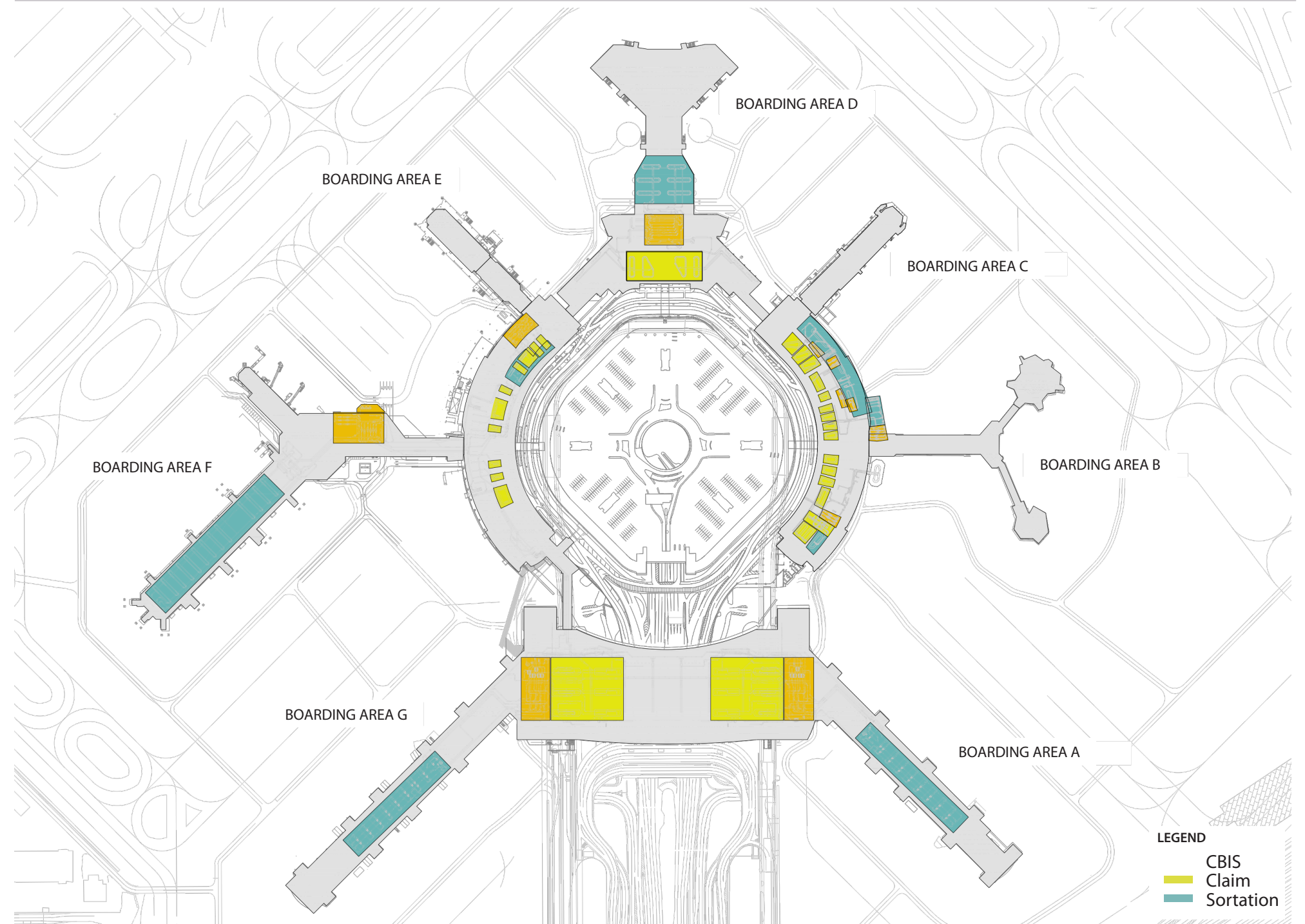
The SFO baggage handling systems (BHSs) support the movement, screening, and sortation of inbound and outbound checked baggage within the landside, terminal, and apron areas of the Airport. The existing conditions of the BHSs at SFO were examined to provide a basis for determining future BHS needs at the Airport.

The BHSs include:

- **Outbound (Departing) Baggage Systems**
  - Baggage conveyors from passenger check-in facilities
  - Transfer-baggage input conveyors to transport bags from one flight to another
  - Input conveyors for arriving international passengers transferring to connecting flights
  - Security screening areas (Checked Baggage Inspection Systems [CBIS])
  - Conveyors that sort baggage to airlines or flights within an airline
  - Baggage equipment (conveyors and carousels) for placing bags onto carts or unit load devices (ULD) used for transporting and loading baggage onto an aircraft
  
- **Inbound (Arriving) Baggage Systems**
  - Baggage input conveyors delivering baggage to the baggage claim area
  - Baggage transport conveyors
  - Baggage carousels

**Exhibit 3.4-27** illustrates the existing BHS layout within the terminal core area. The inventory of the BHSs for each terminal and boarding area is provided in **Appendix G, Baggage Handling System Study**.

**Exhibit 3.4-27 | Existing Baggage Handling System**



Sources: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014; SFO Site Visit by BNP, October 2014; BNP Associates, October 2015

### 3.4.6 Ongoing Passenger Terminal Projects

Several Ongoing Projects have been authorized to proceed by the Airport Commission or have been identified by Airport management as needing to be implemented in the near future, subject to Airport Commission and other necessary approvals. The ongoing terminal projects are in various stages of planning, programming, design, or construction. Appropriate environmental reviews as required under CEQA or NEPA are completed, in process, or will be conducted. These projects are proceeding, or will proceed if approved, irrespective of any ADP projects and do not address long term demands and capacity needs. The following sections describe each ongoing terminal project to provide a comprehensive terminal inventory.

**ITB Arrivals Level Improvements:** This project would include the following improvements on the Arrivals Level in the ITB Main Terminal to enhance the passenger experience and provide flexibility for the use of aircraft gates in B/As A and G:

1. Reconfiguration of the CBP secondary processing area to connect the international bag claim halls for B/As A and G.
2. Modification of the airline recheck counters to provide additional circulation for the reconfigured CBP secondary processing area.
3. Extension of four existing international baggage claim devices to provide additional claim frontage.
4. Reconfiguration of the Arrivals Hall to accommodate a single CBP Exit Control point to the meeter and greeter lobby, a single CBP Exit Control point to the airline recheck area, and enhance the meeter and greeter lobby with improved amenities and concessions.

The four elements of the ITB Main Terminal Arrivals Level improvements are depicted in **Exhibit 3.4-28**.

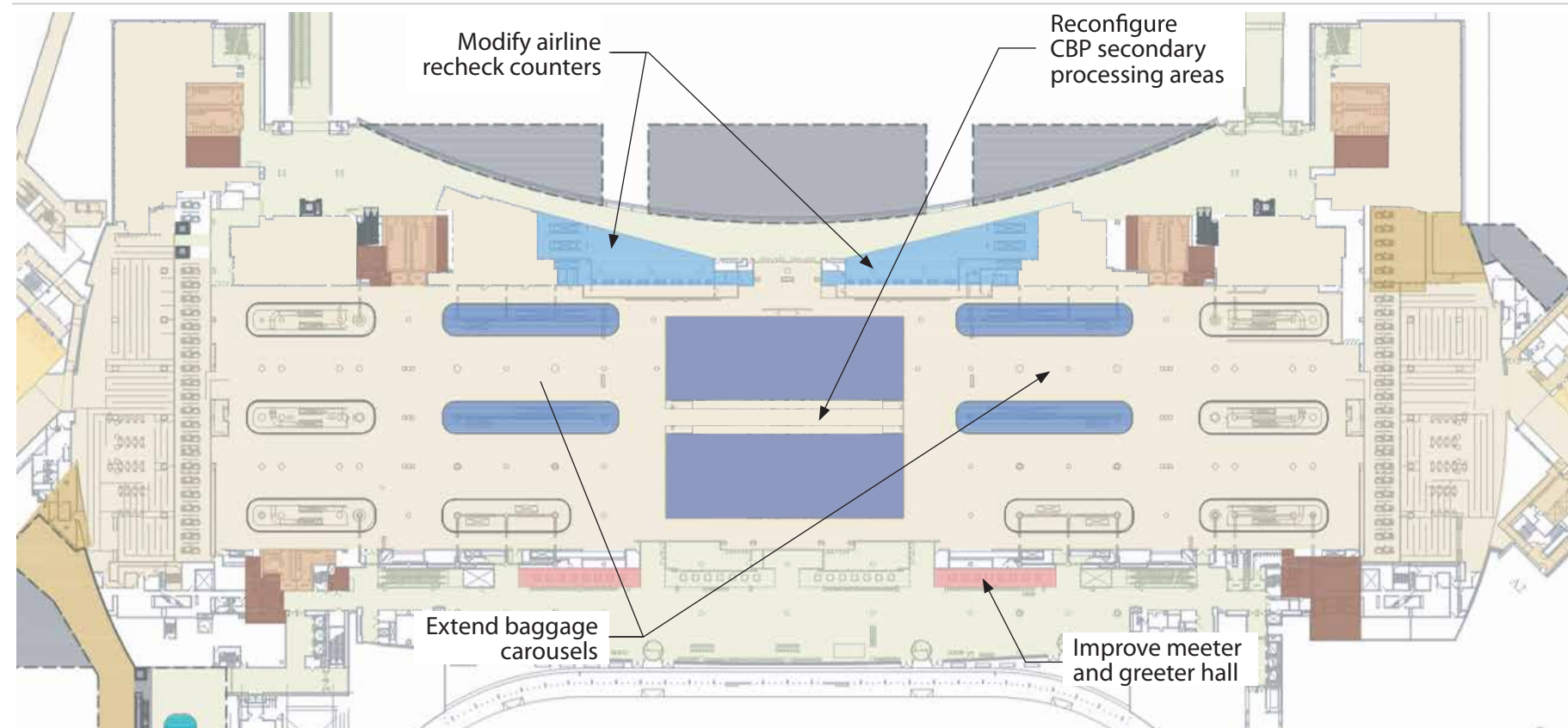
Additional details regarding the alternatives evaluation and identification of recommended improvements is documented in **Appendix E, International Terminal Building Arrivals Level Study**.

**ITB BHS Upgrade:** This project would upgrade the ITB BHS by replacing controls and installing appropriate conveyors and diverters to extend its operational life and reduce its energy consumption. Such work may include:

1. Replacement and upgrade of high- and low-level controls to replace obsolete equipment, improve control of the baggage flow, and implement aggressive energy management.
2. Replacement of drives/motors with high-efficiency drives to enable better control over the baggage and enable the frequent starting/stopping associated with aggressive energy management.
3. Replacement of belting with low-friction belting to reduce energy consumption and allow for reduced drive sizes.
4. Replacement of pushers or plough diverters with high-speed diverters for improved management and control over the baggage flow.
5. Implementation of a reporting system to monitor and manage the BHS performance.

**B/As A, F, and G Near-Term BHS Screening Projects:** This project would replace BHS screening equipment in B/As A, F, and G with newer screening devices.

**Exhibit 3.4-28 | International Terminal Building – Arrivals Level Improvements**



Source: SFO Bureau of Planning and Environmental Affairs, ITB Floor Plans, 2013 Landrum & Brown, Inc., March 2016



**Terminal 1 Redevelopment and BHS:** The Terminal 1 Redevelopment project replaces the existing Terminal 1 and B/A B with a modern facility designed to accommodate forecast demand, enhance passenger level of service, address Terminal 1 foundation deficiencies, and provide an enhanced and modernized guest experience. The reconstruction of Terminal 1 and B/A B will provide 18 gates for widebody and narrowbody aircraft or up to 27 aircraft parking positions with all narrowbody aircraft. The redevelopment of Terminal 1 includes:

1. Construction of a temporary passenger screening checkpoint and interim B/A B facility that will include a connector bridge, holdrooms, jet bridges, and airline support spaces for nine aircraft gates. The nine aircraft gates are required to handle forecast airline and passenger activity during construction of the new B/A B.
2. Construction of a new B/A B and rehabilitated Terminal 1 facility providing new gates, security checkpoints, and baggage screening facilities.
3. Construction of secure and sterile connections to the ITB.
4. Construction of a secure connector to B/A C.
5. Implementation of an Individual Carrier System (ICS) BHS.

A rendering of the Terminal 1 Redevelopment is shown in **Exhibit 3.4-29**.

**Exhibit 3.4-29 | Terminal 1 Redevelopment Rendering**

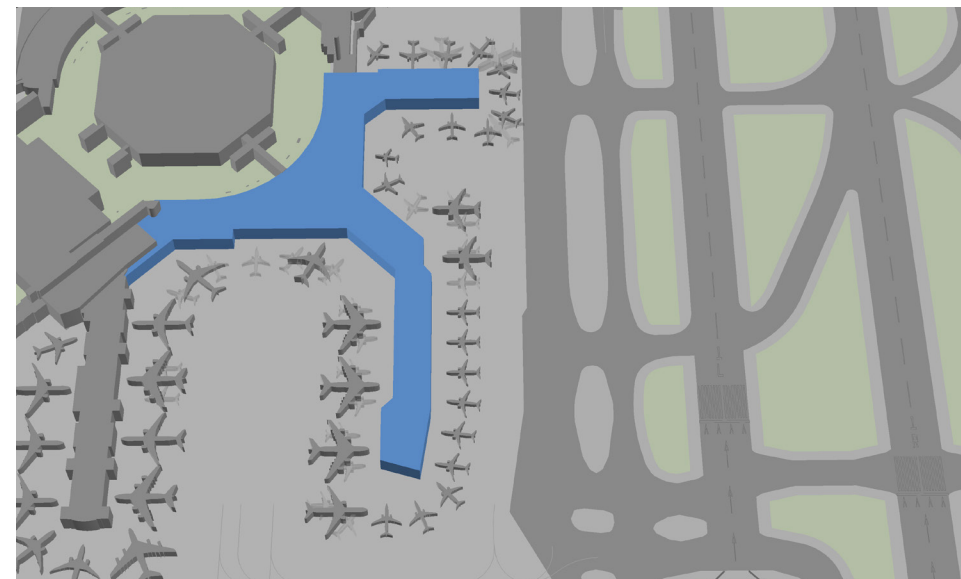


Source: San Francisco International Airport

**B/A C Reconstruction:** The B/A C reconstruction will enhance facilities and services, including concessions spaces, public restrooms, and other passenger amenities. The Terminal 1, B/A B, and B/A C redevelopment is depicted in **Exhibit 3.4-30**.

**Terminal 2 – Terminal 3 Secure Connector:** The secure connector would enable post-security passenger circulation between Terminal 2 and Terminal 3, ultimately allowing passengers to travel between all terminals without exiting and reentering the secure area via a security checkpoint. These connectors would facilitate splitting airline operations between boarding areas and make it easier for airlines in strategic alliances to be located in adjacent boarding areas. A new BHS transfer line would be provided to transfer bags between terminals. The project would also include provision for a new office block, up to six stories tall, that would be built above and adjacent to the connector.

**Exhibit 3.4-30 | Boarding Area B and C Redevelopment**

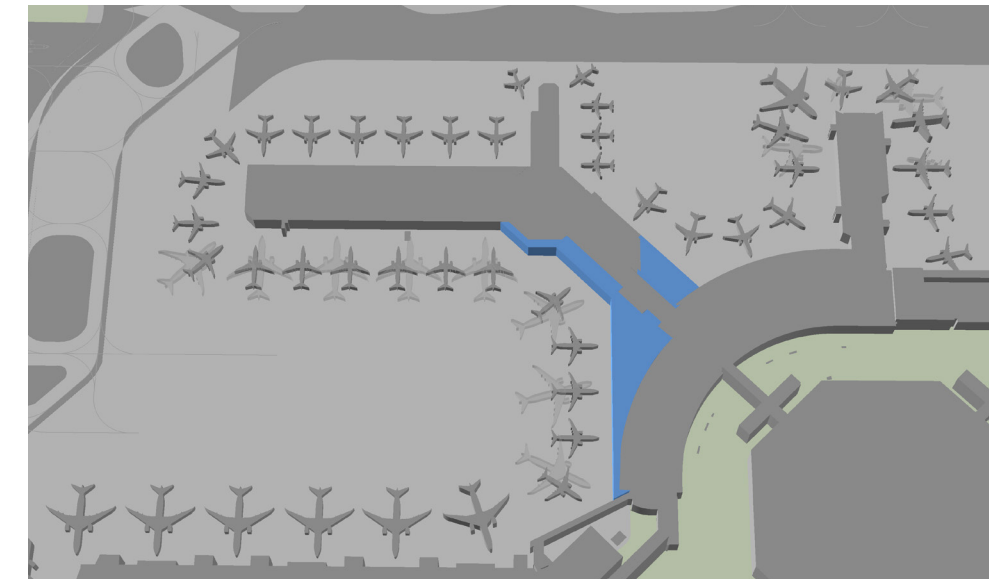


Source: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014, Landrum & Brown, Inc., March 2016

**Terminal 3 West Expansion and Renovation Project:** The Terminal 3 West improvements would reconfigure the western side of the terminal to extend the useful life of the terminal, improve passenger flow, meet SFO's standards of customer service, improve the building systems' performance and meet current building codes. The improvements include expansion of the holdrooms for the western frontage gates, additional domestic/international swing gate capability, improved concessions, passenger amenities, and a modernized BHS. At project completion, the whole of Terminal 3 would be in compliance with the latest life safety and code requirements and the building performance would be improved for energy efficiency. The Terminal 3 West Expansion and Renovation project is depicted in **Exhibit 3.4-31**.

**B/A F Passenger Boarding Bridge and Modernization:** This project will replace five existing nose-load passenger boarding bridges (PBBs) with five new apron drive PBBs and install two additional PBBs on the west side of B/A F. The aircraft parking area will be reconfigured and two new hydrant fuel pits will be installed to serve a wider range of aircraft.

**Exhibit 3.4-31 | Terminal 3 West Improvements**



Source: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014, Landrum & Brown, Inc., March 2016

**Terminal 2 Aircraft Parking Enhancement:** The B/A D aircraft parking area will be reconfigured by downgauging two larger aircraft parking positions and modifying the existing aircraft parking area to include an additional narrowbody aircraft parking position. The Terminal 2 aircraft parking enhancement is shown in **Exhibit 3.4-32**.

**Gate Enhancements:** These projects would enhance gate flexibility by (1) improving the A380 gates at B/A A; (2) providing B/A A fleet flexibility; and (3) installing bus-gate access at B/As A and G.

For the gates on the east side of B/A A, the project reconfigures Gates A1, A3, A5, and A12 to allow Gate A5 to service A380 aircraft without restrictions. Gate A12 would be reconfigured to accommodate a 777-300 aircraft and enable Gate A11 to be an A380 backup gate during Gate A1 reconstruction. Gates A1 and A3 would then be reconfigured and shifted to allow an A380 aircraft to be parked at Gate A5 with a three-PBB operation.

Additional work includes replacing the existing central preconditioned air system with individual units at each gate, relocating the existing fuel pits, and upgrading the electrical infrastructure to support the new equipment.

For the gates on the west side of B/A A, the project reconfigures Gates A2, A4, A6, and A8 to allow for one additional 777-300 (and future 777-9X) gate at Gate A8. Gates A4 and A6 would be reconfigured to accommodate the proposed 777-9X. In addition, the project would replace all of the PBBs, which are at the end of their useful life, and replace the existing central preconditioned air system with individual units at each gate. This project would also relocate the existing fuel pits and upgrade the electrical infrastructure to support the new equipment.

Bus access would also be added to both B/As A and G.

Infrastructure would be upgraded to become more efficient, thereby reducing operation and maintenance costs.

**Demolition of Old Airport Traffic Control Tower:** Construction of the new 221-foot ATCT located between Terminals 1 and 2 in Courtyard #2 is complete. The FAA will perform tenant modifications and fully activate the ATCT in 2016 after a commissioning period. The old tower and a portion of the building above Terminal 2 will be removed after equipment removal is completed. Improvements will be made to the mezzanine level of Terminal 2.

A summary of the ongoing passenger terminal projects are depicted in **Exhibit 3.4-33**.

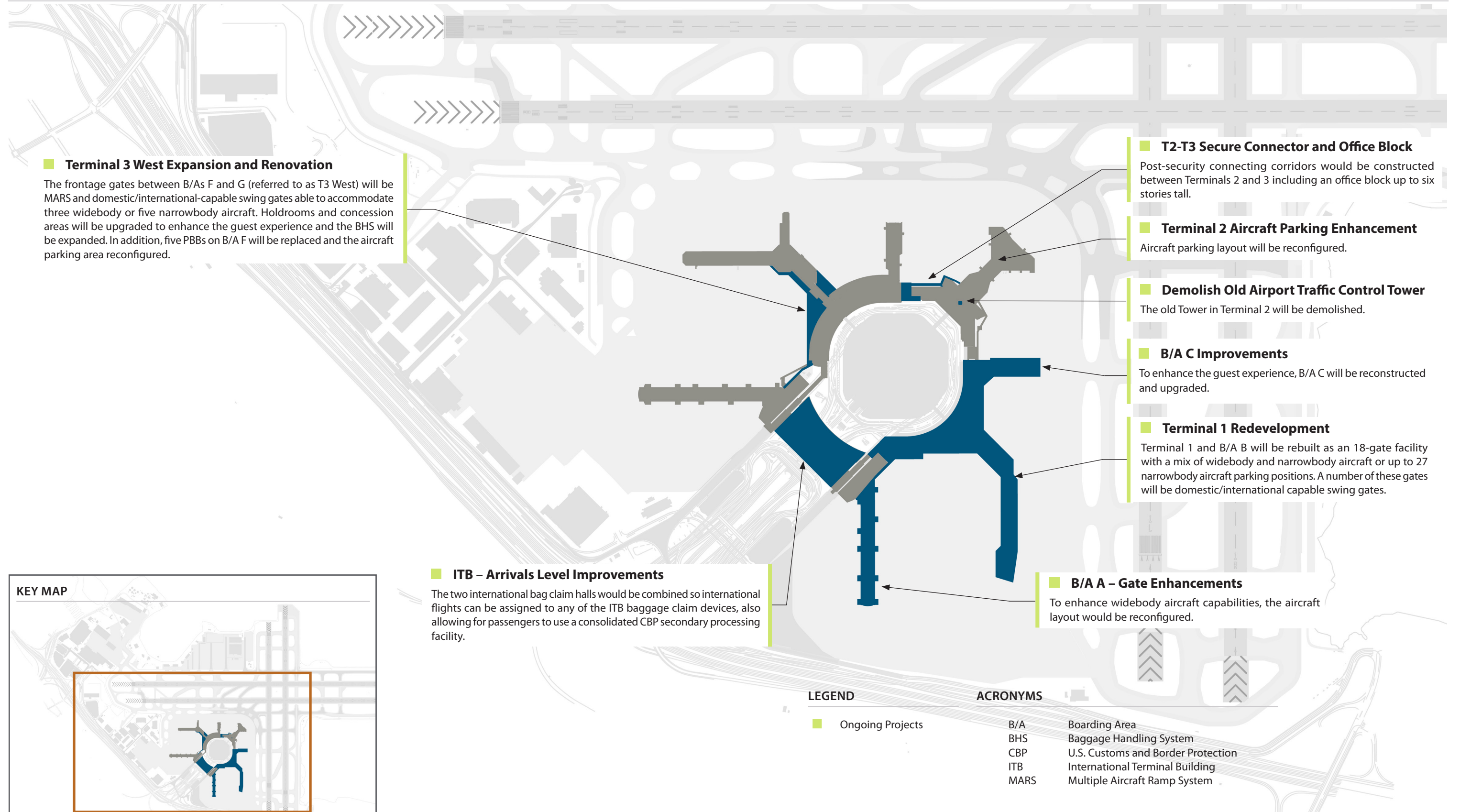
**Exhibit 3.4-32 | Terminal 2 Aircraft Parking Enhancement**



Source: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014, Landrum & Brown, Inc., June 2016



Exhibit 3.4-33 | Ongoing Passenger Terminal Projects



Source: SFO Bureau of Planning and Environmental Affairs, SFO Airport Layout Plan, 2014, Landrum & Brown, Inc., June 2016





Non-terminal roadways are surface streets that pass through Airport property without directly serving the terminal buildings. The primary non-terminal roadways north of the terminal complex include the following, with traffic counts provided in **Table 3.5-3** and count locations depicted in **Exhibit 3.5-2**:

- **North Access Road** provides access to all facilities on the north side of the airfield and the North Field Airfield Checkpoint.
- **North McDonnell Road** parallels US-101 and provides access to facilities west of the airfield, including the Rental Car Center (RCC), administration facilities, and West Field Road. North McDonnell Road becomes South Airport Boulevard at the intersection with San Bruno Avenue.
- **South Airport Boulevard** provides access to the Long Term Parking Garage and the United Airlines San Francisco Maintenance Center, and is the primary surface street between the Airport and points north. South Airport Boulevard becomes North McDonnell Road at the intersection with San Bruno Avenue.
- **West Field Road** provides access to the West Field Employee Parking Garage, cargo and mail facilities, and the West Field Airfield Checkpoint.

**Table 3.5-3 | Peak Traffic Counts on Non-Terminal Roadways – North**

Location	Roadway	2013	2012	2011
A	North Access Road – Westbound	503	508	495
B	North Access Road – Eastbound	512	463	312
C	North McDonnell Road – Southbound	964	982	887
D	North McDonnell Road – Northbound	1,126	1,178	1,060
E	Rental Car Center Exit/Rentals	676	702	688
F	Rental Car Center Entrance>Returns	630	632	531
G	North McDonnell Road – Southbound	460	460	N/A
H	North McDonnell Road – Northbound	619	614	N/A
I	West Field Road – Westbound	624	640	N/A
J	West Field Road – Eastbound	572	504	454

Note: The location letters refer to locations depicted in **Exhibit 3.5-2**. Traffic counts are from the last week of July in the years noted.

Source: San Francisco International Airport, Landside Operations Division, Traffic Counts; Leigh Fisher, 2015. Traffic counts are from the last week of July in the years noted.

The primary non-terminal roadway south of the terminal complex is South McDonnell Road. South McDonnell Road runs parallel to U.S. 101 and provides access to various parking facilities, the South Field Airfield Checkpoint, and a new compressed natural gas (CNG) fueling station. South Link Road and North Link Road provide access to the terminal roadways. South of the Airport, South McDonnell Road becomes Old Bayshore Highway.

Traffic count locations K, L, M, N, O, and P, shown on **Exhibit 3.5-3**, are all on South McDonnell Road (see **Table 3.5-4**).

Since 2012, South McDonnell Road has served diverted commuter traffic, and experiences peak hour traffic volumes at 5:00 p.m. on Fridays. Peak hour traffic volumes occurred at different times and days prior to 2012.

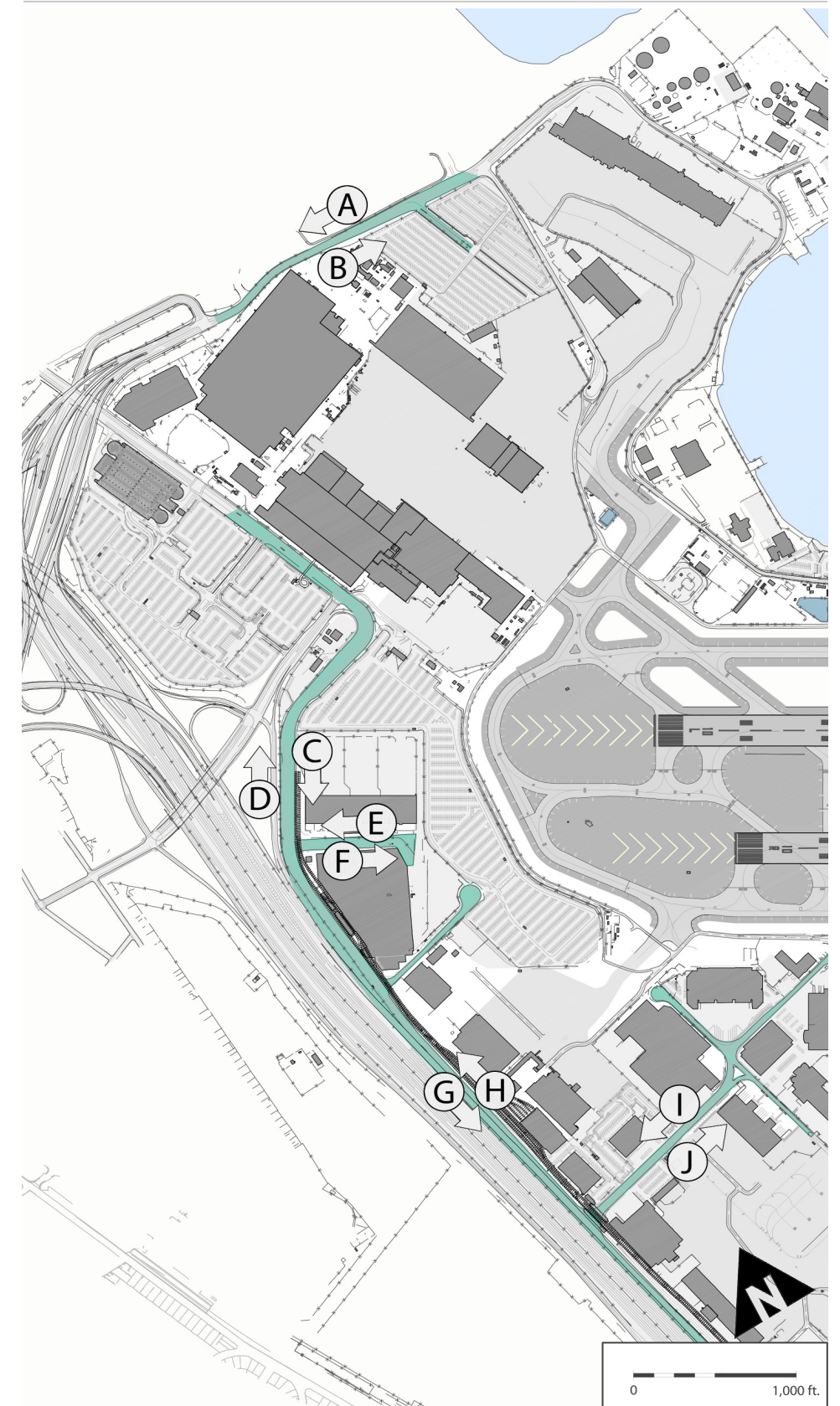
**Table 3.5-4 | Peak Traffic Counts on Non-Terminal Roadways – South**

Location	Roadway	2013	2012	2011
K	South McDonnell Road at Lot C – Southbound	479	445	490
L	South McDonnell Road at Lot C – Northbound	409	384	369
M	South McDonnell Road at Hotel Lot – Southbound	691	457	344
N	South McDonnell Road at Hotel Lot – Northbound	376	198	152
O	South McDonnell Road at CNG – Northbound	370	200	90
P	South McDonnell Road at CNG – Southbound	736	408	186

Notes: CNG refers to the compressed natural gas fueling station near Runway 1R. The location letters refer to locations depicted in **Exhibit 3.5-3**. The traffic count surveys were conducted during the last week of July in the years noted.

Source: San Francisco International Airport, Landside Operations Division, Traffic Counts; Leigh Fisher, 2015.

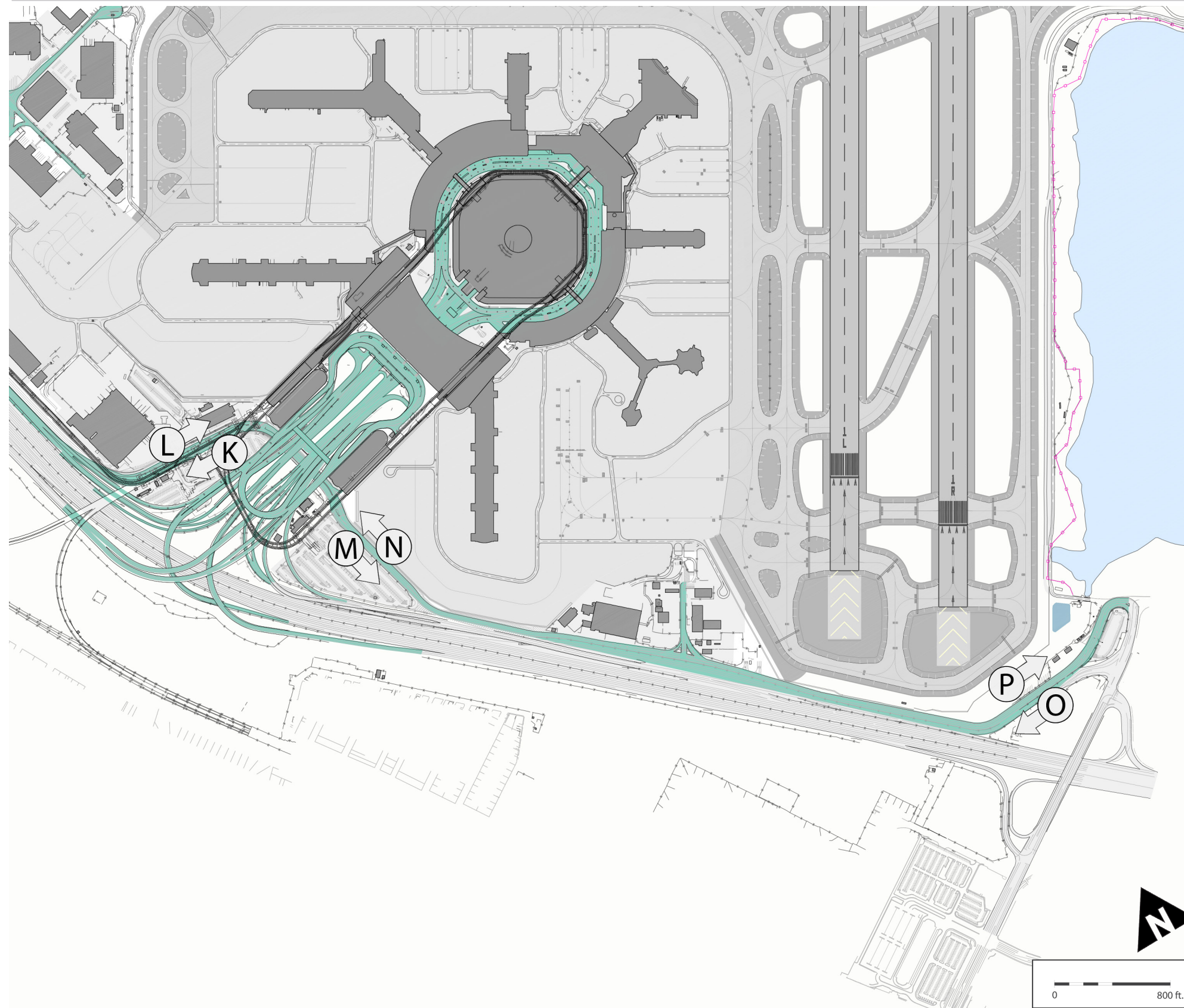
**Exhibit 3.5-2 | Traffic Count Locations – North**



Sources: San Francisco International Airport, Landside Operations Division, Traffic Counts; Leigh Fisher, 2015, Ricondo and Associates, 2016



Exhibit 3.5-3 | Traffic Count Locations – South



Sources: San Francisco International Airport, Landside Operations Division, Traffic Counts; Leigh Fisher, 2015; Ricondo and Associates, 2016

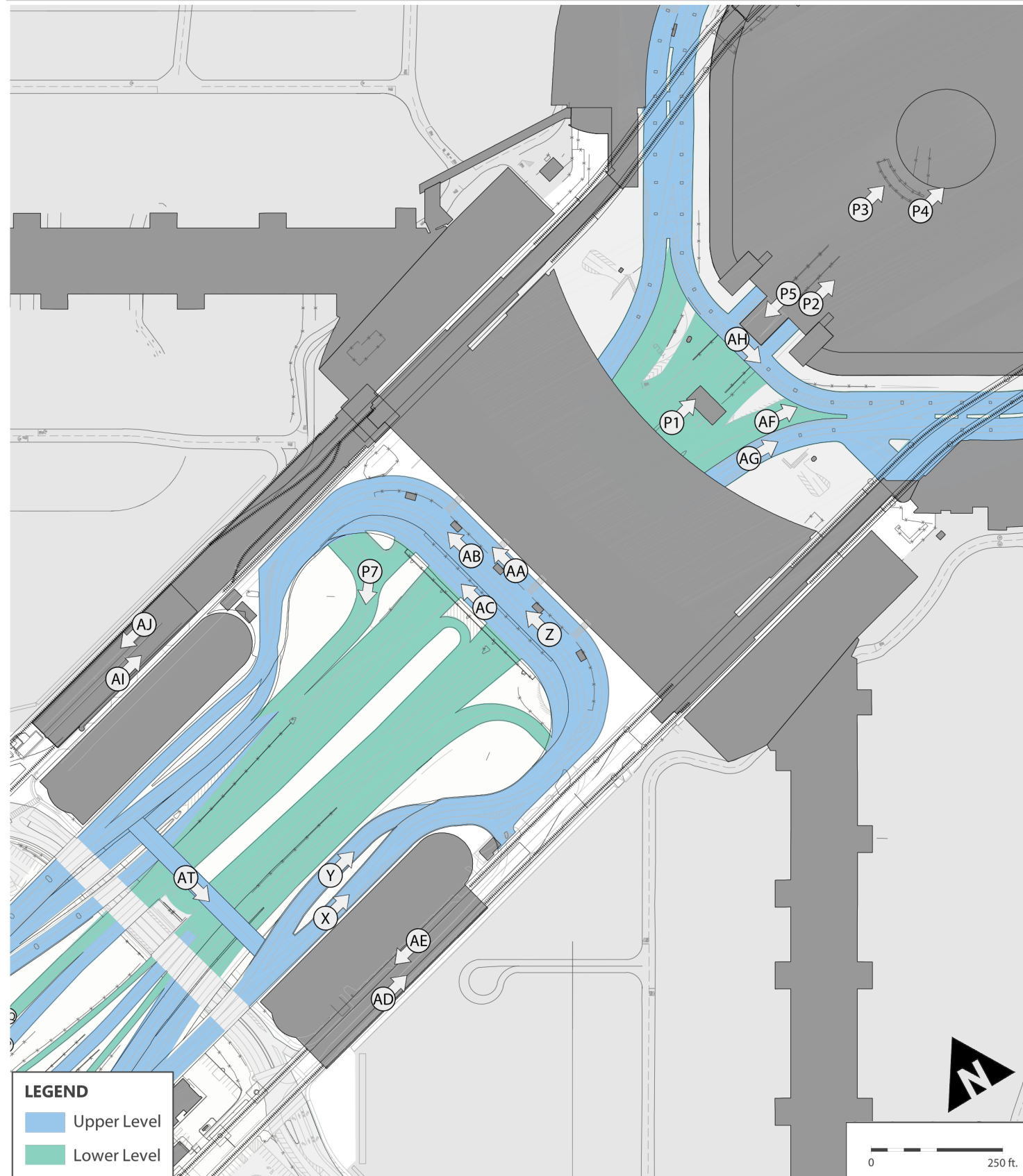
### 3.5.2 Terminal Area Roadway System

The existing terminal area roadway system is discussed in this section and depicted in **Exhibit 3.5-4** and **Exhibit 3.5-5**.

**Table 3.5-5** summarizes the peak hour traffic counts on each roadway segment. The peak day and peak hour vary by roadway segment. At the time this inventory was prepared, 2014 data were not yet available.

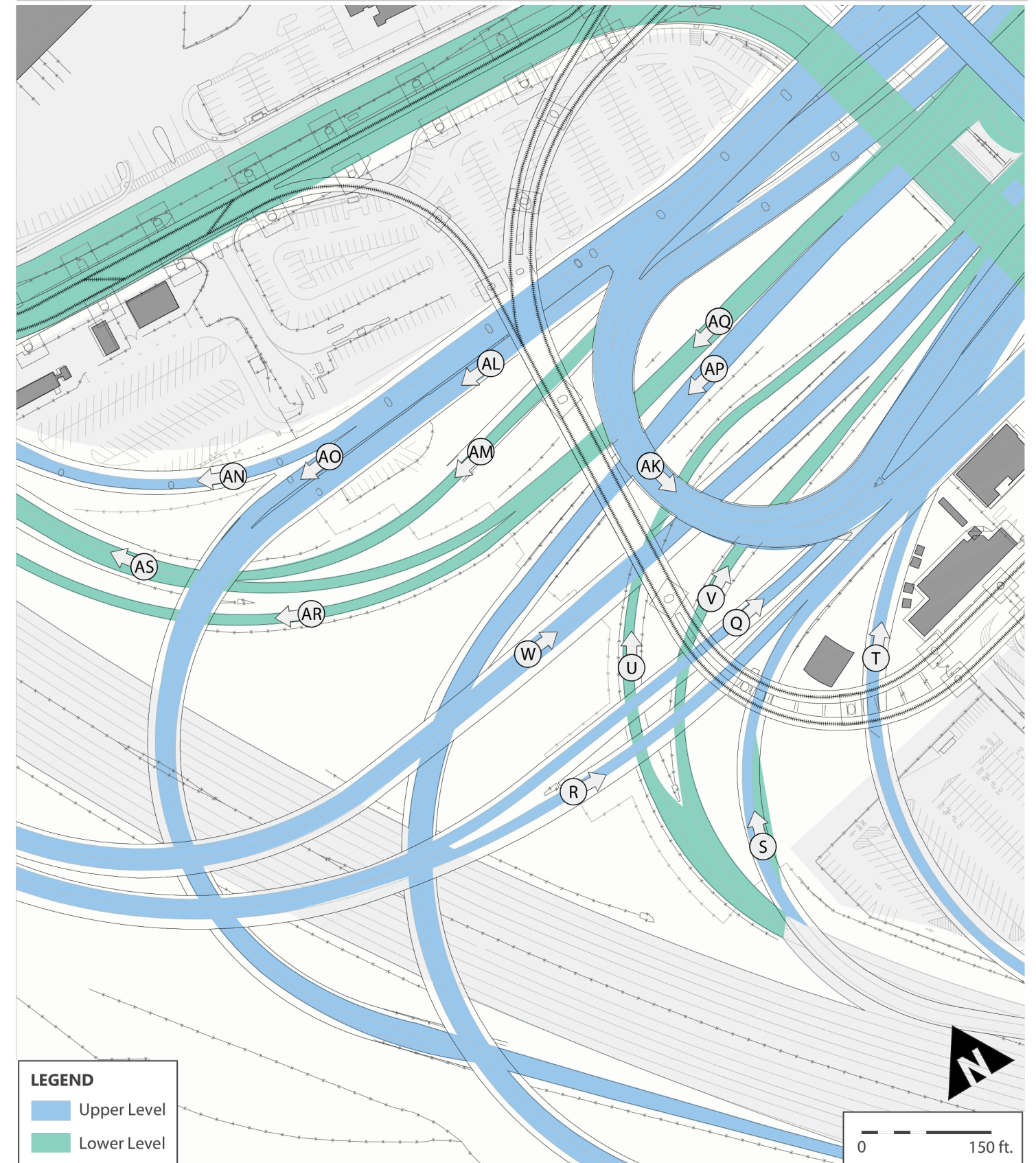


Exhibit 3.5-4 | Terminal Area Roadways – North



Source: Bay Area Airports Ground Survey, Fall and Summer 2014 Preliminary, Draft Results, Leigh Fisher, 2015

Exhibit 3.5-5 | Terminal Area Roadways – South



Source: Bay Area Airports Ground Survey, Fall and Summer 2014 Preliminary, Draft Results, Leigh Fisher, 2015



Table 3.5-5 | 2011-2013 Terminal Roadway Traffic Counts

Location	Roadway	2011	2012	2013
A	North Access Road – Westbound	495	508	503
B	North Access Road – Eastbound	312	463	512
C	North McDonnell Road – Southbound	887	982	964
D	North McDonnell Road – Northbound	1,060	1,178	1,126
E	Rental Car Center Exit/Rentals	688	702	676
F	Rental Car Center Entrance>Returns	531	632	630
G	North McDonnell Road – Southbound	N/A	460	460
H	North McDonnell Road – Northbound	N/A	614	619
I	West Field Road – Westbound	N/A	640	624
J	West Field Road – Eastbound	454	504	572
K	South McDonnell Road at Lot C – Southbound	490	445	479
L	South McDonnell Road at Lot C – Northbound	369	384	409
M	South McDonnell Road at Hotel Lot – Southbound	344	457	691
N	South McDonnell Road at Hotel Lot – Northbound	152	198	376
O	South McDonnell Road at CNG – Northbound	90	200	370
P	South McDonnell Road at CNG* – Southbound	186	408	736
Q	Southbound U.S. 101 Ramp to Lower International Terminal	396	396	499
R	Southbound U.S. 101 Ramp to Upper International Terminal	541	541	601
S	Northbound U.S. 101 Ramp to Upper International Terminal	452	452	531
T	Northbound U.S. 101 Ramp to Lower International Terminal	270	270	255
U	Northbound U.S. 101 Ramp to Lower Domestic Terminal	572	572	478
V	Northbound U.S. 101 Ramp to Upper Domestic Terminal	610	610	524
W	Southbound U.S. 101 Ramp to Lower Domestic Terminal	1576	1576	1606
X	Upper Level International Terminal Roadway	1014	1014	1119
Y	Lower Level International Terminal Roadway	794	794	868
Z*	Upper Level International Terminal, Lanes 1 and 2	159	159	--
AA*	Upper Level International Terminal, Lanes 3 and 4	672	672	--
AB*	Lower Level International Terminal, Lanes 1 and 2	202	202	--
AC*	Lower Level International Terminal, Lanes 3 and 4	609	609	--
AD	Eastbound Southern Link Road east of South McDonnell Road	100	100	110
AE	Westbound Southern Link Road east of South McDonnell Road	628	628	619
AF	Lower Level Domestic Terminal Roadway	1180	1180	1328
AG	Upper Level Domestic Terminal Roadway	1702	1702	1790
AH	Domestic Terminal Return-to-Terminal	116	116	90
AI*	Eastbound Northern Link Road east of North McDonnell Road	482	482	--
AJ	Westbound Northern Link Road east of North McDonnell Road	76	76	70
AK*	International Terminal Return-to-Terminal	580	580	--
AL	International Terminal Arrivals exit to Southbound U.S. 101	276	276	327
AM	International Terminal Arrivals exit to Northbound U.S. 101 and I-380	238	238	264
AN	International Terminal Departures exit to Northbound U.S. 101 and I-380	616	616	539
AO	International Terminal Departures exit to Southbound U.S. 101	445	445	438
AP	Domestic Terminal exit to Southbound U.S. 101	902	902	834
AQ*	Domestic Terminal exit to Northbound U.S. 101 and I-380	1502	1502	--
AR	Domestic Terminal entrance ramp to Northbound U.S. 101	1184	1184	1203
AS*	Ramp to I-380	543	543	--
AT*	Terminal 1 Turnaround	302	302	--
P1	Domestic Terminal Garage Main Entrance	369	369	368
P2	Level Four Domestic Terminal Garage Entrance	42	42	40
P3	Level One Domestic Terminal Garage Entrance	38	38	42
P4	Level One Taxicab Garage Entrance	552	552	646
P5	Taxicab Garage Exit	521	521	563
P6*	International Terminal Garage Entrance	662	662	--
P7*	International Terminal Garage Exit	743	743	--

Sources: The SFO Landside Operations Division conducts traffic count surveys in late July on an annual basis. The above data were supplemented by the surveys conducted in July 2012 as part of the SFO *Ground Transportation Master Plan*. These supplemental counts are denoted by an asterisk (\*) in the table.



### 3.5.3 Terminal Curbsides

Terminals 1, 2, and 3 and the ITB have inner (terminal-side) and outer (garage-side) curbsides on both the upper (departures) and lower (arrivals) level roadways. The domestic terminals have three courtyards and the ITB has two courtyards on the ground level. At the ITB, the curbside furthest from the building (and closest to Parking Garages A and G) is referred to as the outer curbside.

#### Departures Level

The inner roadway at Terminals 1, 2, and 3 has 2,190 linear feet of usable curbside<sup>13</sup> and the inner roadway at the ITB has 617 linear feet of usable curbside. The outer roadway has a total of 2,191 linear feet of usable curbside; 1,631 linear feet are provided at Terminals 1, 2, and 3 and 560 linear feet are provided at the ITB.

#### Arrivals Level

On the arrivals level, 2,298 linear feet of usable curbside are provided at Terminals 1, 2, and 3 and 611 linear feet are provided at the ITB. The outer roadway has 1,647 linear feet of usable curbside at Terminals 1, 2, and 3 and 525 linear feet are provided at the ITB.

#### Courtyard

The courtyards at all four terminals are used by drivers of vehicles that are picking up pre-arranged passengers, including limousines, shared-ride vans, and charter buses. For the ITB, SamTrans public buses also pick up and drop off passengers near Courtyard G. The courtyard locations are depicted in **Exhibit 3.5-6**.

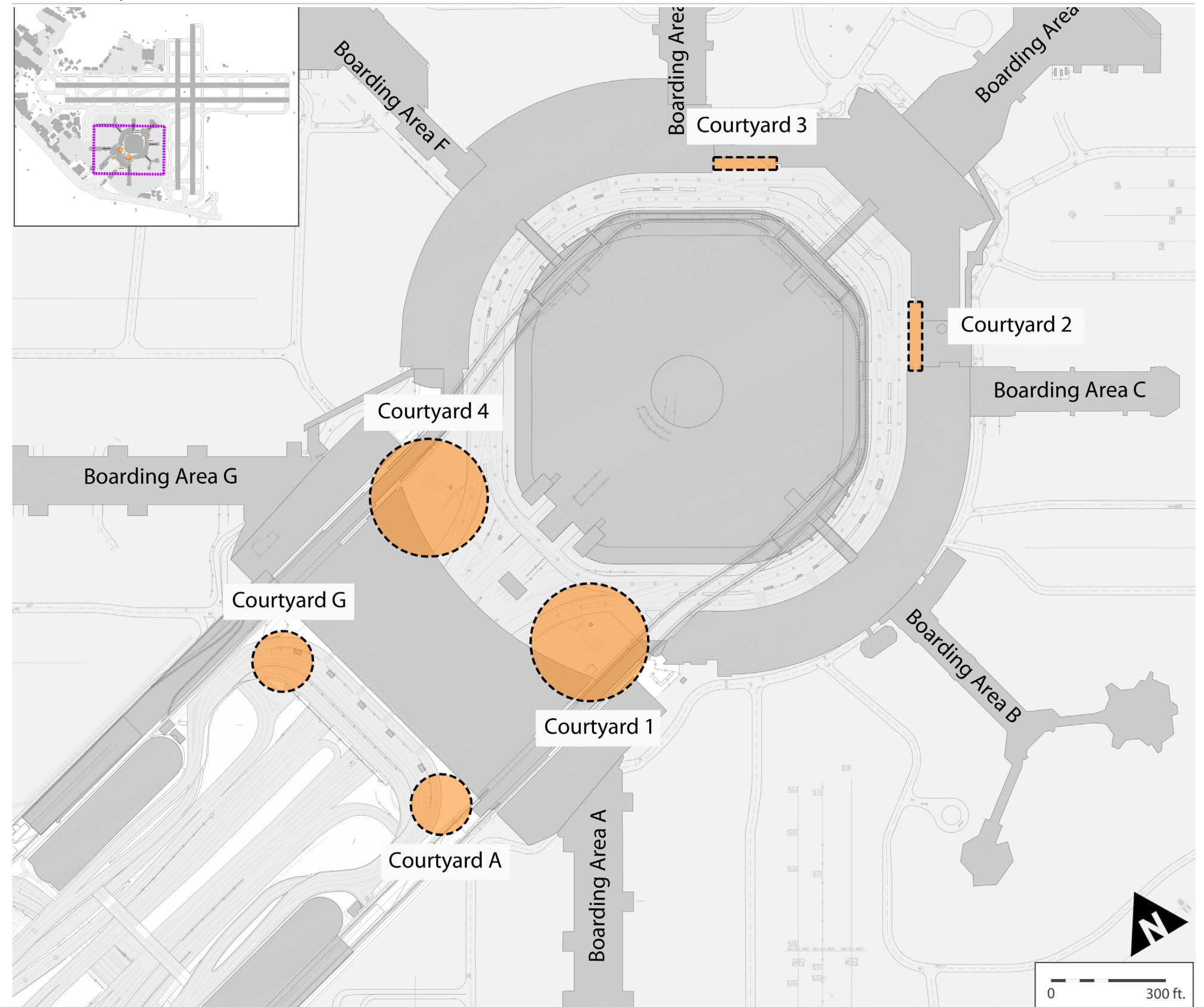
A breakdown of the types of vehicles using the terminal curbside is provided in **Table 3.5-6**.

#### Curbside Dwell Times

Curbside dwell times by vehicle type are shown in **Table 3.5-7** for the three domestic terminals and in **Table 3.5-8** for the ITB.

<sup>13</sup> Usable curbside is the length of roadway located immediately in front of the terminal building where vehicles are able to pick up and drop off passengers, providing sufficient maneuverability and bypass capability without being restricted by roadway geometry or physical obstacles.

Exhibit 3.5-6 | Location of Courtyards



Source: LeighFisher, with data provided by San Francisco International Airport, Bureau of Planning and Environmental Affairs, September 2014; Ricondo and Associates, 2016

**Table 3.5-6 | Terminal Curbside Usage Breakdown**

Vehicle Type	Inner Curbside Level 1	Outer Curbside Level 1	Inner Curbside Level 2	Outer Curbside Level 2	Courtyard	Kiss-n-Fly
Charter Bus	-	-	D	-	P	-
Hotel/Motel Shuttle	-	-	-	P/D	-	-
Off-Airport Parking Shuttle	-	-	-	P/D	-	-
Crew Shuttle	P/D	-	P/D	-	P/D (ITB only)	-
Limousine	P	-	D	-	-	-
Off-Airport Rental Car Shuttle (does not operate in Terminal Complex)	-	-	-	-	-	P/D
Airporter	-	P	D	D (ITB only)	-	-
Shared-Ride Van	-	-	D	P	-	-
SFO Employee Shuttle	-	-	P/D (T2 only)	P/D	-	-
SFO Parking Shuttle	P/D	-	-	-	-	-
Taxicab	-	P	D	-	-	-
TNC (e.g., Uber, Lyft)	-	-	P/D	-	-	-
Private Vehicle	P	-	D	-	-	-
Public Bus (SamTrans)	P/D (T3 only)	P/D	-	-	P/D (ITB only)	-

Note: Only primary pick-up and drop-off locations are listed. Some vehicle types, such as limousines, are permitted to pick up and drop off on either level.  
P = Pick-Up/D = Drop-Off

Source: SFO BPEA and SFO Landside Operations, 2016

**Table 3.5-7 | Average Dwell Times at Terminals 1, 2, and 3 (in seconds)**

Vehicle Type	Drop-off	Pick-up	Combined Drop-off and Pick-up
Private Vehicle	82	68	--
Taxicab	74	41	--
Limousine	81	78	--
Shared-Ride Van	94	564	--
SFO Parking Shuttle	--	--	28
Off-Airport Parking Shuttle	--	--	36
Hotel/Motel Shuttle	--	--	88
Airporter	71	84	--
Airline Crew Bus	164	No data	--
Public Bus (SamTrans)	--	--	No data
Charter Bus	69	No data	--
TNC (e.g., Uber, Lyft)	65	80	--

Note: Dwell times listed as "--" indicate that this type of vehicle does not stop for this purpose, e.g., a private vehicle does not have a combined pick-up/drop-off dwell time, as this mode drops off and picks up passengers in separate locations.

Source: HNTB, Curbside Alternatives Analysis Simulation Report, February 2013; SFO BPEA and HNTB, Curbside Congestion Survey, 2016 (TNC only)

**Table 3.5-8 | Average Dwell Times at the International Terminal Building (in seconds)**

Vehicle Type	Drop-off	Pick-up	Combined Drop-off and Pick-up
Private Vehicle	128	97	--
Taxicab	112	87	--
Limousine	No data	65	--
Shared-Ride Van	64	325	--
SFO Parking Shuttle	--	--	158
Off-Airport Parking Shuttle	--	--	29
Hotel/Motel Shuttle	--	--	126
TNC (e.g., Uber, Lyft)	57	78	--

Note: Dwell times listed as "--" indicate that this type of vehicle does not stop for this purpose, e.g., a private vehicle does not have a combined pick-up/drop-off dwell time, as this mode drops off and picks up passengers in separate locations.

Source: HNTB, Curbside Alternatives Analysis Simulation Report, February 2013; SFO BPEA and HNTB, Curbside Congestion Survey, 2016. (TNC only)



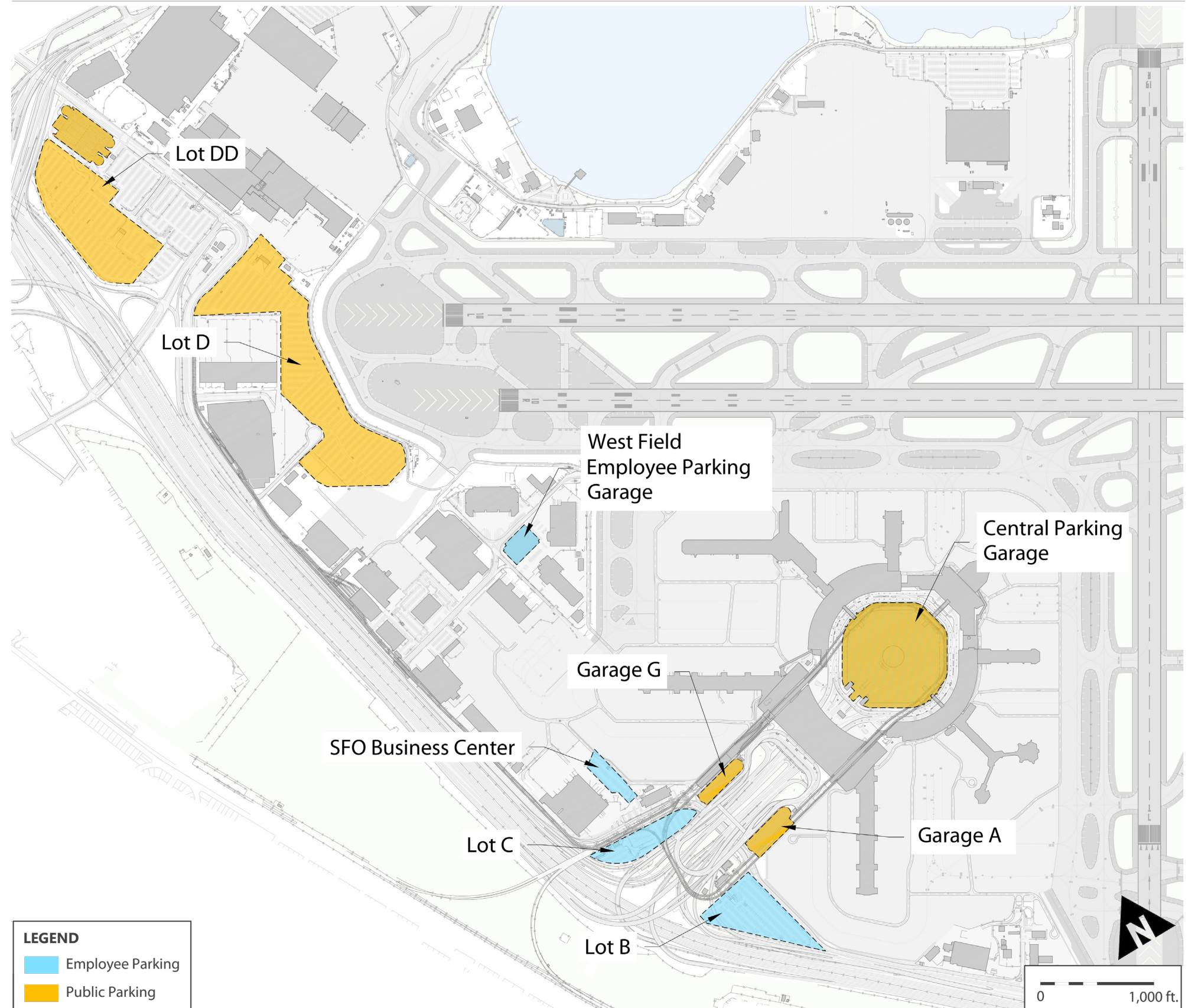
### 3.5.4 Automobile Parking

The existing conditions related to public and employee parking, electric vehicle parking, holding and cell phone lots, and off-Airport parking are discussed in this section.

#### 3.5.4.1 Public and Employee Parking

The public parking facilities are located at various sites within the terminal complex and points north, as depicted in **Exhibit 3.5-7**. Each of the public parking facilities accommodates some employee parking as well.

Exhibit 3.5-7 | Locations of SFO Managed Public and Employee Parking Facilities



Source: LeighFisher, with data provided by San Francisco International Airport, Bureau of Planning and Environmental Affairs, September 2014; Ricondo and Associates, 2016

Public parking is provided in the Central Parking Garage (also known as the Domestic Garage), Parking Garages A and G, the Long Term Parking Garage, and surface lots, as presented in **Table 3.5-9**. The Airport owns and operates the public parking facilities.

Short-term parking facilities, from which customers can walk to the terminals, include:

- The Central Parking Garage, which provides 5,674 short-term public parking spaces.
- Garages A and G, which provide a total of 2,159 short-term public parking spaces. The garages are connected internally.

Long-term parking facilities, from which customers must board a shuttle bus to access the terminals, are provided in the Long Term Parking Garage, the adjacent surface lot (Lot DD), and the overflow lot (Lot D). In total, these facilities provide

7,137 long-term public parking spaces. Employee parking is provided in various Airport Commission operated garages and surface lots. The total number of employee parking spaces in these facilities is 6,751. Employees access the terminals by shuttle bus, AirTrain, or on foot depending on the parking facility location.

In addition to the on-Airport parking facilities, approximately 7,300 parking spaces are currently available in privately operated, off-Airport parking facilities.

**Exhibit 3.5-8** depicts the 2013 monthly public parking transactions at the Airport. The busiest months for public parking transactions are typically June and July. During these months in 2013, 48 percent of transactions occurred in the Central Parking Garage. Long-term parking transactions per enplaned passenger have decreased since 2009, while overall number of parking transactions has remained steady.

**Exhibit 3.5-9** depicts the occupancy rates for each garage during May and June 2014. Long-term parking capacity at the Airport has been constrained for the past several years. Peak occupancy was higher than 80 percent in the long-term parking facilities. More than 80 percent of the spaces in overflow Lot D were occupied approximately 25 percent of the time. The short-term parking garages remained below 80 percent peak-period occupancy, except during a few midweek days.

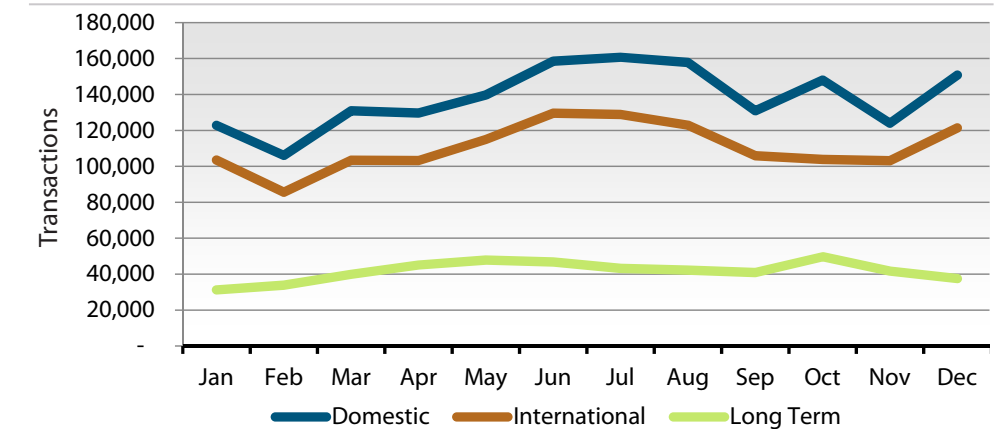
**Table 3.5-9 | Public and Employee Parking Inventory**

Facility	Number Of Parking Spaces			
	Public	Employee	Disabled <sup>1</sup>	Total
Central Parking Garage	5,674	785	129	6,459
Domestic <sup>2</sup>	5,443	0	113	
ParkFast <sup>3</sup>	105	0	2	
ParkValet <sup>4</sup>	126	0	14	
Employee (Level 4)	0	785	0	
Garages A and G	2,159	831	48	2,990
South Garage A	1,008	577	24	
North Garage G	1,151	254	24	
Long-Term Parking	7,137	0	64	7,137
Long Term Parking Garage	3,109	0	N/A	
Surface Lot DD	1,856	0	N/A	
Surface Lot D	2,172	1,120	45	3,292
West Field Employee Parking Garage	0	1,722	29	1,722
Parking Lot B	0	811	17	811
Parking Lot C	0	418	10	418
Cargo (includes 670, 710, etc.)	0	909	25	909
SFO Business Center	0	155	5	155
<b>Total Parking Spaces</b>	<b>14,970</b>	<b>6,751</b>	<b>372</b>	<b>21,721</b>

Notes: <sup>1</sup> Disabled parking spaces included within Public/Employee parking total.  
<sup>2</sup> Level 1 includes space occupied by the overflow taxicab hold lot.  
<sup>3</sup> Exclusive automated parking service located on Level 4 of Domestic Garage.  
<sup>4</sup> Valet parking service located on Level 4 of Domestic Garage.  
<sup>5</sup> N/A = Not Available

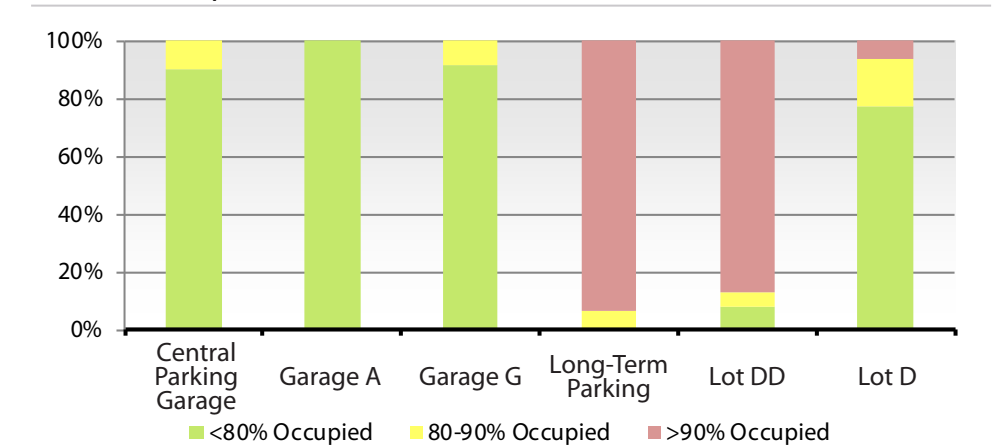
Source: San Francisco International Airport, Aviation and Parking Management, September 2014

**Exhibit 3.5-8 | Monthly Public Parking Transactions, 2013**



Source: San Francisco International Airport, Aviation and Parking Management, September 2014

**Exhibit 3.5-9 | Peak Parking Occupancy, May and June 2014**



Source: San Francisco International Airport, Aviation and Parking Management, September 2014



### 3.5.4.2 Electric Vehicle Parking

Electric vehicle charging stations are provided at SFO at the locations listed in **Table 3.5-10**. To encourage use of electric vehicles, Airport management currently does not charge customers for use of these stations beyond any applicable parking fees.

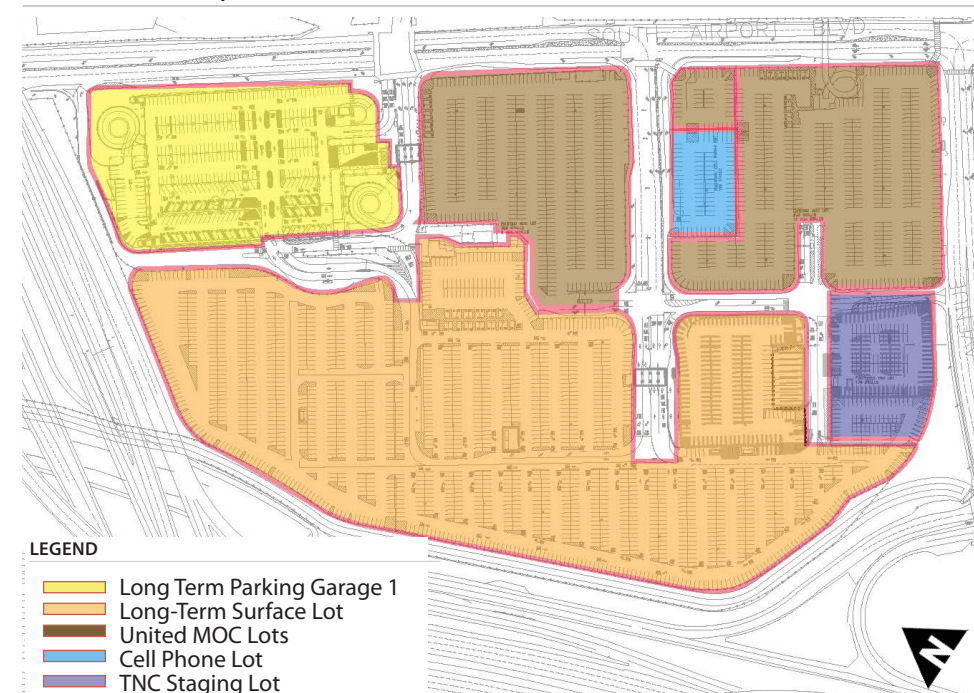
### 3.5.4.3 Holding and Cell Phone Lots

The Commercial Vehicle Hold Lot and Cell Phone Lot are located on the south side of Lot DD, adjacent to San Bruno Avenue. Currently, 94 marked parking spaces are provided in the Commercial Vehicle Hold Lot, including 81 standard spaces and 13 bus spaces. Based on visual inspection, 71 marked parking spaces are provided in the Cell Phone Lot. A limousine holding lot is provided on the "Teardrop" lot, adjacent to Millbrae Avenue.

Lot DD provides 170 parking spaces for Transportation Network Companies, 8 spaces for charter buses, and 138 parking spaces available for the Cell Phone Lot. Lot CC provides 86 shared-ride van parking spaces. The Teardrop lot provides 101 spaces dedicated for limousine parking. A detailed map of Lot DD is depicted in **Exhibit 3.5-10**.

There are 359 taxicab holding spaces provided on a portion of Level 1 of the Central Parking Garage.

**Exhibit 3.5-10 | Allocation of Lot DD**



Source: San Francisco International Airport, Bureau of Planning and Environmental Affairs, August 2016

### 3.5.4.4 Employee Parking

Employee parking is accommodated primarily near where SFO and tenant employees work. A summary of some of the larger employee parking locations is provided in **Table 3.5-11**.

**Table 3.5-10 | Electric Vehicle Parking Facilities**

Facility	User	Smart Chargers	Non-Smart Chargers	Outlets	Electric Vehicle Stalls
Central Parking Garage	Public	16	0	2	30
Garage A	Public	5	0	0	10
Garage G	Public	8	1	0	18
Long Term Parking Garage	Public	0	0	15	15
Courtyards 4 and G	Employee	0	2	0	3
West Field Employee Parking Garage	Employee	0	0	8	8
Lot B	Employee	0	0	8	8
Lot D	Public/Employee	0	0	10	10
SFO Business Center	Employee	0	2	2	4
<b>Total</b>		<b>29</b>	<b>5</b>	<b>45</b>	<b>106</b>

Source: San Francisco International Airport, Aviation and Parking Management, September 2014

**Table 3.5-11 | Employee Parking for Support Functions**

Parking Lot / Garage	Footprint/Lot Area (Square Feet)	Building Area (Square Feet)	Total Spaces
United Airlines Pilot Parking Lot (Lot C)	N/A	N/A	525
United Airlines Cargo Parking Lot (near Building 585)	262,440	N/A	517
SFO Airport Employee Parking Lot (near Building 670)	202,270	N/A	248
West Field Employee Parking Garage (7 floors) (Building 638) – Airline Employees	70,680	523,290	1,722
Building 710 Parking Lot	N/A	N/A	144
United Airlines Maintenance and Operations Center Employee Parking Lot (near Rental Car Center)	N/A	N/A	386
Lot D (near Rental Car Center)	N/A	N/A	1,820
United Airlines Employee Parking Lot (near Public Long-Term Parking Lot)	N/A	N/A	1,060
Contract Employee Parking/Construction Staging (near North Access Road and North Field Road, also known as Plot 700) (5 acres)	N/A	N/A	N/A
Superbay Hangar Employee Parking Lot (near Superbay Hangar, Building 1060)	422,690	N/A	1,046

Note: N/A = Not Available

Source: RS&H, October 2014

### 3.5.5 Rental Car Center

The existing on-Airport rental car facilities and capacities, rental car companies, and trends in rental car transactions are discussed in this section.

Constructed in 1998, the RCC was one of the first airport consolidated rental car structures in the United States in which the majority of rental car companies operate within a common facility. The RCC is located approximately 1.0 mile northwest of the terminal complex on North McDonnell Road (see **Exhibit 3.5-11**).

AirTrain provides transportation between the RCC and the terminal complex. The AirTrain RCC station provides access directly into the main customer service lobby on Level 4.

The RCC has three primary components—customer service lobbies, the ready/return garage, and the Quick Turn Around (QTA) facility.

- Customer service lobbies are located on Levels 1 and 4 of the RCC garage. These lobbies include check-in counters for the rental car companies.
- The ready/return garage include areas dedicated to clean/ready cars available for rent and areas dedicated to return cars. Rental car companies are allocated portions of Levels 1 through 4 of the RCC garage for their ready/return operations. Level 5 is used for overflow ready/return stacking.<sup>14</sup>
- The QTA facility consists of fuel nozzles, wash bays, and stacking/staging vehicle parking spaces. Each company operating in the RCC is allocated a portion of the QTA facility.

The capacity of each component of the RCC is shown in **Table 3.5-12**.

**Table 3.5-13** lists the rental car companies currently operating in the RCC. Hertz

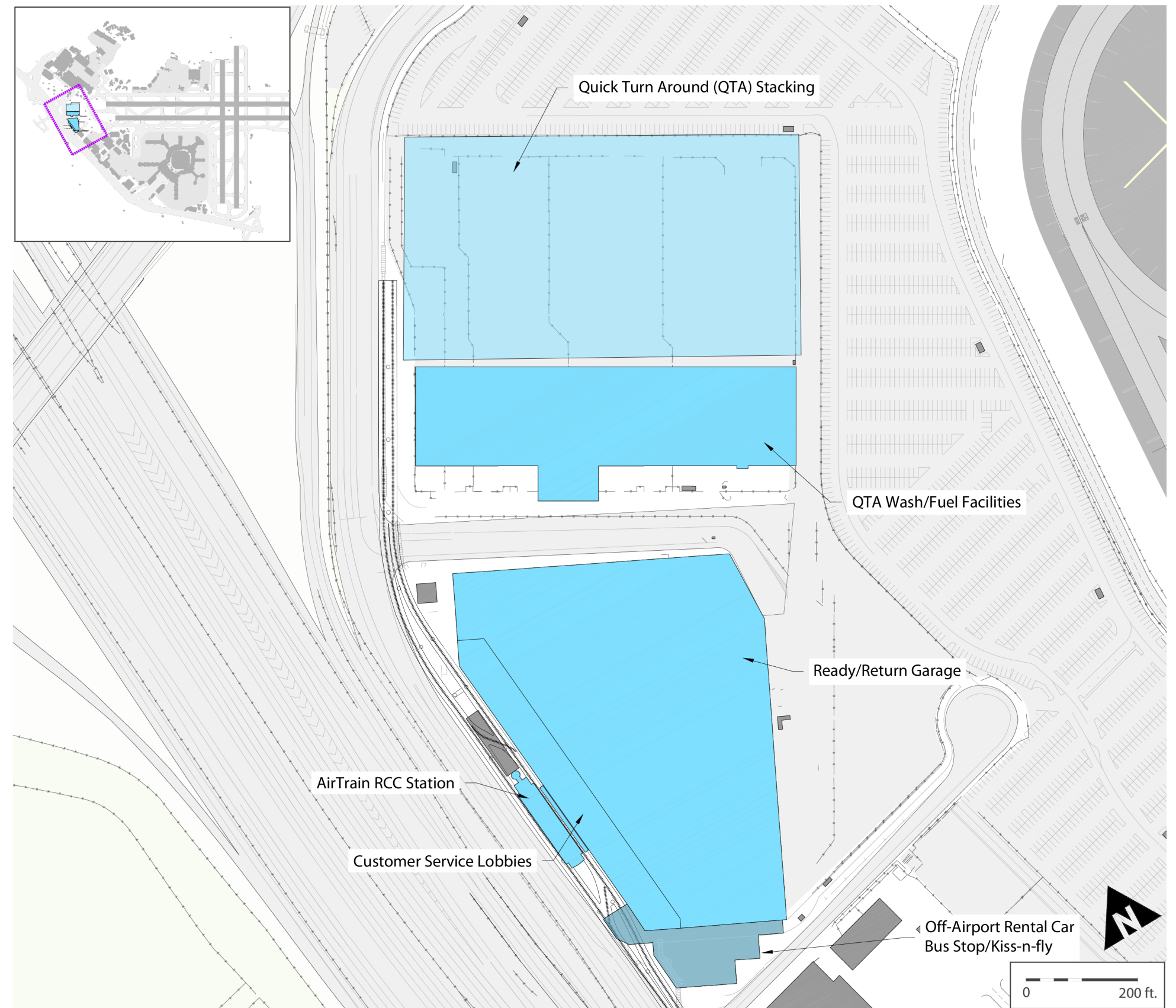
<sup>14</sup> The practice of stacking vehicles involves parking of vehicles closely together to maximize vehicle storage, where maneuverability of vehicles is managed by the rental car company.

**Table 3.5-12 | Rental Car Center Inventory**

Component	Total
<b>Rental Car Center Garage</b>	
Customer Service Lobbies (square feet)	26,200
Ready/Return Spaces	2,485
<b>Quick Turn Around Facility</b>	
Fuel Nozzles	120
Car Wash Bays	14
Vehicle Stacking Spaces	720
Vehicle Staging Spaces	994
Vehicle Storage Spaces	1,820

Source: LeighFisher, *Analysis of Near- and Long-Term Rental Car and Parking Expansion Options*, April 2013

**Exhibit 3.5-11 | Rental Car Center Facilities**



Source: LeighFisher, with added data provided by San Francisco International Airport, September 2014; Ricondo and Associates, 2016

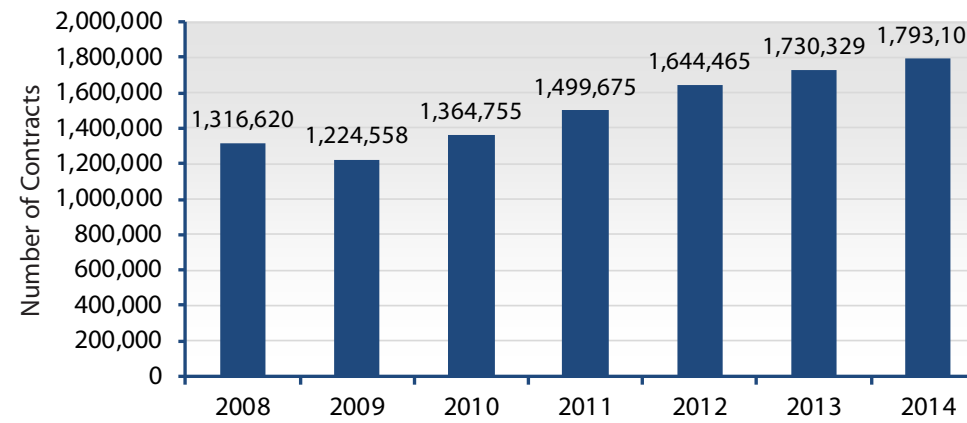


Car Rental and Fox Rent A Car relocated to the Level 1 customer service lobby in 2014.

The annual number of rental car transactions increased from 1.32 million in 2008 to an estimated 1.79 million in 2014, depicted in **Exhibit 3.5-12**. **Exhibit 3.5-13** depicts that rental car transactions have varied in comparison to originating-terminating passenger enplanements at the Airport.

The rental car transaction rate decreased from 2008 to 2010, mirroring the economic decline. Since 2010, rental car transactions per originating enplanement have grown annually by an average of 2.0 percent.

**Exhibit 3.5-12 | On-Airport Rental Car Contracts**



Source: San Francisco International Airport, Revenue Development and Management, September 2014

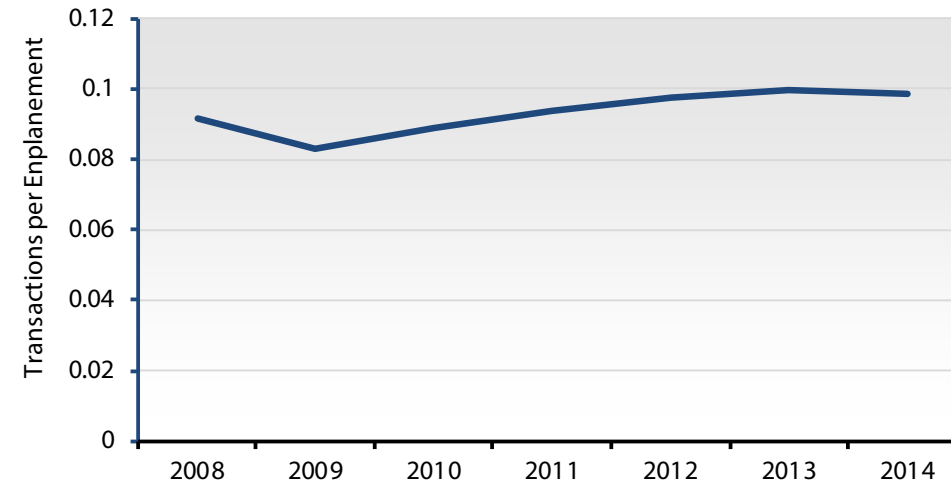
**Table 3.5-13 | Rental Car Companies in the Rental Car Center**

	Market Share	Lobby Location	Garage Location
Alamo Rent A Car	10.2%	Level 4	Level 4
Avis Rent A Car System	17.5%	Level 4	Level 3
Budget Rent A Car System	8.8%	Level 4	Level 3
Dollar Rent A Car	7.7%	Level 4	Level 2
Enterprise Rent-A-Car	8.0%	Level 4	Level 2
Fox Rent A Car	3.7%	Level 1	Level 2
Hertz Car Rental	31.0%	Level 1	Levels 1 and 2
National Car Rental	9.5%	Level 4	Levels 3 and 4
Thrifty Car Rental	3.5%	Level 4	Level 2

Note: Numbers may not sum due to rounding.

Source: LeighFisher Associates, December 2015

**Exhibit 3.5-13 | On-Airport Rental Car Contracts per Enplanement**



Source: San Francisco International Airport, Revenue Development and Management, September 2014

### 3.5.6 Automated People Mover – AirTrain

The AirTrain people mover system provides transportation for passengers and employees between the terminals and other Airport facilities. The nine-station AirTrain system, depicted in **Exhibit 3.5-14**, operates 24 hours per day on two lines (Red and Blue). AirTrain stations within the domestic terminal complex are accessed via pedestrian bridges over the roadway viaducts. The Red Line operates in a clockwise direction and connects all Airport terminals, garages, and the Airport’s BART rail station. Within the terminal complex, the Blue Line operates in a counterclockwise direction, connecting to all Red Line stations, then proceeds to the support facilities at West Field Road and terminates at the RCC.

The AirTrain system includes a fleet of 38 vehicles. The observed vehicle capacity is 40 passengers with baggage and carts.<sup>15</sup>

**Table 3.5-14** provides operating statistics for the AirTrain Red and Blue Lines. Red Line service is significantly reduced or eliminated during off-peak periods. The longest station dwell time for the Blue Line is 47 seconds and occurs at the RCC station.

August is the peak month for AirTrain ridership. As depicted in **Exhibit 3.5-15**, peak month ridership has increased 7.4 percent since 2011, but the number of riders per annual origin and destination (O&D) enplaned passenger has remained steady at approximately 0.44 riders per O&D enplaned passenger.

<sup>15</sup> Based on field surveys conducted by LeighFisher Associates in February 2015.

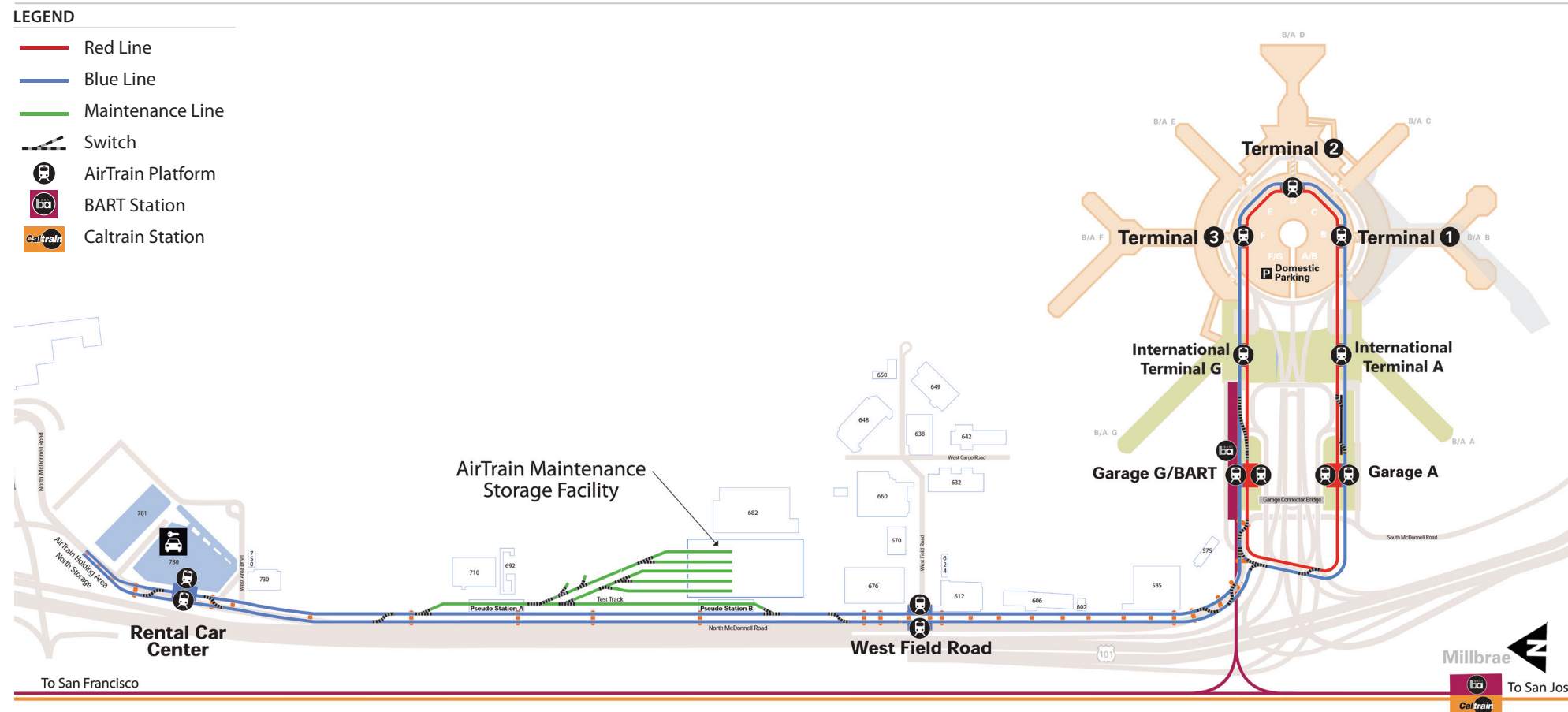
**Table 3.5-14 | AirTrain Operating Statistics**

	Blue Line	Red Line
Headways (minutes)	3.1	3.5
Stations	9	7
Dwell Times (seconds)	25–47	35 for all stops
Round Trip (minutes)	18.5	10.0
<b>Operating Trains</b>		
Peak (0430-2300)	6 three-car trains	3 two-car trains
<b>Off-Peak (2300-0430)</b>		
Monday – Tuesday	4 three-car trains	Out of service
Wednesday – Thursday	3 three-car trains	3 two-car trains
Friday – Sunday	4 three-car trains, modified Blue Line route	

Note: 0430-2300 = 24-hour time format

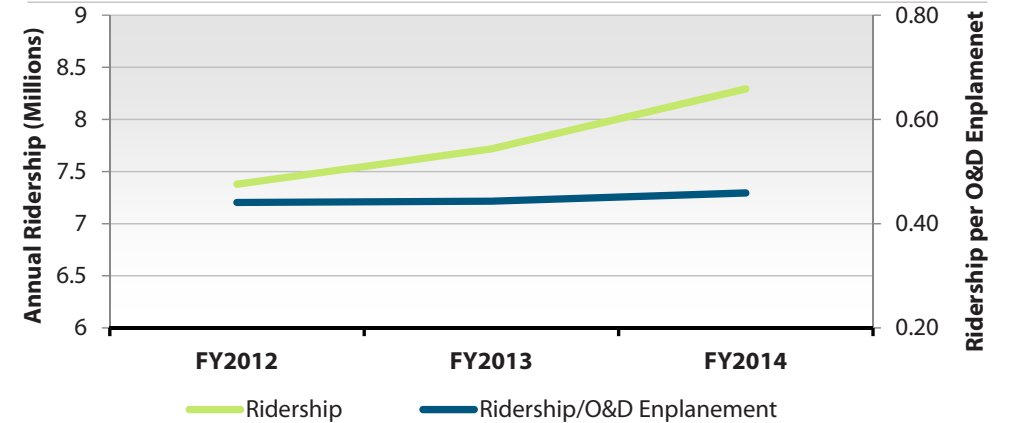
Source: San Francisco International Airport, Operations and Security, September 2014

**Exhibit 3.5-14 | AirTrain System Alignment**



Source: Getting Around SFO Airport Website, 2014

**Exhibit 3.5-15 | AirTrain Ridership vs. O&D Enplaned Passengers**



Source: San Francisco International Airport, Operations and Security, September 2014



### 3.5.7 Public Transportation

The existing transit services serving the Airport are discussed in this section.

#### 3.5.7.1 Bus Services

SamTrans, a service of the San Mateo County Transit District, provides bus service connecting SFO to San Mateo County and parts of San Francisco. Route 292 provides all-day service to both San Mateo/Hillsdale to the south and downtown San Francisco to the north, while Routes 398 and 140 provide all-day service to San Bruno, with Route 140 onward to Pacifica and Route 398 onward to Redwood City. Route KX provides service during the morning and evening commute times. Night route 397 provides after-hours transit. Routes 292, 398, and KX stop directly at the Airport terminals, while Route 140 stops at the RCC and the United Airlines San Francisco Maintenance Center, as does Route 292. Route 49 also has a stop at the United Airlines facility.

#### 3.5.7.2 Rapid Transit

Direct BART rail service to the Airport was initiated in 2003. The SFO BART station is located adjacent to B/A G, providing direct walking access to the ITB and via AirTrain to the other terminals and Airport facilities. The station has three tracks and two island platforms, each capable of accommodating 10-car trains, the longest used by BART system-wide. It is a stub-end station, requiring all trains to turn back, with a wye-junction connecting the Airport spur line to the mainline BART tracks in both Millbrae and downtown San Francisco directions. Because the spur line requires trains to reverse direction, when trains stop at the Airport Station the train conductors must switch train ends and are entitled to an end-of-line break.

BART provides access to the Airport from four Bay Area counties (Alameda, Contra Costa, San Francisco, and San Mateo). Construction is under way to extend the Fremont lines to Santa Clara County. As depicted in **Exhibit 3.5-16**, SFO has all-day direct service from points north and night and weekend service south from Millbrae through the Pittsburg/Bay Point (Yellow) line. From inauguration of the station in 2003 until 2004, a Purple Line shuttle service connected SFO directly to Millbrae Station approximately every 20 minutes, in addition to downtown San Francisco service every 15 minutes. This shuttle service was modified between 2004 and 2008, before it was abandoned entirely in 2008, leaving only the downtown connection during daytime hours. Currently, the Airport is served directly from Millbrae station only after 9:00 p.m. and on weekends.

In 2015, BART carried 4.4 million customers (4.7 million including employees with a BART discount card) to and from the Airport station.<sup>16</sup> According to the 2015 SFO Customer Survey Report, about 9 percent of SFO passengers surveyed rode BART to access the Airport.<sup>17</sup>

<sup>16</sup> 2015 BART SFO Station entry/exit count.

<sup>17</sup> 2015 SFO Customer Survey Report, prepared by Corey, Canapary & Galanis.

#### 3.5.7.3 Commuter Rail

Caltrain provides commuter rail service between San Francisco (north) and San Jose (south), with further southern service to Gilroy during commute hours. Passengers traveling on Caltrain access SFO by transferring to BART at the Millbrae Intermodal Station.

#### 3.5.7.4 Programmed Improvements

High-speed rail is being planned as part of a blended system allowing Caltrain and high-speed trains to share the existing Caltrain tracks and corridor. Early investment will fund the delivery of modernized, electrified Caltrain service by 2019. Additional system upgrades, including new platforms at the Millbrae Intermodal Station to accommodate a new four-track configuration, will be required to support the blended system.

No major improvements to the regional highways are programmed.

Exhibit 3.5-16 | BART System Map



Source: Bay Area Rapid Transit, 2015

### 3.5.8 Ongoing Ground Access and Parking Projects

These projects related to ground access have been authorized to proceed by the Airport Commission or have been identified by Airport management as needing to be implemented in the near future, subject to Airport Commission and other necessary approvals. The ongoing ground access projects are in various stages of planning, programming, design, or construction. Appropriate environmental reviews, as required under CEQA or NEPA, are completed, in process, or will be conducted. These projects are proceeding, or will proceed if approved, irrespective of any ADP Projects and do not address long-term demands and capacity needs. The sections below describe each ongoing ground access project to provide a comprehensive understanding of the inventory.

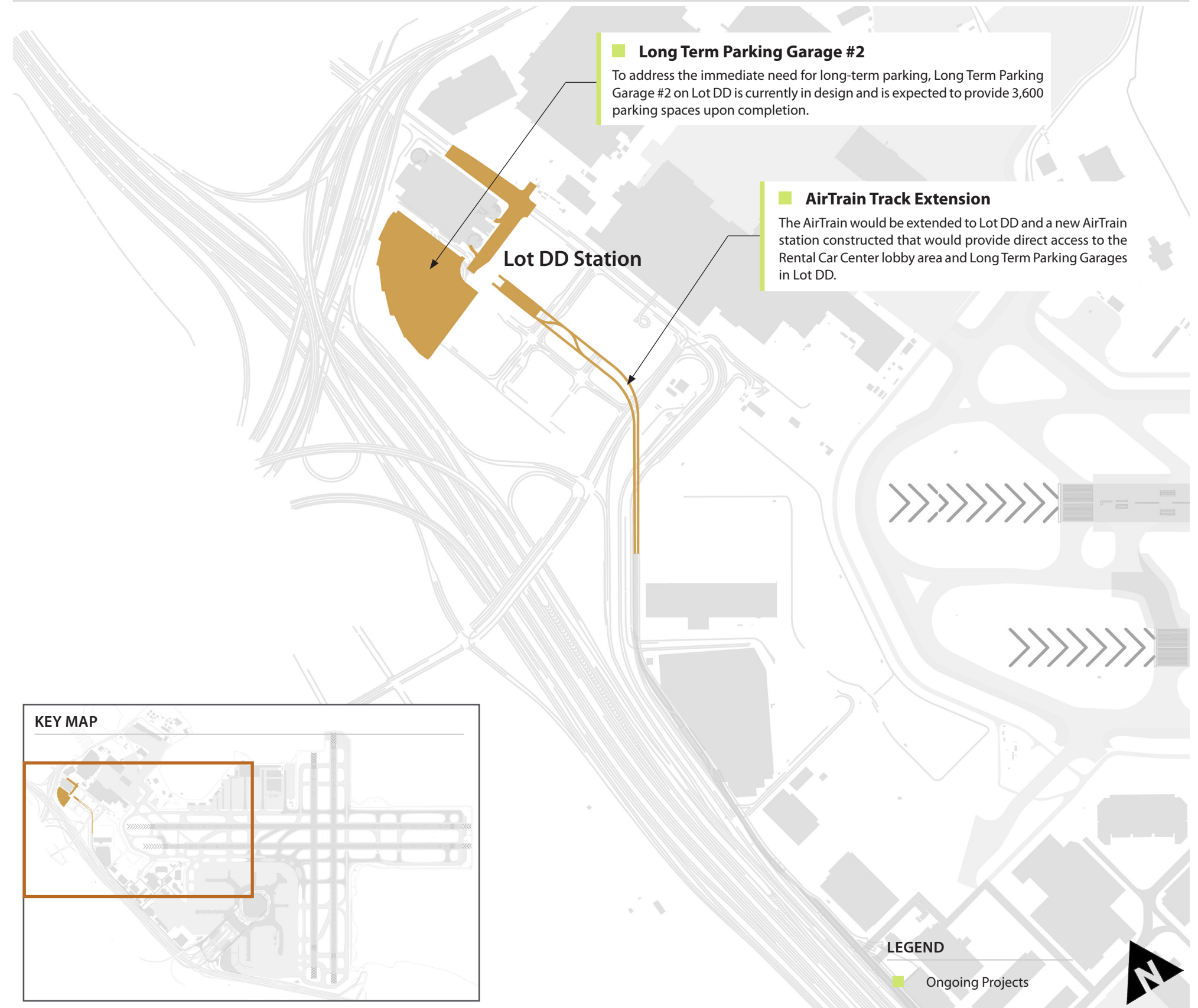
**Long Term Parking Garage #2 and Roadway Improvements:** Long Term Parking Garage #2 on Lot DD would provide 3,600 parking spaces to address the immediate need for long-term parking. Associated changes to the roadways and interchanges in the vicinity of Lot DD would be made to provide access to the site. The Sanitary Sewer Force Main within Lot DD would be relocated.

**AirTrain Extension:** The AirTrain track would be extended approximately 1,800 feet from the current terminus to Lot DD. A new AirTrain station would be added at the Lot DD site to serve Long Term Parking Garages #1 and #2, the future RCC, and the proposed Long Term Parking Garage #3.

**Lot DD Utilities Improvements:** This project would construct an Industrial Waste Line from Lot DD to the Bus Vehicle Maintenance Yard.

The ongoing ground access projects are illustrated in **Exhibit 3.5-17**.

Exhibit 3.5-17 | Ongoing Ground Access and Parking Projects



Source: SFO Airport Layout Plan, 2014; Leigh Fisher 2015, Landrum & Brown, Inc., June 2016



## 3.6 SUPPORT FACILITIES

The inventory of support facilities describes the location, size, age, condition, and use of facilities that support airline and Airport operations. The facilities are located and described within the four geographic areas of the Airport—South Field, North Field, East Field and West Field—which provides a context for land use planning and the development of alternatives considering issues of connectivity and adjacencies by facility types and uses. This inventory provides a basis for determining future support facility needs for the Airport through the planning horizon.

The inventory of support facilities by facility type or operation includes:

- Air Cargo, Ground Handling, and U.S. Postal Service
- General Aviation
- Remain Overnight Aircraft Parking
- Airport Support
- Airline Support
- Ongoing Support Area Projects

**Table 3.6-1 | Air Cargo, Ground Handling, and U.S. Postal Service Facilities**

Building No.	Total Floors	Total Building Footprint Area (square feet)	Total Building Area (square feet)	Total Building Area Used For Cargo (square feet)	Total Lot Area Used For Cargo (square feet)	Current Cargo/Ground Handler Tenant	Non-Cargo Tenants	Year Built	Building Condition
16 <sup>1</sup>	3	66,408	82,466	20,000	36,389	Philippine Airlines, Swissport, Menzies, Total Airport Services	Lufthansa Technik, SIA Engineering USA, Certified Aviation Services, Aircraft Services International Group	1954	Poor (to be demolished in 2016)
585	1	133,100	133,100	133,100	262,435	United Airlines	None	1969	Fair
606 <sup>1</sup>	3	72,034	82,492	22,700	13,737	Southwest Airlines, AGI Alliance, Pegasus Aviation	SFO Facilities/Airport Maintenance, SFO Storage, SFO Central Receiving	1969	Poor
612 <sup>1</sup>	2	86,856	114,550	49,900	31,030	Delta Air Lines, Menzies, Swissport	Airport Administration, Building Inspections Code Enforcement, Accounting, Construction Inspection, Human Resources Center, Quality Standard Programs, Survey	1969	Poor
632	2	112,520	112,520	112,520	219,554	Delta Air Lines	None	2014	Good
648	3	96,492	124,317	78,400	73,671	China Airlines, ANA, Asiana Airlines, Swissport, U.S. Customs	None	2001	Good
660 <sup>2</sup>	2	158,000	247,648	N/A	N/A	U.S. Postal Service	N/A	1967	Good
710 <sup>3</sup>	3	85,335	123,349	74,600	64,621	Singapore Airlines Cargo, Menzies	Airport Administration	1967	Fair
730	1	42,668	42,668	42,668	39,384	Swissport	None	1968	Fair
900	2	191,719	343,000	343,000	268,502	FedEx, Total Airport Services	Sky West Airlines GSE Maintenance	2000	Good
944 <sup>4</sup>	1	78,000	78,000	73,900 <sup>3</sup>	70,760	Mercury Air Cargo	Facilities/Airport Maintenance	1980	Fair/Poor

Note: N/A = Not Available

<sup>1</sup> Building 16, Building 606, and Building 612 have multiple tenants that include non-air cargo tenants.

<sup>2</sup> Building 660 is the airmail/U.S. Postal Service building.

<sup>3</sup> Building 710 is designated as Airport administration, but Singapore Airlines Cargo also leases office space.

<sup>4</sup> The primary use of Building 944 is air cargo; approximately 5 percent of this building is vacant.

Sources: SFO staff, October 2014; RS&H, October 2014

### 3.6.1 Air Cargo, Ground Handling, and U.S. Postal Service

This section contains the inventory of Air Cargo, Ground Handling, and U.S. Postal Service (USPS) facilities. Air cargo facilities support the movement of belly<sup>18</sup> (e.g., United Airlines), freighter<sup>19</sup> (e.g., Nippon Cargo Airlines), and integrated<sup>20</sup> (e.g., FedEx) cargo and airmail to and from SFO. These facilities include cargo warehouses, sortation facilities, administrative space, aircraft ramp areas, truck docks, cargo vehicle access, and parking. Ground handling facilities support the operations of ground handlers (e.g., Swissport, Menzies) and U.S. Customs. The USPS facility supports postal mail operations.

The building area used for air cargo and ground handling activities totals approximately 950,800 square feet and the building area used for USPS activities totals approximately 248,000 square feet. The land area for the USPS parcel totals approximately 1,080,000 square feet. **Table 3.6-1** summarizes the building data

<sup>18</sup> Belly cargo is defined as cargo transported in the belly compartment of passenger aircraft.

<sup>19</sup> Freighter cargo is defined as cargo transported in aircraft dedicated for all-cargo use.

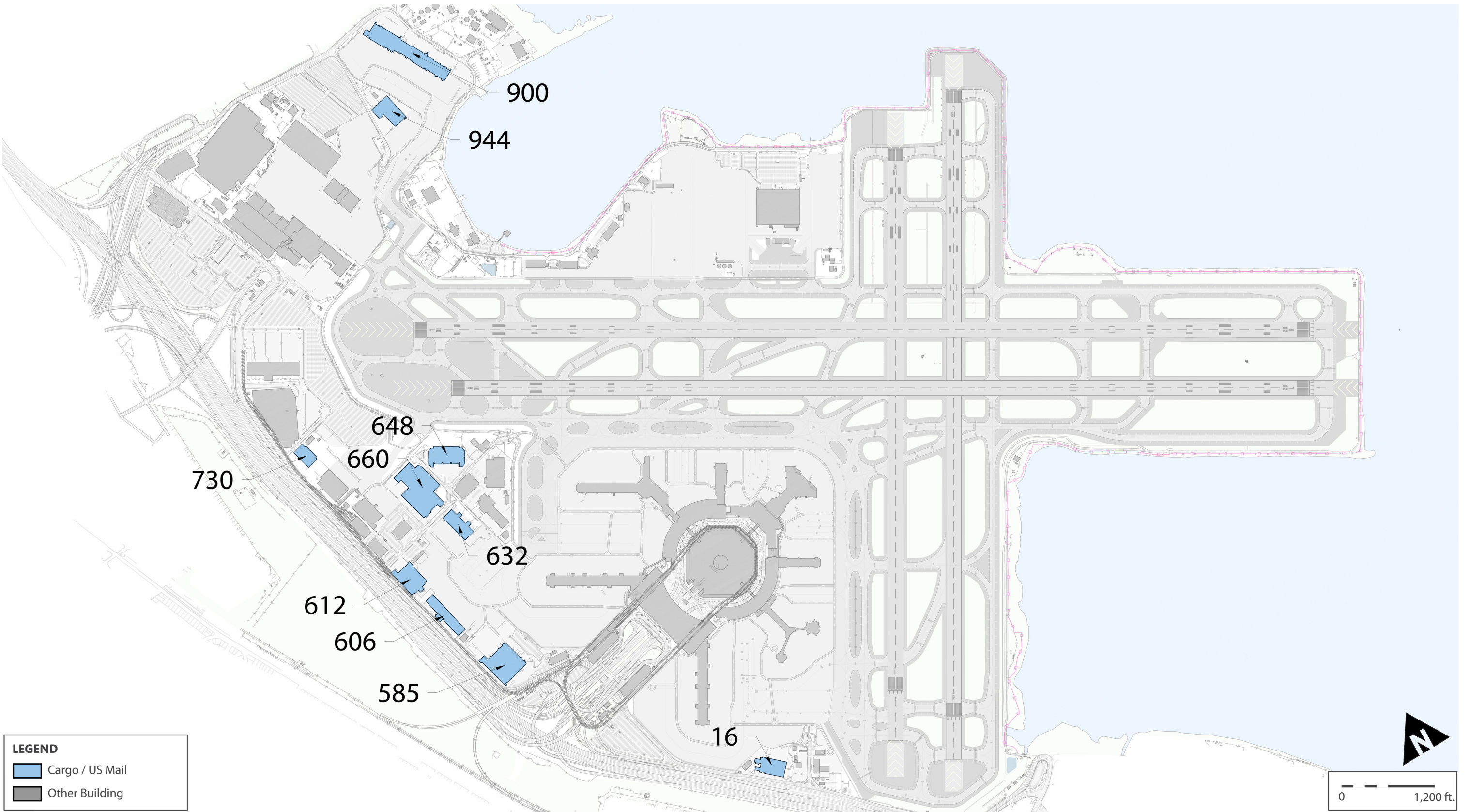
<sup>20</sup> Integrated cargo is defined as cargo transported using the carriers' own equipment (aircraft, ships, trucks, etc.) instead of scheduled airlines or shipping lines.

for air cargo, ground handling, and USPS operations and **Exhibit 3.6-1** shows the location of SFO air cargo facilities. Table 3.6-1 provides the total number of floors by building (including the ground floor), total footprint area, total building area, current tenants, year constructed, and building condition.

Air cargo aircraft parking positions are located in the South Field, North Field, and West Field. The preferential use parking positions for air cargo (freighter) aircraft are located in the North Field at Building 900. There are six aircraft parking positions (three for narrowbody aircraft, three for widebody aircraft).

Building 660 is used by the USPS to process mail. This building is located in the West Field along West Field Road. The ground floor has a large central area for mail sorting equipment and offices; the second floor also has offices, a locker room, and break room. The USPS ground lease is to be renewed for 5-year periods over the next 20 years.

Exhibit 3.6-1 | Air Cargo, Ground Handling, and U.S. Postal Service Facility Locations



Source: SFO Airport Layout Plan, 2014; RS&H, 2015; Ricondo and Associates 2016



### 3.6.2 General Aviation

General aviation (GA) refers to operational activity by aviation users other than scheduled commercial flights and military aviation. GA includes recreational flights, for-hire charters, flight training activities, aerial observation, news reporting, traffic observation, police patrol, emergency medical evacuation, and business air travel. The SFO GA facilities discussed in this section include terminals and fixed base operator (FBO) facilities, aircraft hangars, and GA support facilities.

Signature Flight Services (Signature), a fixed-based operator (FBO), maintains all GA facilities at SFO. The Signature facilities are located in the East Field. Signature provides aircraft fueling (AvGas and Jet-A fuel), storage, rentals, maintenance, and passenger processing primarily for corporate clients and their business jets. **Exhibit 3.6-2** depicts the general aviation facilities.

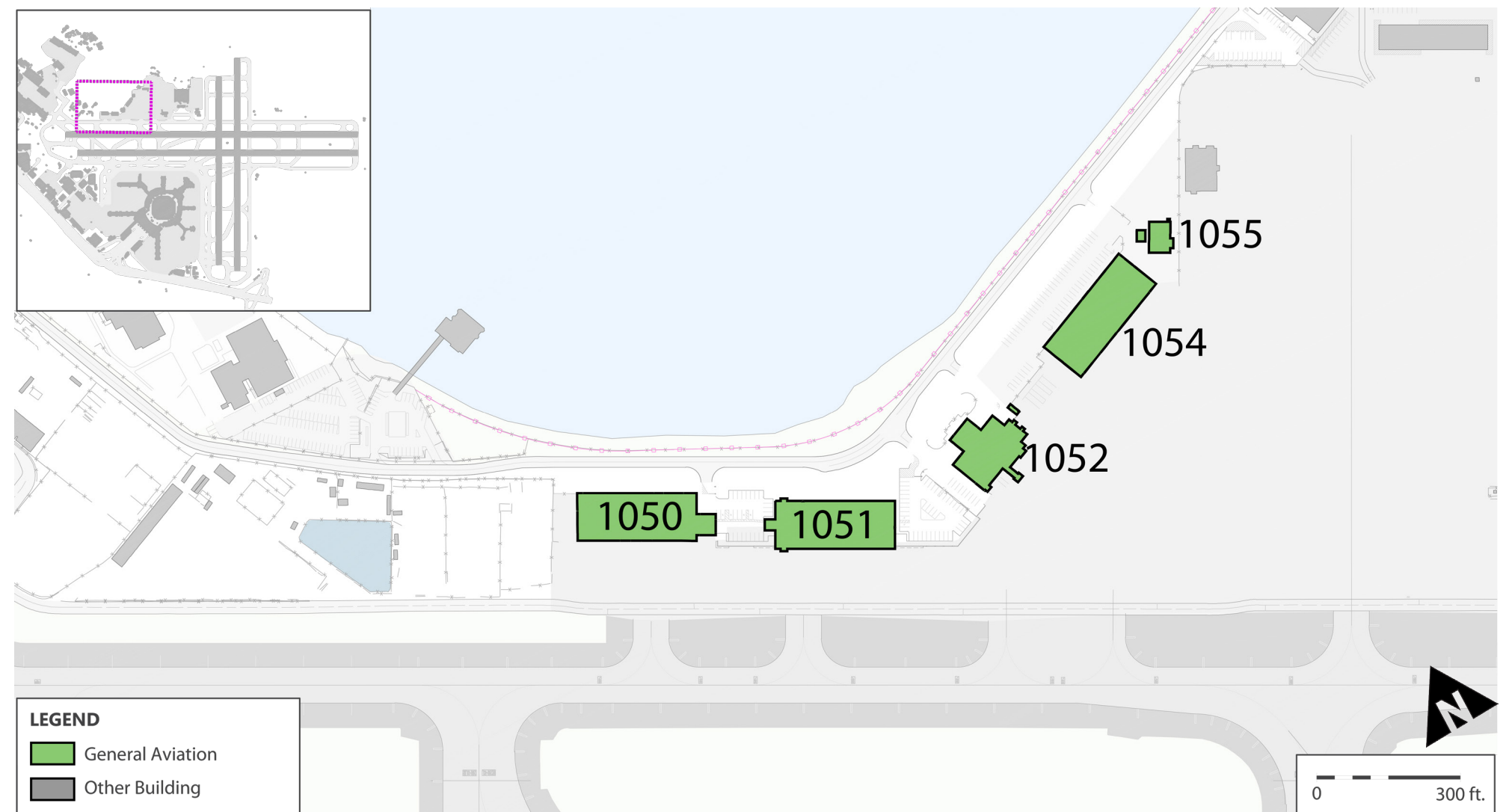
As shown in **Table 3.6-2**, the GA facilities total approximately 95,630 square feet. The Signature Executive Air Terminal (Building 1052) has a footprint of approximately 12,000 square feet. Signature also leases three aircraft hangars (Buildings 1050, 1051, and 1054) and a fuel and maintenance shop (Building 1055), each with a footprint of approximately 25,000 square feet.

All Signature facilities were renovated in 2010 with new heating, ventilation, and air conditioning (HVAC) and new lighting, except for Building 1051, which was constructed in 2014. These buildings were awarded with Leadership in Energy and Environmental Design (LEED)<sup>21</sup> Gold certification for Commercial Interiors in 2010. All of these buildings are in good condition.

The FBO apron totals approximately 333,000 square feet, but only about half of the area is adequately sized for aircraft parking. The FBO apron can accommodate approximately 10 Cessna Citation X aircraft. Overflow GA parking occurs in a portion of Plot 41 totaling approximately 661,500 square feet. The Plot 41 apron can accommodate approximately 20 Cessna Citation X aircraft. The GA apron location is depicted in **Exhibit 3.6-8**.

21 LEED is a green building certification program that recognizes best-in-class building strategies and practices. (U.S. Green Building Council)

**Exhibit 3.6-2 | General Aviation Location**



Source: SFO Airport Layout Plan, 2014; RS&H, 2015; Ricondo and Associates 2016

**Table 3.6-2 | General Aviation Facilities**

Building No.	Total Floors	Total Building Footprint Area (square feet)	Total Building Area (square feet)	Total Lot Area (square feet)	Year Constructed	Building Condition
1050	1	25,000	25,000	N/A	1997	Good
1051	1	25,000	25,000	N/A	2014	Good
1052	1	12,000	12,000	N/A	1997	Good
1054	1	25,000	25,000	N/A	1997	Good
1055	1	5,816	5,816	N/A	1997	Good

Note: N/A = Not Available

Sources: SFO staff, October 2014; RS&H, October 2014

### 3.6.3 Remain Overnight Aircraft Parking

An inventory of RON aircraft parking positions for passenger airlines was completed based on the SFO Non-Terminal Aircraft Parking Map (August 2011), the current aircraft parking layout for the United Airlines San Francisco Maintenance Center, and reservations data and observations provided by SFO Operations. The inventory reflects the RON aircraft parking positions outside of the immediate terminal area; excluding the RON parking adjacent to B/As A and G. The RON parking position inventory is organized by location and the SFO aircraft fleet mix by ADG, a classification of aircraft based on wingspan and tail height. **Table 3.6-3** summarizes the SFO aircraft fleet mix by ADG. **Table 3.6-4** summarizes the existing RON parking position inventory by size or ADG.

**Exhibits 3.6-3** through **3.6-8** depict the RON parking locations in each area of the airfield.

**Table 3.6-3 | Aircraft by Airplane Design Group**

Airplane Design Group (ADG)	Aircraft
ADG III (or smaller)	Airbus A319, A320, A321
	Boeing 737, 737-800, 737-900, 737 MAX 9
	Bombardier Q400 (DH4), CRJ-700, CRJ-900
	Embraer ERJ-175, ERJ-190
	Mitsubishi Regional Jet (MRJ)
ADG IV	ATR NextGen Turboprop (NGT)
	Boeing 757, 767-300
ADG V	Airbus A330-200, A330-300, A340-300, A340-600, A350-900, A350-1000
	Boeing 747-400, 777-200, 777-300, 777-9X, 787-8, 787-9, 787-10, 787-100
ADG VI	Airbus A380, A380-800
	Boeing 747-8

Sources: SFO staff, October 2014; RS&H, October 2014

**Table 3.6-4 | Passenger Remain Overnight Aircraft Parking Positions**

Location	Airplane Design Group		
	III	IV	V/VI
<b>South Field</b>			
Plot 3 <sup>1</sup>	3	1	0
Boarding Area A Remote Gates	0	0	2
<b>West Field</b>			
Plot 9	11	2	0
Plot 10	0	0	1
Plot 12	2	0	0
Plot 12 – Virgin America	4	0	0
Boarding Area G Remote Gates	0	0	3
<b>North Field</b>			
United Airlines San Francisco Maintenance Center <sup>2</sup>	22	0	5
Plot 50 – Building 900	2	0	1
<b>East Field</b>			
Plot 40A – VIP/A380 <sup>3</sup>	0	0	2
Plot 40 – American Airlines	7	0	1
Plot 40 – Superbay Maintenance Hangar – American Airlines	0	0	2
Plot 40 – United Airlines	0	0	4
Plot 40 – Superbay Maintenance Hangar – United Airlines	0	0	2
Plot 41 – United Airlines	0	0	1
Plot 41 – Military	0	1	0
Plot 41 – Fire Training for Emergency Response Facility	1	0	0
Plot 41	10	1	2
Subtotal by ADG	62	5	26
<b>Total</b>		<b>93</b>	

Notes: Two narrowbody aircraft parking positions were counted instead of one widebody aircraft parking position where varying sized aircraft could park within the same marked parking area. Non-terminal aircraft parking positions allocated exclusively for air cargo and general aviation use are excluded from the passenger RON aircraft parking position inventory. Building 900 in Plot 50 includes three ADG V and three ADG V/VI aircraft allocated for air cargo use. Plot 41 in the East Field includes two ADG III, six ADG V, and two ADG V/VI marked, SFO-managed, parking positions allocated for general aviation use.

<sup>1</sup> Southwest Airlines has exclusive use of two South Field positions, but because of future plans to relocate the positions, these positions are counted as SFO-managed positions.

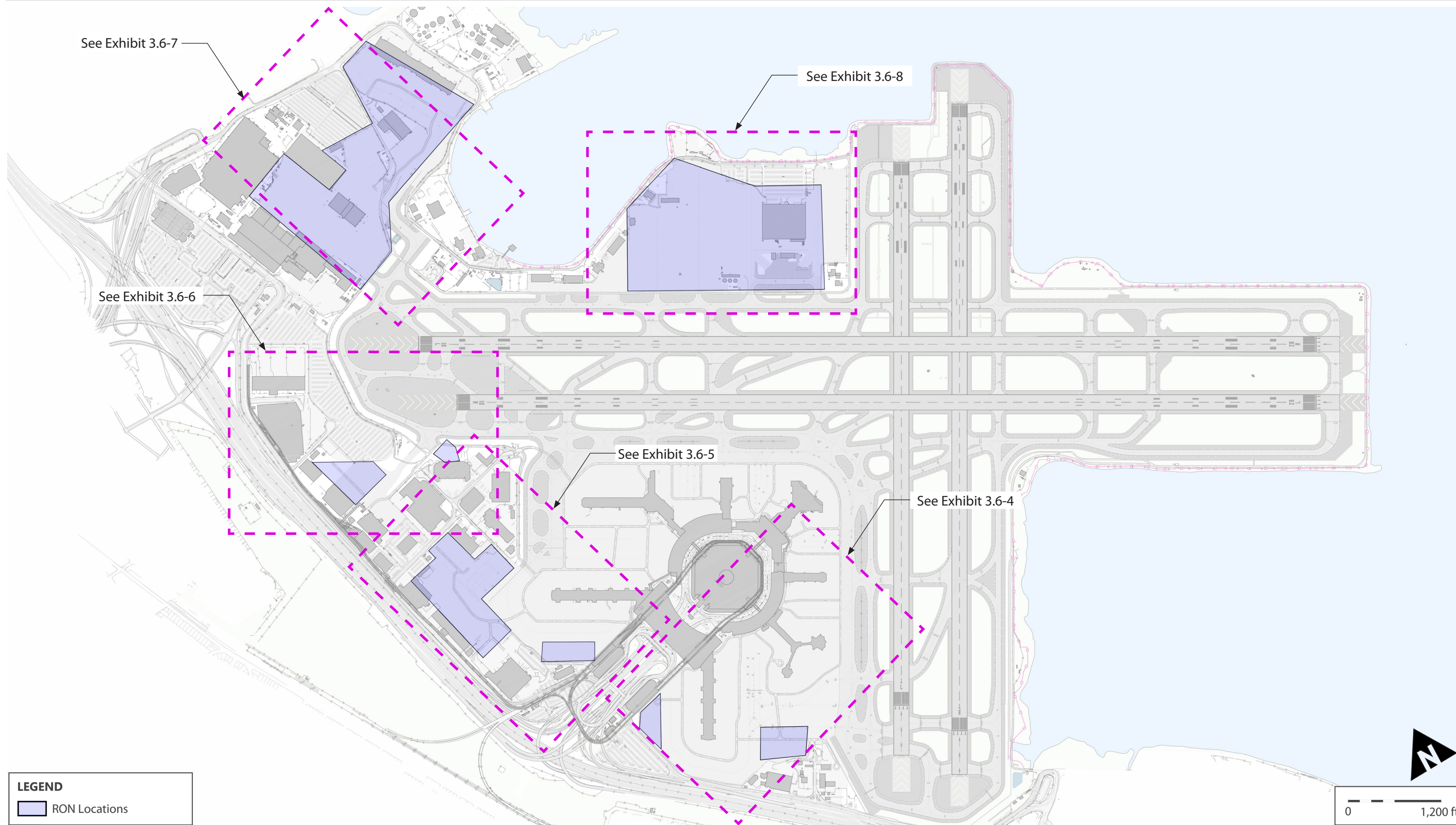
<sup>2</sup> Only aircraft parking positions located on the ramp (not in a hangar) are included.

<sup>3</sup> Plot 40A includes two A380-capable parking positions typically used for VIP or A380 parking.

Sources: SFO staff, October 2014; RS&H, January 2016



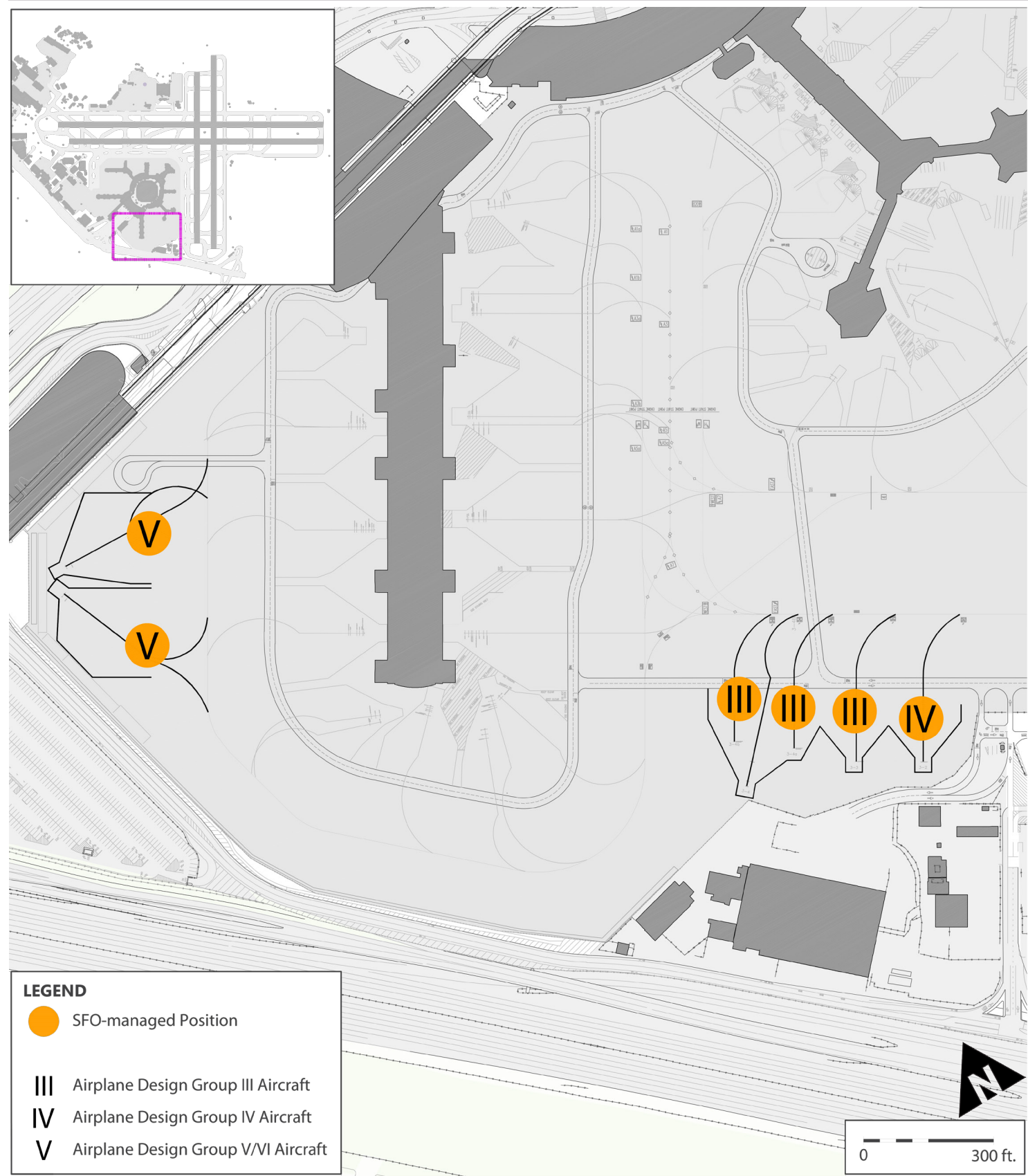
Exhibit 3.6-3 | Remain Overnight Aircraft Parking Locations



Source: SFO Airport Layout Plan, 2014; RS&H, 2015; Ricondo and Associates, 2016

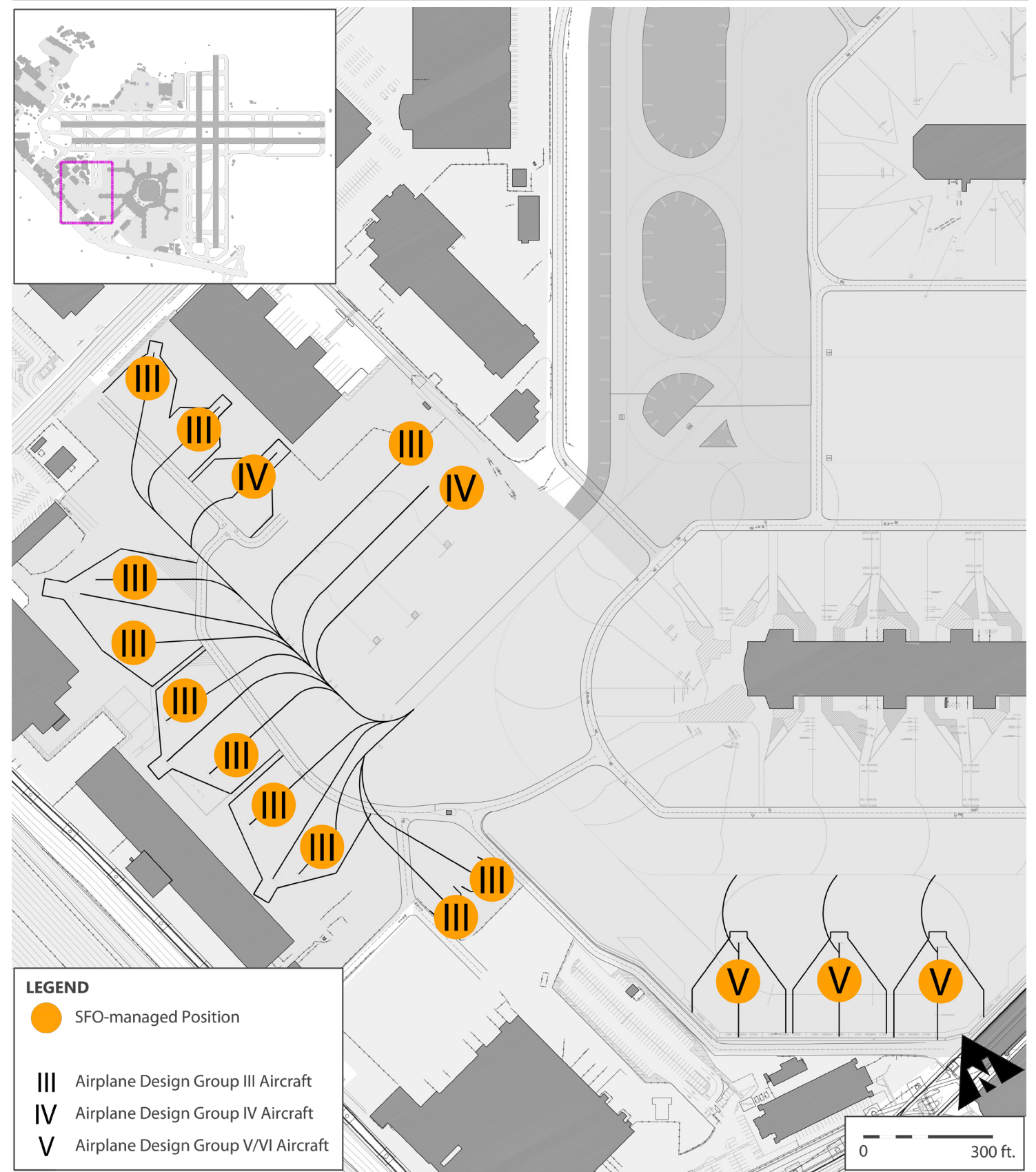


Exhibit 3.6-4 | South Field Remain Overnight Aircraft Parking Positions – Plot 3



Sources: SFO Non-Terminal Aircraft Parking Map, August 2011; RS&H, February 2016; Ricondo and Associates, 2016

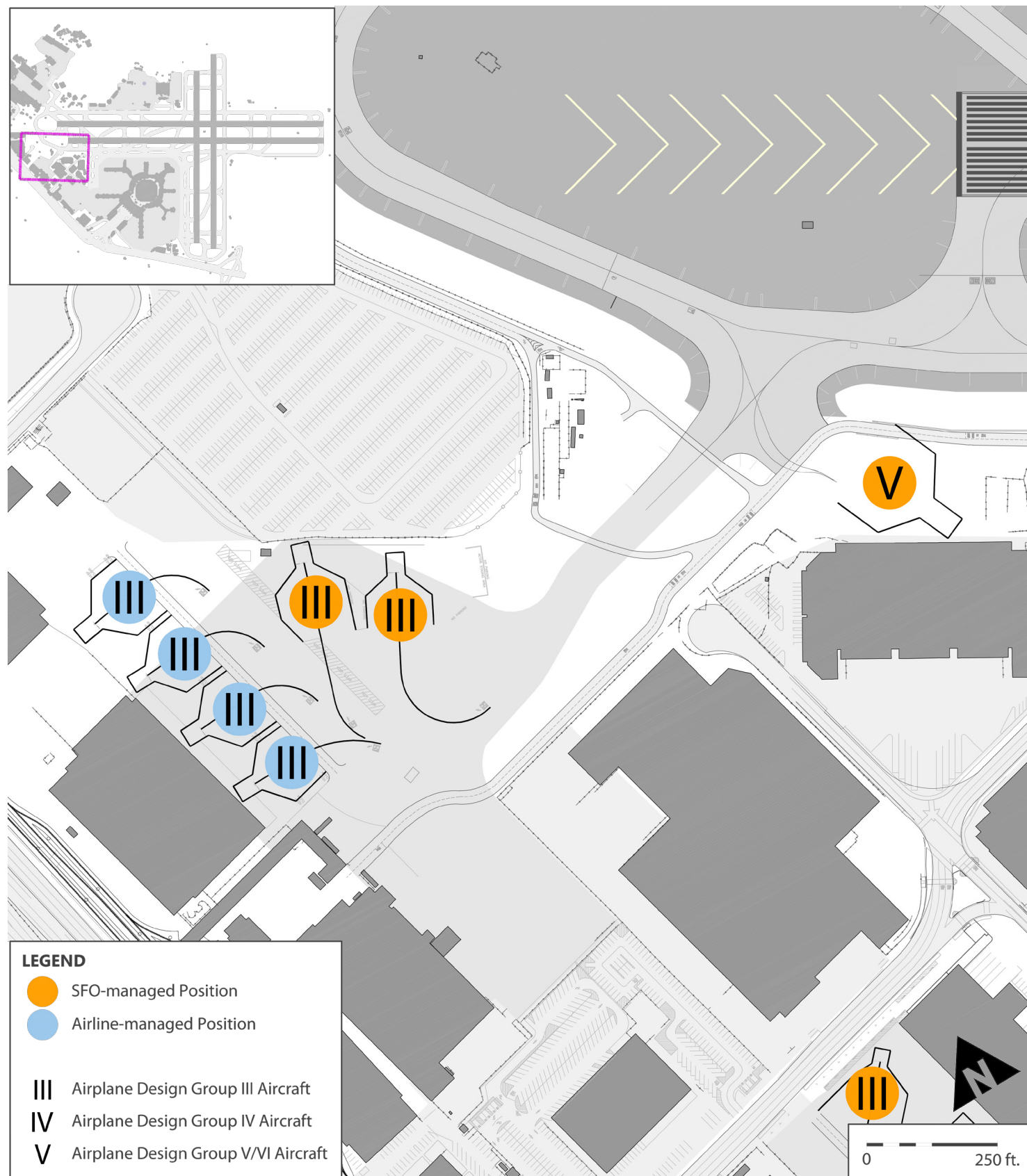
Exhibit 3.6-5 | West Field Remain Overnight Aircraft Parking Positions – Plot 9



Sources: SFO Non-Terminal Aircraft Parking Map, August 2011; RS&H, January 2016; Ricondo and Associates, 2016

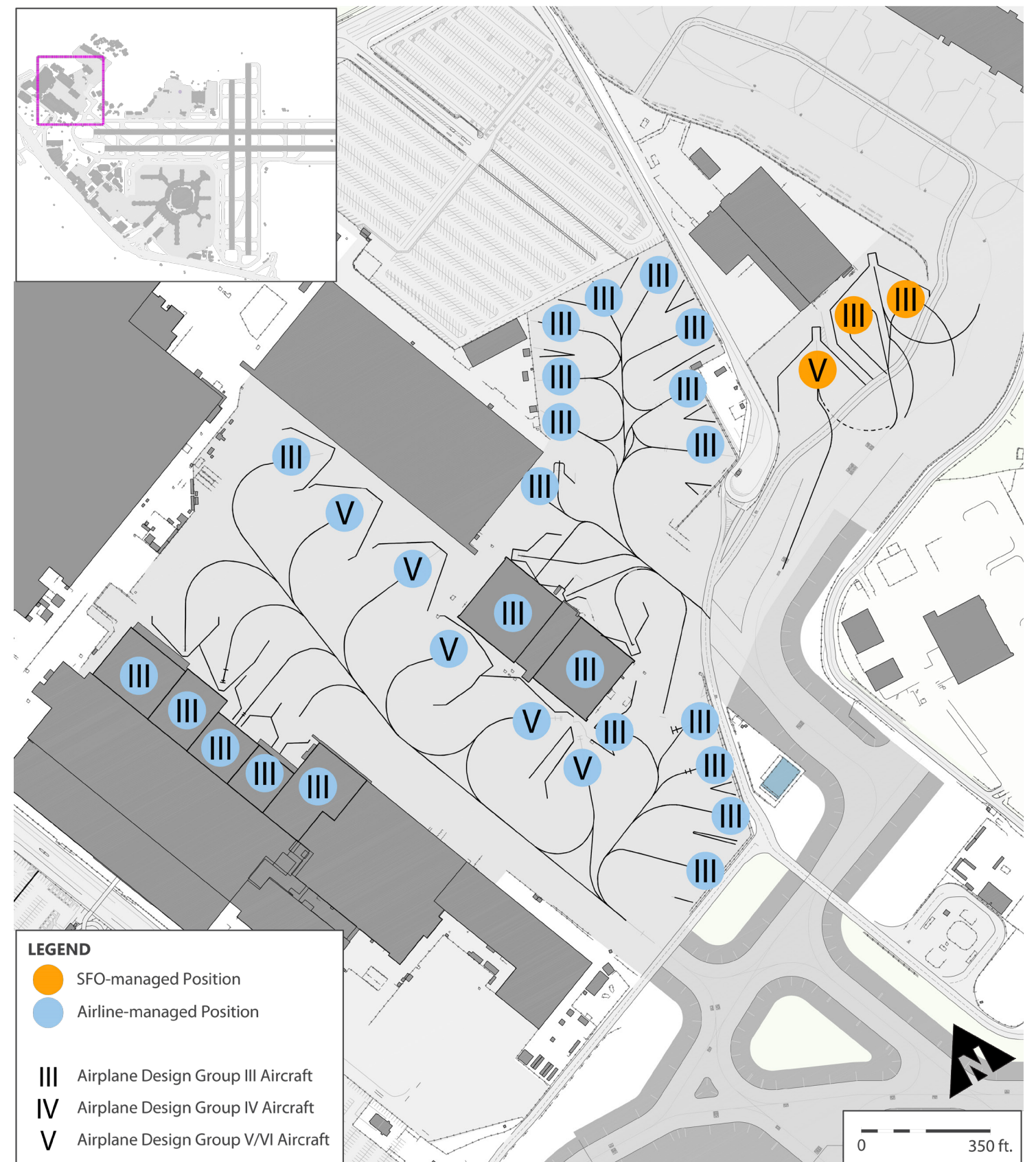


Exhibit 3.6-6 | West Field Remain Overnight Aircraft Parking Positions – Plots 10 and 12



Sources: SFO Non-Terminal Aircraft Parking Map, August 2011; RS&H, February 2016; Ricondo and Associates, October 2014

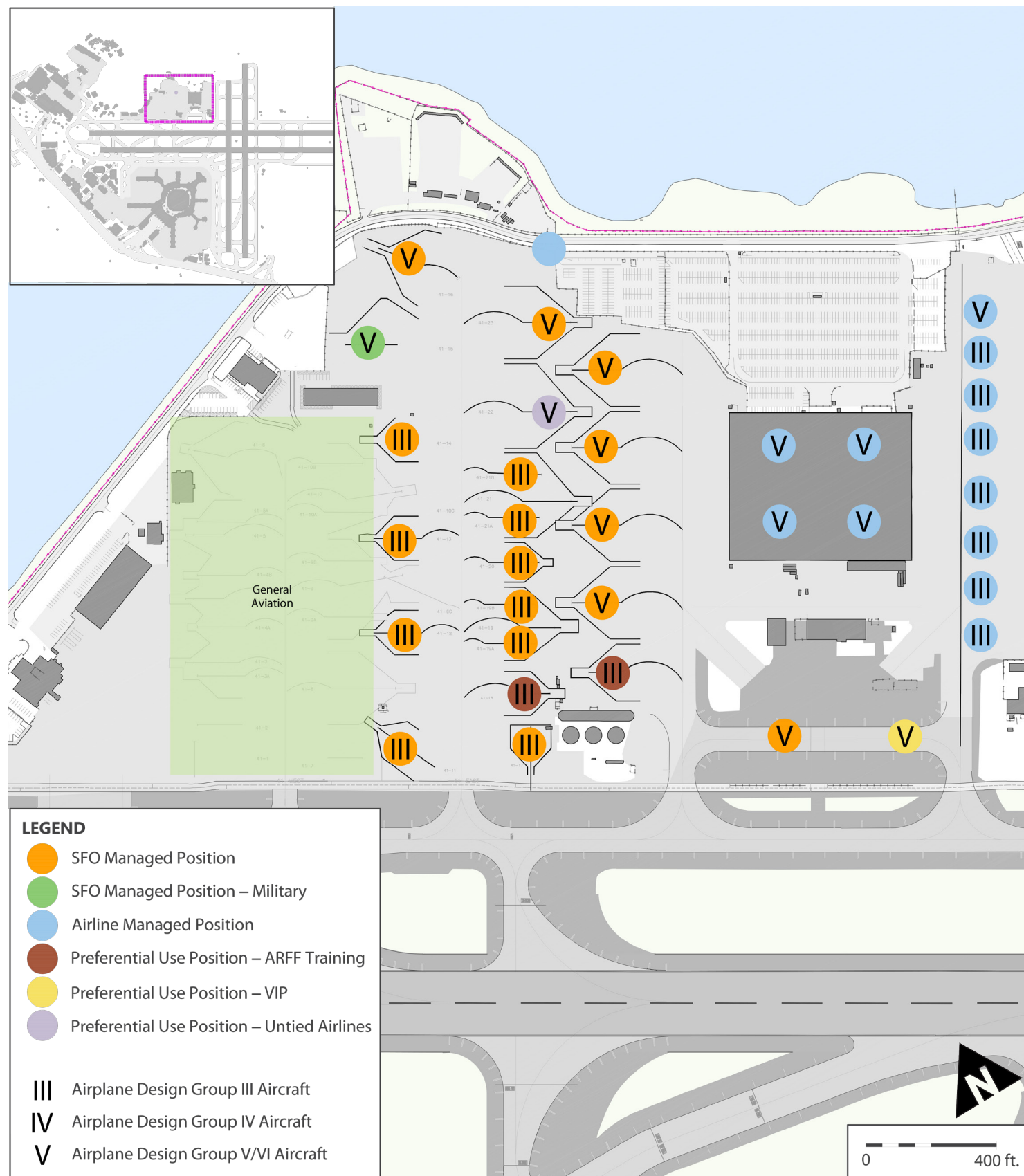
Exhibit 3.6-7 | North Field Remain Overnight Aircraft Parking Positions



Sources: United Airlines Maintenance and Operations Center Parking Layout, August 2011; SFO Non-Terminal Aircraft Parking Map, August 2011; RS&H, February 2016; Ricondo and Associates, October 2014



Exhibit 3.6-8 | East Field Remain Overnight Aircraft Parking Positions



Sources: SFO Non-Terminal Aircraft Parking Map, August 2011; RS&H, February 2016; Ricondo and Associates, October 2014



### 3.6.4 Airport Support

Airport support facilities provide for the operation and maintenance of the Airport. The following support facilities are discussed in this section:

- Airport maintenance
- Aircraft and vehicle fueling
- Airport administration
- Emergency response facilities
- Museum storage and educational buildings

#### 3.6.4.1 Airport Maintenance

Approximately 269,000 square feet of building space is designated for Airport maintenance, which includes workshops, offices, storage areas, and a central receiving dock. Only about 147,900 square feet of this designated space are currently being used for this function. The remaining 121,100 square feet are vacant or used for other Airport-related functions. The Airport maintenance land area totals approximately 686,000 square feet. **Table 3.6-5** summarizes the Airport maintenance building data. **Exhibit 3.6-9** depicts the location of Airport maintenance facilities at SFO.

##### Workshops/Offices

The main SFO maintenance facility is Building 682, the Facilities Maintenance Center, located in the West Field. The workshops in Building 682 include the paint, steamfitter, plumbing, automobile heavy maintenance, pavement and grounds, landscaping, equipment and vehicle storage (excluding custodial), and sign shops. Landscaping greenhouses and equipment are stored in the adjacent Plot 11 surface lot. Building 682 is in need of roof repairs and will likely need upgrades in 5 to 10 years, but otherwise is in good condition.

The AirTrain maintenance facility is currently located in Building 679. It comprises heavy maintenance bays that can accommodate four-car trains and light maintenance bays that can only accommodate three-car trains. The current system provides two turnout switches and storage tracks near the maintenance facility. End-of-line storage tracks will be removed due to the Lot DD extension.

Building 692 is the SFO Vehicle Maintenance Facility/Sheet Metal Shop, located just north of Building 682 in the West Field. Building 692 is used primarily for SFO maintenance and storage. It also houses the sheet metal shop, used for automobile bodywork, and the carpentry shop. The building systems were upgraded in approximately 2011. Recent drainage improvements were implemented to curtail flooding during rainstorms. The building is in fair condition.

Building 790 is the SFO Shuttle Bus Vehicle Maintenance Facility. It is located in the West Field at the intersection of San Bruno Avenue and North McDonnell Road. Building 790 is a maintenance garage for the repair and maintenance of shuttle buses by the shuttle bus operating concessionaire. The site includes a mobile trailer used for administration purposes. Building 790 is in fair to poor condition.

Table 3.6-5 | Airport Maintenance Building Data

Building No.	Total Floors	Total Building Footprint Area (square feet)	Total Building Area (square feet)	Total Building Area Used For Airport Maintenance (square feet)	Total Lot Area Used For Airport Maintenance (square feet)	Current SFO Division	Non-Airport Maintenance Tenants	Year Constructed	Building Condition
575 <sup>1</sup>	4	31,595	69,450	3,620	-	SFO Facilities	United Airlines	1981	Good
606 <sup>1</sup>	3	72,034	82,492	27,220	-	SFO Facilities/Airport Maintenance, SFO Storage, SFO Central Receiving	Southwest Airlines, AGI Alliance, Pegasus Aviation	1969	Poor
624	1	8,125	8,125	8,125	40,650	SFO Maintenance	None	1974	Fair
679	3	100,659	39,553	39,553	90,000	SFO Maintenance	None	1999	Good
682	1	75,974	75,974	75,974	157,528	SFO Facilities Maintenance Center	None	1974	Good
692	1	19,260	19,260	19,260	39,101	SFO Facilities Vehicle Maintenance Facility/Sheet Metal Shop	None	1974	Fair
750	1	7,200	7,200	7,200	17,745	SFO Heavy Vehicle Maintenance and Equipment Storage	None	1971	Good
790	1	6,500	6,500	6,500	64,229	SFO Shuttle Bus Vehicle Maintenance Facility	None	1983	Fair/Poor

Note: <sup>1</sup> Building 575 and Building 606 have multiple tenants, which include Airport maintenance.

Sources: SFO staff, October 2014; RS&H, October 2014

**Storage**

Building 624, located in the West Field, is used by SFO Maintenance for storage and by SFO Facilities to store power generators. The building is in fair condition.

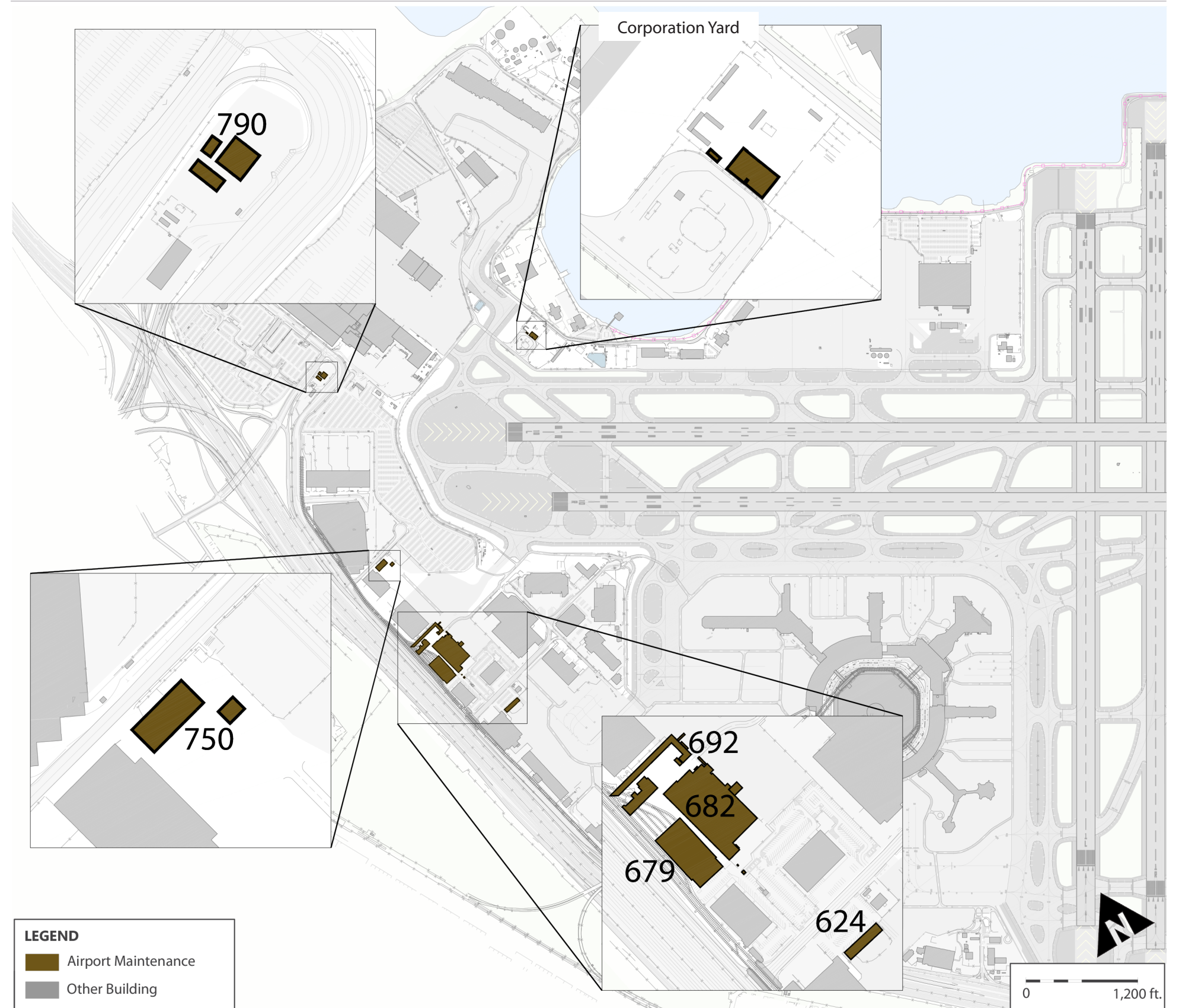
Building 750, also located in the West Field, is used for heavy vehicle and equipment storage. The building is in good condition.

In the East Field, SFO Facilities stores large vehicles in an area near the U.S. Coast Guard Air Station known as the Corporation Yard. The Corporation Yard includes a number of sheds used to store heavy equipment. SFO also has another lot next to the Corporation Yard known as the Bone Yard, which is used to store construction materials. Just past the Bone Yard is a paint shop used by SFO Facilities for pavement markings. The Corporation Yard and the “Bone Yard” total approximately 8.4 acres.

**SFO Central Receiving**

Building 606, although designated for air cargo use, is also used for SFO Central Receiving, which is the clearinghouse for all supplies purchased by SFO management and staff. Custodial supplies are the only SFO purchases not cleared at this location. The building is in poor condition.

**Exhibit 3.6-9 | Airport Maintenance Facilities**



Source: SFO Airport Layout Plan, 2014; RS&H, 2015; Ricondo and Associates, 2016



### 3.6.4.2 Aircraft and Vehicle Fueling

The SFO Fuel Farm is located in the North Field. Facilities include two main buildings, totaling approximately 8,410 square feet, and seven fuel storage tanks. Building 904 is the Fuel Maintenance and Operations Building. Building 906 is the SFO Fuel Control Building. All buildings are well maintained and in good condition. **Table 3.6-6** summarizes the aircraft fueling building data. **Exhibit 3.6-10** depicts the location of aircraft and vehicle fueling facilities at SFO.

In addition to Buildings 904 and 906, the 9.37-acre site has seven fuel storage tanks. The tanks are serviced yearly and inspected at 5- to 10-year intervals. The tank and control systems are up to current code and in good condition.

Fueling stations for SFO and City vehicles are located in the South Field and West Field. The South Field City and County of San Francisco (CCSF) fueling station is located northeast of the Ground Transportation Unit (GTU) facility. This fueling station supplies gasoline and diesel that is stored in three underground storage tanks totaling 30,000 gallons. The station also includes a two-port car wash. The fueling station and car wash total 5,020 square feet and are used only by CCSF employees, including the San Francisco Police Department and San Francisco Fire Department. Future plans include moving the GTU facility, fueling station, and car wash to Plot 700 in the North Field.

Most SFO vehicles operate using CNG. The Airport has two third-party-operated CNG facilities. Clean Energy SFO operates a CNG station at 790 North McDonnell Road in the same lot as the SFO Shuttle Bus Vehicle Maintenance Facility. Trillium USA operates a CNG station in the South Field at South McDonnell Road near Millbrae Avenue. Both CNG stations are open to the public 24 hours per day.

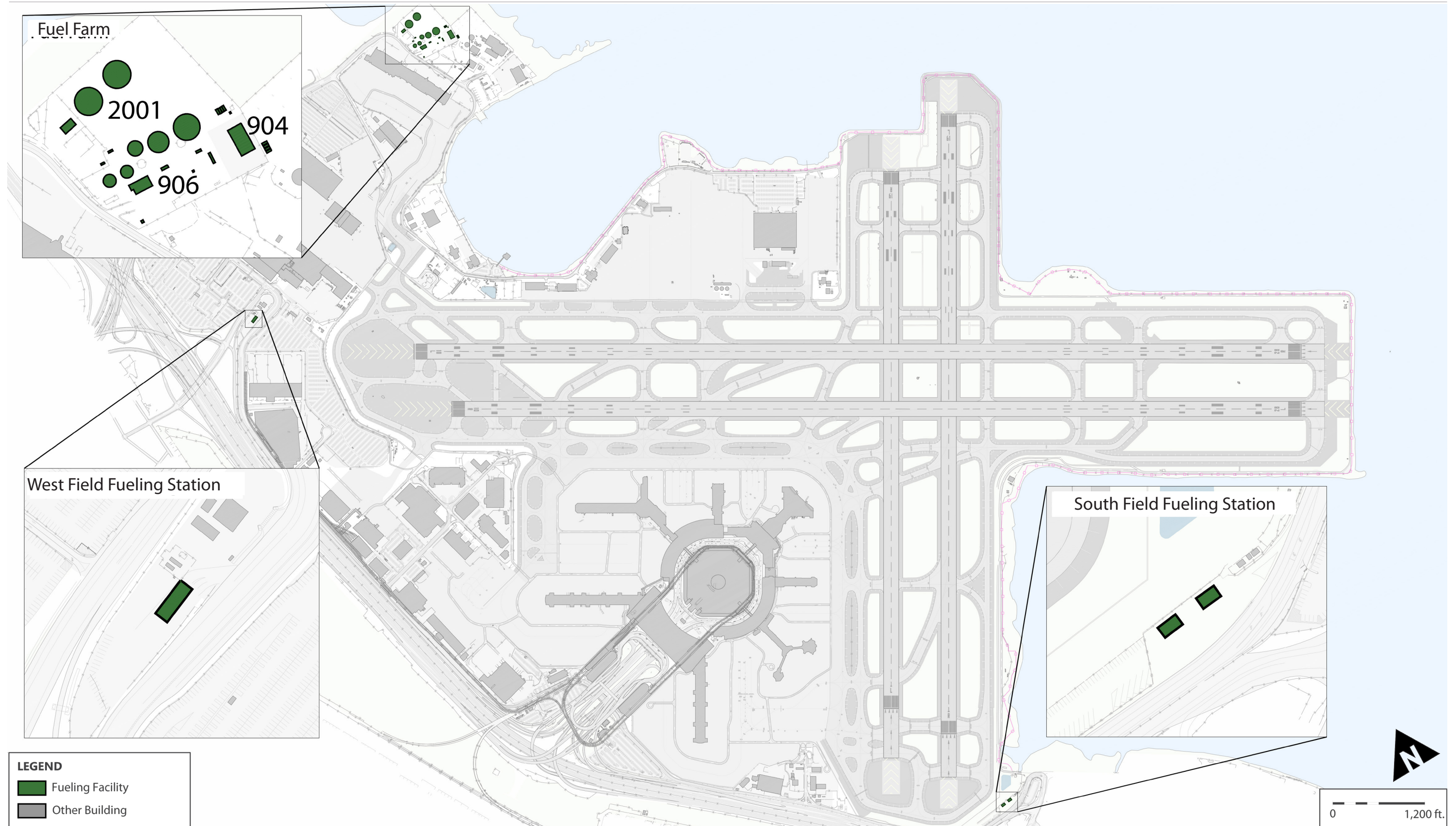
**Table 3.6-6 | Aircraft Fueling Building Data**

Building No.	Total Floors	Total Footprint Area (square feet)	Total Building Area (square feet)	Total Lot Area (square feet)	Year Constructed	Building Condition
904	1	5,407	5,407	N/A	2000	Good
906	1	3,000	3,000	N/A	1965	Good

Note: N/A = Not Available

Sources: SFO staff, 2014; RS&H, October 2014

Exhibit 3.6-10 | Aircraft and Vehicle Fueling Facilities



Source: SFO Airport Layout Plan, 2014; RS&H, 2015; Ricondo and Associates, 2016



### 3.6.4.3 Airport Administration

Approximately 379,820 square feet of building area is designated for Airport administration use, primarily in the West Field. Only about 149,000 square feet of building area is used for this function. The remaining building space is vacant or used for other Airport-related functions. The employee vehicle parking lot areas total approximately 389,300 square feet. **Table 3.6-7** summarizes the Airport administration building data. **Exhibit 3.6-11** shows the location of Airport administration buildings at SFO.

Building 60 is the SFO Information Technology and Telecommunications (ITT) Data Center, which is located near Garage A (see **Exhibit 3.5-4**).

Building 575 is located in the West Field near North International Parking Garage G. It includes the SFO Business Center, Airport administration (ITT, Aviation Management, Parking Management, Revenue Development and Management, Finance and Accounting, Airport Liaison Office, and Storage), and the United

Airlines Service Center. Building 575 was renovated in 2010 using green building techniques and has a new interior, roof, and mechanical systems. The building is well maintained and in good condition.

Building 612, which is designated primarily for air cargo use, also houses Airport administration offices for SFO Building Inspections Code Enforcement, SFO Accounting, SFO Construction Inspection, SFO Human Resources Center, SFO Quality Standards Program, and SFO Survey. The building has an approximate 10-year life span and will likely need major roof repairs and upgrades to the HVAC system. The building is in poor condition.

Building 676 is known as the Jason Yuen Engineering & Architecture Building and is used for the SFO Design and Construction administrative offices. The building was originally constructed by Howard Hughes in 1967 and was retrofitted with photovoltaic panels in 2001. In approximately 2012, improvements were implemented to include a new water and fire main and the interior areas were remodeled. The building is in poor condition. It is slated to be demolished and replaced by the Consolidated Administration Campus (see Section 3.6.7).

Building 710 is designated for Airport administration use, which includes SFO Human Resources, SFO Planning & Environmental, and SFO Project Management. It was originally constructed as an air cargo building to accommodate two Boeing 737 aircraft, but most of the building has been converted to office space used by various airlines and Airport administration. Offices for Singapore Airlines Cargo and Menzies are also housed in this building, which is in fair condition.

Building 1056 and Building 1057 in the East Field are used for SFO Operations. Building 1056 is a shelter for vehicles and other equipment storage. Building 1057 houses SFO Operations administrative offices. Both buildings are in good condition.

**Table 3.6-7 | Airport Administration Building Data**

Building No.	Total Floors	Total Footprint Area (square feet)	Total Building Area (square feet)	Total Building Area Used For Airport Administration (square feet)	Total Lot Area Used For Airport Administration Employee Parking (square feet)	Current SFO Department	Non-Aiport Administration Tenants	Year Constructed	Building Condition
60	1	4,510	4,510	4,510	0	SFO Information Technology and Telecommunications Data Center	None	Unknown	Unknown
575 <sup>1</sup>	4	31,595	69,450	49,030	100,726	SFO Business Center, SFO Airport Administration (ITT, Aviation Management, Parking Management, Revenue Department and Management, Finance and Accounting, Airport Liaison Office, Storage)	SFO Facilities, United Airlines	1981	Good
612 <sup>2</sup>	2	86,856	114,550	10,640	32,859	SFO Administration, SFO Building Inspections Code Enforcement, SFO Accounting, SFO Construction Inspection, SFO Human Resources Center, SFO Quality Standard Programs, SFO Survey	Delta Air Lines, Menzies, Swissport	1969	Poor
676	1	30,800	30,800	30,800	202,274	SFO Design & Construction	None	1967	Poor
710 <sup>3</sup>	3	85,335	123,349	16,850	53,432	SFO Airport Administration (SFO Human Resources, SFO Planning & Environmental, SFO Project Management)	Singapore Airlines Cargo, Menzies	1967	Fair
1056	1	11,496	11,496	11,496	0	SFO Operations	None	2014	Good
1057	1	9,882	9,882	9,882	0	SFO Operations	None	2014	Good

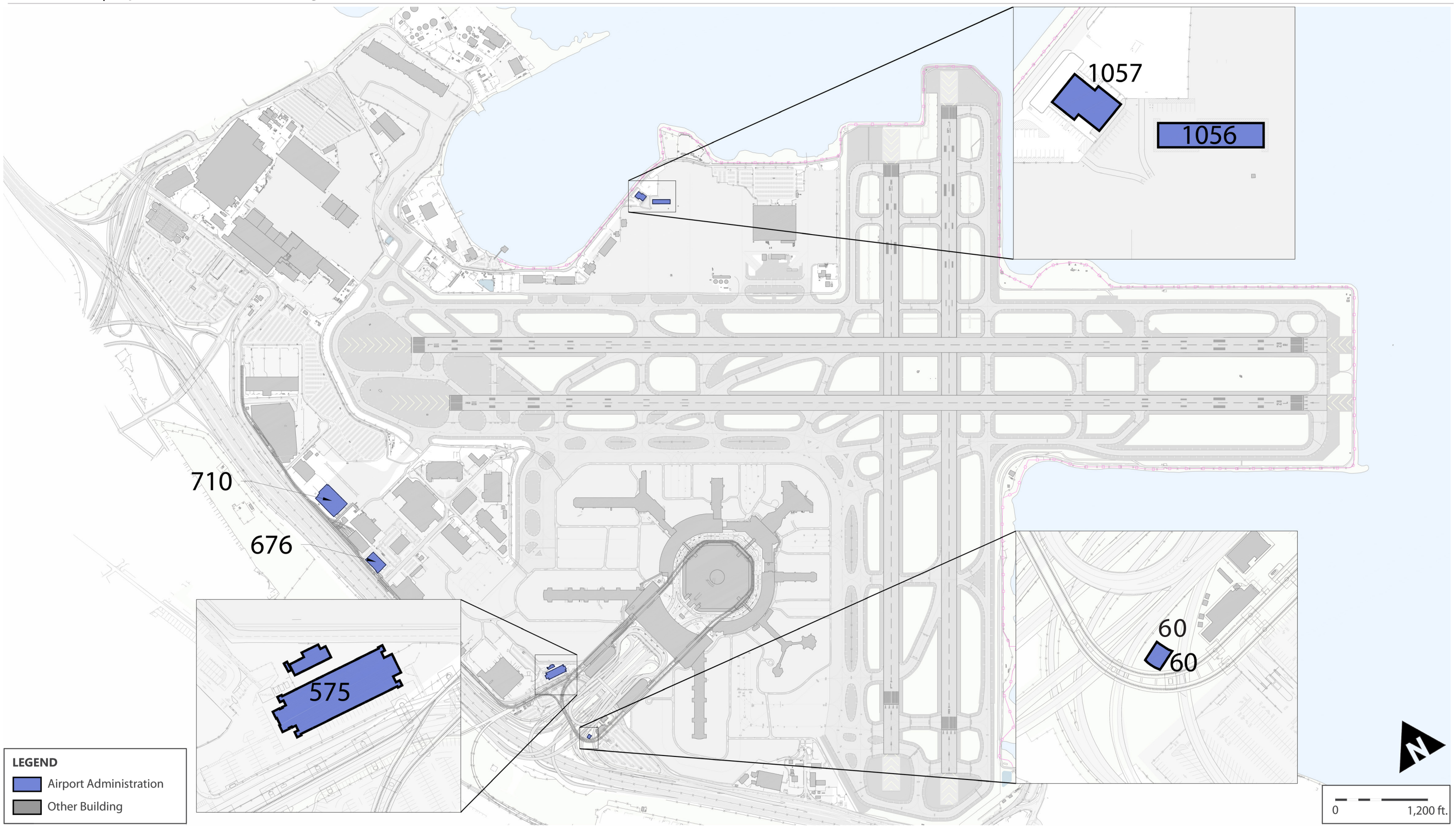
Notes: <sup>1</sup> The Building 575 designation includes multiple buildings. The areas shown above are for the largest building.

<sup>2</sup> Building 612 is designated for air cargo. The areas shown above are for the entire building.

<sup>3</sup> Building 710 is designated primarily as Airport administration, but Singapore Airlines Cargo also leases office space in the building. The areas shown above are for the entire building.

Sources: SFO staff, October 2014; RS&H, October 2014

Exhibit 3.6-11 | Airport Administration Building Facilities



Source: SFO Airport Layout Plan, 2014; RS&H, 2015; Ricondo and Associates, 2016



### 3.6.4.4 Emergency Response Facilities

The SFO emergency response facilities include fire protection, police services, and other specialized emergency management operations.

#### Fire Protection

SFO is served by three Emergency Response Facilities (ERFs) that provide aircraft rescue and fire-fighting services. Each ERF is staffed by the San Francisco Fire Department – Airport Division. Firefighting staff are responsible for providing fire protection, training, fire prevention, code enforcement, emergency medical services, hazardous materials abatement, and community-based fire safety, cardiopulmonary resuscitation (CPR), and automatic defibrillator training and recertification for SFO. **Table 3.6-8** summarizes the fire protection building data. The ERF locations are depicted in **Exhibit 3.6-12**.

Building 650 is ERF #1. It is located along West Field Road near the Romeo Checkpoint. The building is in good condition.

Building 1064 is ERF #2 located next to the Superbay maintenance hangar. ERF #2 is the only facility at the Airport designated to meet the FAR Part 139 certification requirement for incident response time. The building is in good condition.

Building 1064A is a small building used for general storage for ERF #2. The building is in good condition.

Building 12 is ERF #3 located near the Runway 1L end. The building currently contains six garage bays for firefighting/emergency vehicles. The building is in good condition. It is scheduled to be demolished and replaced as one of the projects in the South Field area.

Building 1030 is ERF #4, the Marine Emergency Response Facility (MERF). It is located adjacent to the U.S. Coast Guard Air Station. The building is in good condition.

#### Police Services

Airport police services are provided by the San Francisco Police Department (SFPD). The SFPD–Airport Bureau provides law enforcement services to SFO in accordance with Transportation Security Administration (TSA) regulations. Police services building data are presented in **Table 3.6-9** and the building locations are depicted in **Exhibit 3.6-12**. Police offices are also located throughout the terminals, as described in Section 3.4.

Building 1059 is the Main Police Training Facility and Shooting Range. It includes four trailers, two outdoor shooting ranges, and an adjoining parking lot. The range is also used by neighboring police departments. The buildings are in poor condition.

### Other Specialized Emergency Management Operations

In addition to fire and police facilities, SFO maintains facilities for Airfield Safety Officers, specialized emergency management personnel, and a dedicated incident command center. An emergency response exercise is conducted annually at SFO to help ensure readiness for a potential incident. In addition, SFO also provides facilities for the TSA, Department of Homeland Security, CBP, and Immigrations and Customs Enforcement staff, which handle passenger/baggage screening for departing and arriving passengers and the protection of U.S. borders.

Since 1941, the U.S. Coast Guard has had an Air Station on property adjacent to the North Field with access to the Airport runway and taxiway systems. The U.S. Coast Guard Air Station San Francisco occupies approximately 24 acres and seven buildings, which include one hangar, one nose hangar, one barracks, one administration building with an enclosed infirmary, bachelor officer quarters, a supply building, and a boathouse, as well as a few small support structures.

**Table 3.6-8 | Fire Protection Building Data**

Building No.	Total Floors	Total Building Footprint (square feet)	Total Building Area (square feet)	Total Lot Area (square feet)	Year Constructed	Building Condition
12	1	20,604	20,604	N/A	1998	Good
650	1	18,732	18,732	N/A	1998	Good
1030	1	4,536	4,356	N/A	1994	Good
1064	1	14,012	14,012	N/A	1971	Good
1064A	1	4,937	4,937	N/A	1994	Good

Note: N/A = Not Available

Sources: SFO staff, October 2014; RS&H, October 2014

**Table 3.6-9 | Police Services Building Data**

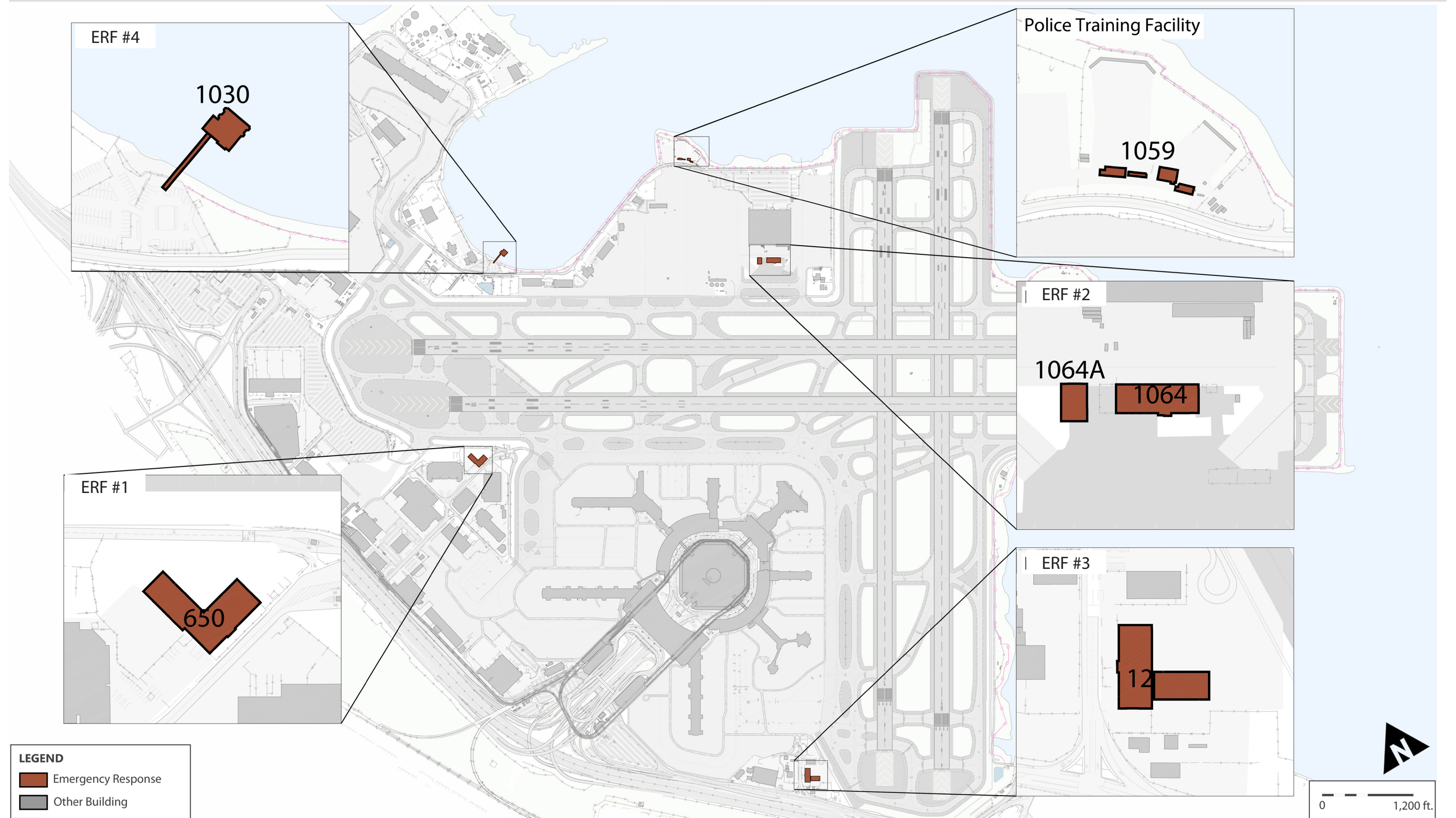
Building No.	Total Floors	Total Building Footprint (square feet)	Total Building Area (square feet)	Total Lot Area (square feet)	Year Constructed	Building Condition
1059 <sup>1</sup>	1	1,791	1,791	N/A	1989	Poor

Notes: N/A = Not Available

<sup>1</sup> The Building 1059 designation includes four buildings. The areas shown are for all four buildings.

Sources: SFO staff, October 2014; RS&H, October 2014

Exhibit 3.6-12 | Emergency Response Facilities



Source: SFO Airport Layout Plan, 2014; RS&H, 2015; Ricondo and Associates, 2016  
AIRPORT DEVELOPMENT PLAN – DRAFT FINAL



### 3.6.4.5 Museum Storage and Educational Buildings

Building 670, located in the West Field, is the Museum Support Facility. This building is used to store Airport Museum equipment and archives, and to construct museum displays. Minor renovations and upgrades were implemented in approximately 2006. Improvements included HVAC upgrades, structural retrofits, offices, storage, and fire alarm installations. The roof may need to be replaced in 10 years. The building is in fair condition. It is slated to be demolished and replaced by the Consolidated Administration Campus.

Building 928, located in the North Field, is used by the City College of San Francisco, Department of Aeronautics, to train aircraft mechanics. The building includes classrooms, workshops, and offices, but is not often used. Building 928A, also used by City College, is a small storage shed located east of Building 928. Both buildings are in good to fair condition.

**Table 3.6-10** summarizes the building data. **Exhibit 3.6-13** depicts the locations of the museum and educational buildings.

**Table 3.6-10 | Museum Support Facility and Education Buildings Data**

Building No.	Total Floors	Total Building Footprint Area (square feet)	Total Building Area (square feet)	Total Lot Area (square feet)	Year Constructed	Building Condition
670	1	34,335	34,335	N/A	1974	Good/Fair
928	1	25,000	25,000	N/A	1976	Good/Fair
928A	1	1,540	1,540	N/A	1976	Good/Fair

Note: N/A = Not Available

Sources: Compiled from data provided by SFO staff and RS&H observations in October 2014; RS&H, October 2014

### 3.6.5 Airline Support

Airline support facilities provide for aircraft maintenance and airline operations. The following support facilities are discussed in this section:

- Flight kitchens
- GSE maintenance
- Airline maintenance, Superbay maintenance hangar, and United Airlines San Francisco Maintenance Center

#### 3.6.5.1 Flight Kitchens

Flight kitchens are used by food service providers to prepare in-flight meals for airlines. All on-Airport flight kitchens are housed in Building 649, located in the West Field near Taxiway B and the West Field Checkpoint. Current tenants include Gate Gourmet and Dobbs International Services, Inc. The building accommodates approximately 700 employees working three shifts.

In addition to the main building, Gate Gourmet has facilities near Building 649. These facilities include a permanent trash compactor (Building 649A) and a portable trailer (Building 649B). **Table 3.6-11** summarizes the flight kitchen data for Building 649 and four off-Airport buildings used as flight kitchens. **Exhibit 3.6-14** depicts the locations of the on-Airport flight kitchens.

The area surrounding Building 649 is leased by United Airlines. Renovations and upgrades to the cargo elevators, fire suppression system, boilers, lighting in the rear loading dock area, and paving were completed in approximately 2011. While the building is in good condition, the boilers are small and may need to be replaced to accommodate the growing activity within the building. In addition, the autoclave system for sterilizing international garbage may need to be replaced with a new mulching process if approved by the U.S. Food and Drug Administration. Further lighting upgrades may also be considered inside the facility to reduce the building's overall energy use. The building lacks an oil-water separator for runoff.

In addition to Building 649, four flight kitchens are located off Airport property. These flight kitchens are operated by Flying Food Group, Servisair, LSG Sky Chefs, and Yamato Flight Kitchen. The four buildings used as off-Airport flight kitchens are estimated to total approximately 152,900 square feet based on aerial photographs of the buildings.

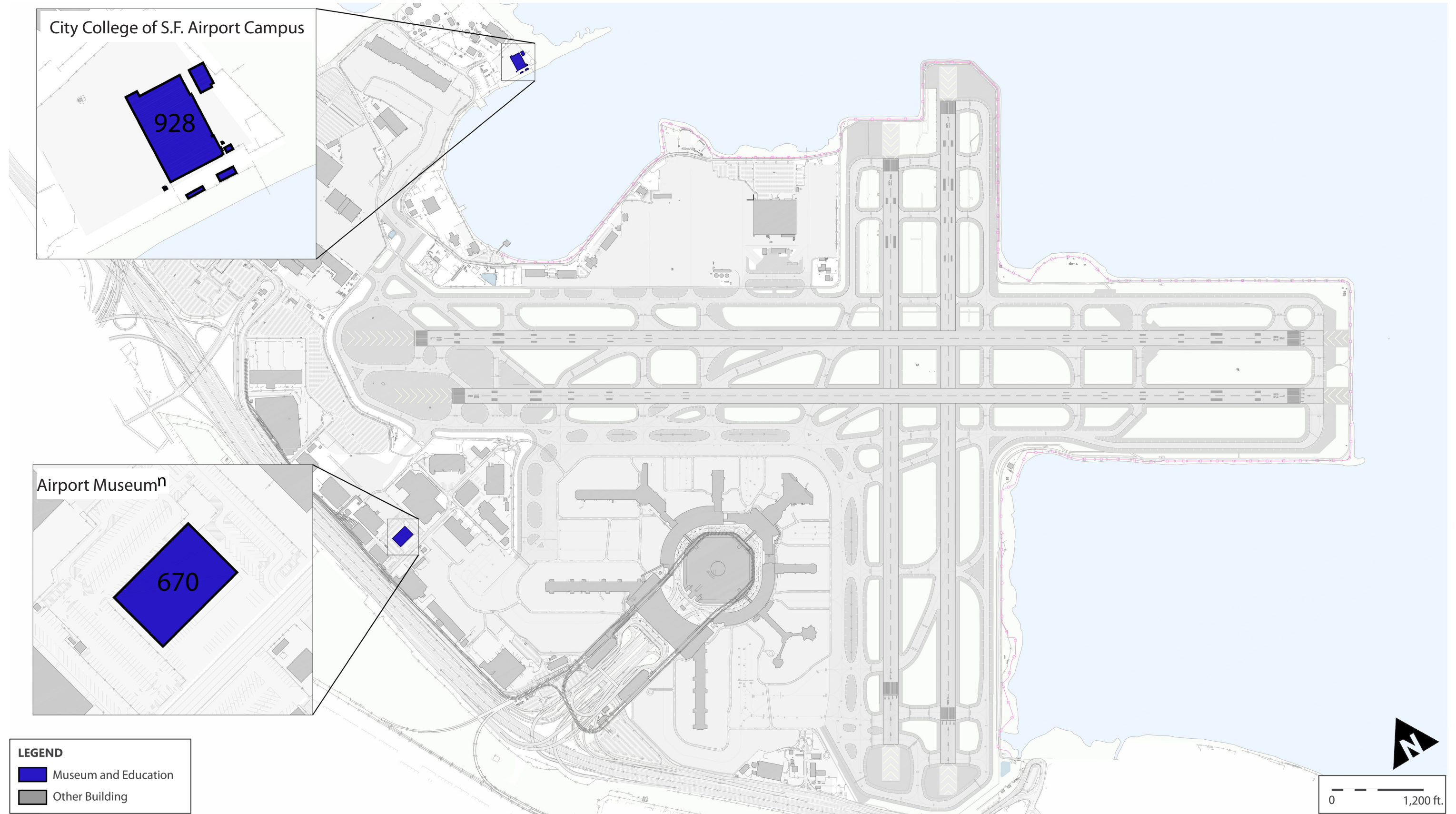
**Table 3.6-11 | Flight Kitchen Building Data**

Building No.	Total Floors	Total Building Footprint Area (square feet)	Total Building Area (square feet)	Total Lot Area (square feet)	Year Constructed	Building Conditions
649	2	84,926	135,000	N/A	1997	Good
Off-Airport	4 Structures	120,900	152,900	300,000	N/A	N/A

Note: N/A = Not Available

Sources: SFO staff, October 2014; RS&H, October 2014

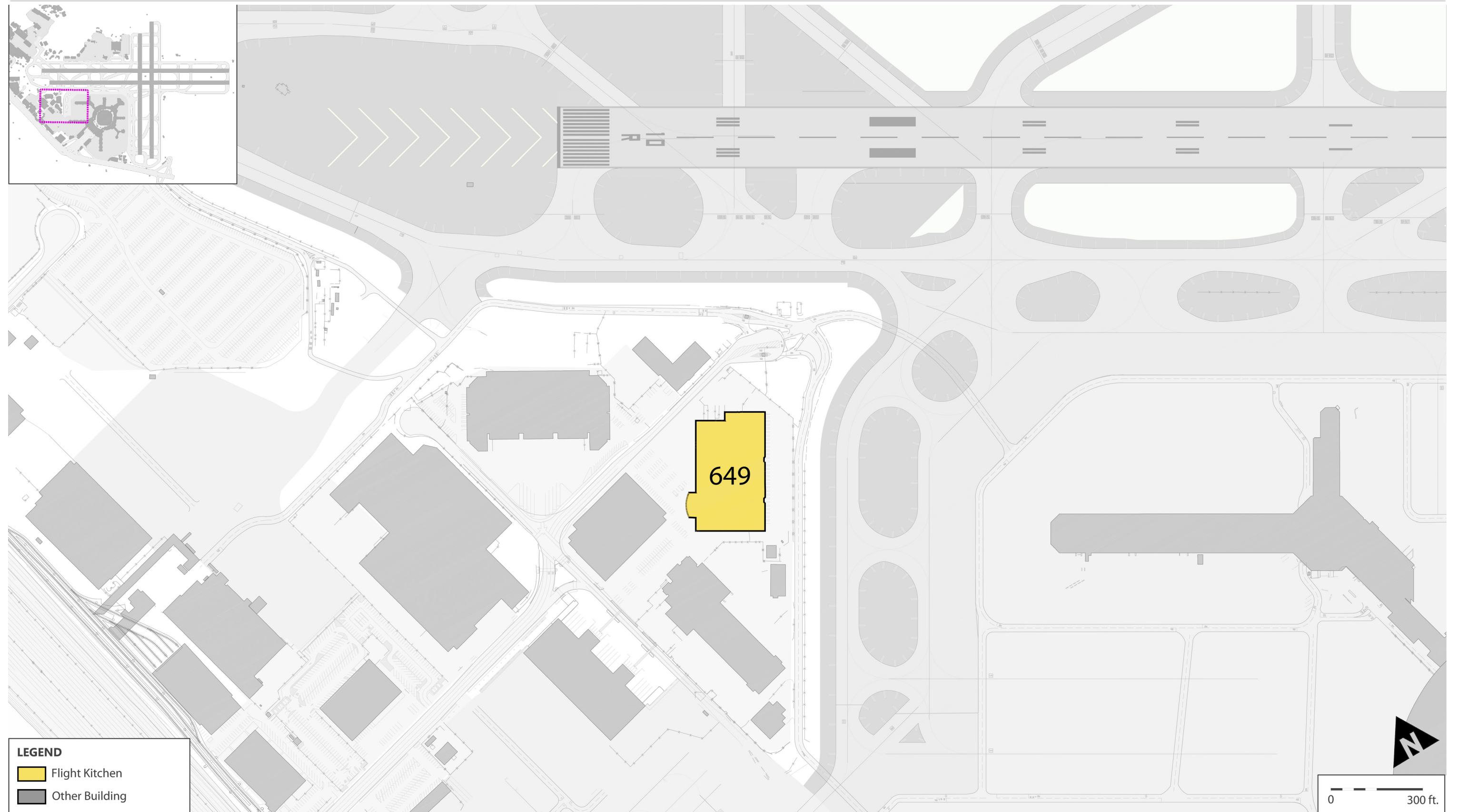
Exhibit 3.6-13 | Museum Support Facility and Education Facilities



Source: SFO Airport Layout Plan, 2014; RS&H, 2015; Ricondo and Associates, 2016



Exhibit 3.6-14 | On-Airport Flight Kitchen Facilities



Source: SFO Airport Layout Plan, 2014; RS&H, 2015; Ricondo and Associates, 2016

### 3.6.5.2 Ground Service Equipment Maintenance

Some ground handlers have designated facilities used for the maintenance of GSE. The ground handlers that maintain the GSE at SFO are discussed in this section. These companies include Menzies, Servisair/Swissport, and Aircraft Service International Group (ASIG). SkyWest Airlines and United Airlines also provide some GSE maintenance.

The GSE maintenance facilities at SFO total approximately 100,200 square feet. The GSE maintenance lot area totals approximately 377,200 square feet. **Exhibit 3.6-15** depicts the locations of GSE maintenance facilities. **Table 3.6-12** summarizes the GSE maintenance building data.

Building 16, located in the South Field, is occupied by ASIG for GSE maintenance and by several other cargo-related ground handlers, including Menzies, Total

Airport Services, and Swissport. The building is designated for air cargo activity, but is also occupied by Lufthansa Technik (airline maintenance) and other tenants. The building is in poor condition and is scheduled for demolition in 2016.

Building 22 is occupied by SkyWest Airlines for GSE maintenance and airline administration. The building is in poor condition and is scheduled for demolition in 2016.

Building 602 is occupied by Swissport and used for GSE maintenance. The building is in fair condition.

The Building 642 designation includes four buildings used by United Airlines for GSE maintenance. The main building has two floors that are used for workshop and office space. Just south of the main building is an open shed used to store equipment. Two small buildings are located just east of the main building. The

larger of the two buildings is used as a “blue water” hazardous waste dumping area and the smaller building is used for mail sorting.

The main building has some minor roof leaks and some of the garage doors are in need of repair. The expansion joints around the outside of the building connecting to the driveway are cracked and need repair. The building is in good condition.

The Building 1070 designation includes two buildings: one is used by ASIG for GSE maintenance; the other is used by SFO Facilities for the airfield sign shop. The buildings are in fair to poor condition.

**Table 3.6-12 | Ground Service Equipment Maintenance Building Data**

Building No.	Total Floors	Total Footprint Area (square feet)	Total Building Area (square feet)	Total Building Area Used For GSE Maintenance (square feet)	Total Lot Area Used For GSE Maintenance (square feet)	Current GSE Maintenance Tenant	Non-GSE Maintenance Tenants	Year Constructed	Building Condition
16 <sup>1</sup>	3	66,408	82,466	2,355	93,300	Aircraft Service International Group	Philippine Airlines, Swissport, Menzies, Total Airport Services, Lufthansa Technik, SIA Engineering USA, Certified Aviation Services	1954	Poor (to be demolished in 2016)
22	1	8,105	8,105	8,105	See Building 16	SkyWest Airlines	None	1954	Unknown (to be demolished in 2016)
602	1	6,575	6,575	6,575	40,400	Swissport	None	1974	Fair
642 <sup>2</sup>	1	7,922	7,922	7,922	179,370	United Airlines – Equipment Shed	None	1997	Good
642 <sup>2</sup>	1	67,888	67,888	67,888		United Airlines – Main Building	None	1997	Good
642 <sup>2</sup>	1	5,000	5,000	0		United Airlines – Hazardous Waste Dumping	None	1997	Good
642 <sup>2</sup>	1	1,200	1,200	0		United Airlines – Mail Sort	None	1997	Good
1070 <sup>3</sup>	1	9,972	9,972	4,052	25,600	Aircraft Service International Group	SFO Facilities	1950	Fair/Poor

Notes: <sup>1</sup> Building 16 has multiple tenants, including non-GSE maintenance tenants.

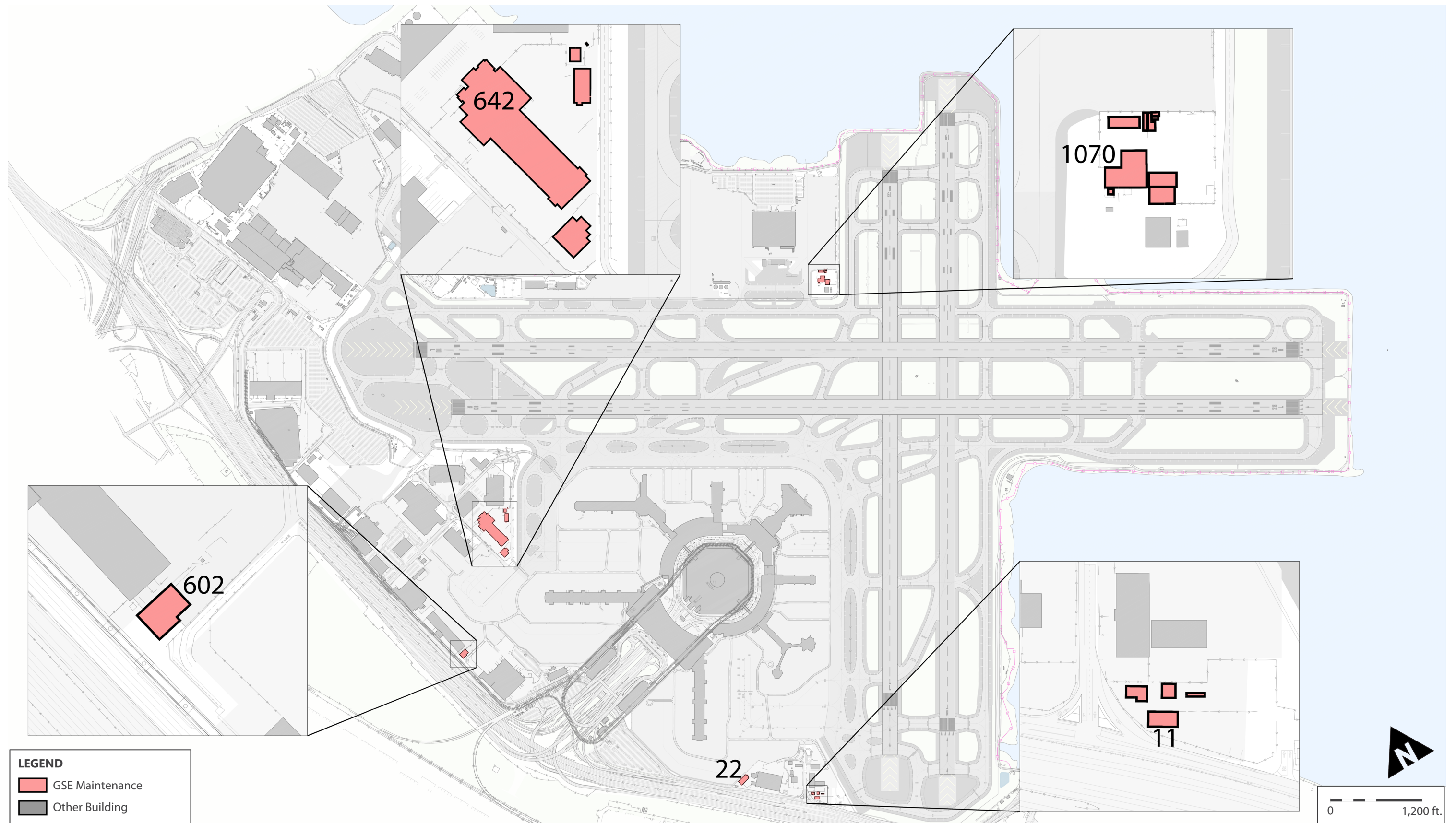
<sup>2</sup> The Building 642 designation includes four separate buildings for United Airlines GSE maintenance.

<sup>3</sup> The Building 1070 designation includes two buildings used by ASIG and Airport Maintenance – SFO Facilities.

Sources: SFO staff, October 2014; RS&H, October 2014



Exhibit 3.6-15 | Ground Service Equipment Maintenance Building Locations



Source: SFO Airport Layout Plan, 2014; RS&H, 2015; Ricondo and Associates, 2016

### 3.6.5.3 Airline Maintenance

Airline aircraft maintenance services at SFO are provided by United Airlines, American Airlines, and Lufthansa Technik. **Table 3.6-13** summarizes the airline support facilities data. **Exhibit 3.6-16** depicts the locations of airline support facilities, which include airline maintenance, the Superbay maintenance hangar, and the United Airlines San Francisco Maintenance Center (commonly referred to as the Maintenance and Operations Center, or MOC).

Building 16 is located in the South Field. The building is designated for air cargo activity, but is also occupied by Lufthansa Technik (airline maintenance) and other tenants. The building is in poor condition and is scheduled for demolition in 2016.

The United Airlines MOC consists of Buildings 800 A–H, located in the North Field. United Airlines has a ground lease for the site.

The Superbay maintenance hangar is Building 1060, located in the East Field. The hangar is occupied by United Airlines and American Airlines for maintenance and can accommodate approximately six narrowbody aircraft RON positions. The Superbay Hangar was originally constructed by American Airlines to house four Boeing 747s. The fire suppression system was recently improved and uses three water tanks installed on adjacent apron. The hangar itself is structurally sound, but is in need of maintenance. The building is in fair condition.

**Table 3.6-13 | Airline Support Facilities Data**

Building No.	Total Floors	Total Footprint Area (square feet)	Total Building Area (square feet)	Total Employee Vehicle Parking Lot Area (square feet)	Current Airline Maintenance Tenant	Non-Airline Maintenance Tenants	Year Constructed	Building Condition
16 <sup>1</sup>	3	66,408	82,466	8,368	Lufthansa Technik, SIA Engineering USA, Certified Aviation Services	Philippine Airlines, Swissport, Menzies, Total Airport Services, Aircraft Service International Group	1954	Poor (to be demolished)
800 <sup>2</sup>	N/A	1,841,665	N/A	N/A	United Airlines	None	N/A	N/A
1060	1	255,800	255,800	422,690	United Airlines/ American Airlines	None	1971	Fair

Notes: N/A = Not Available

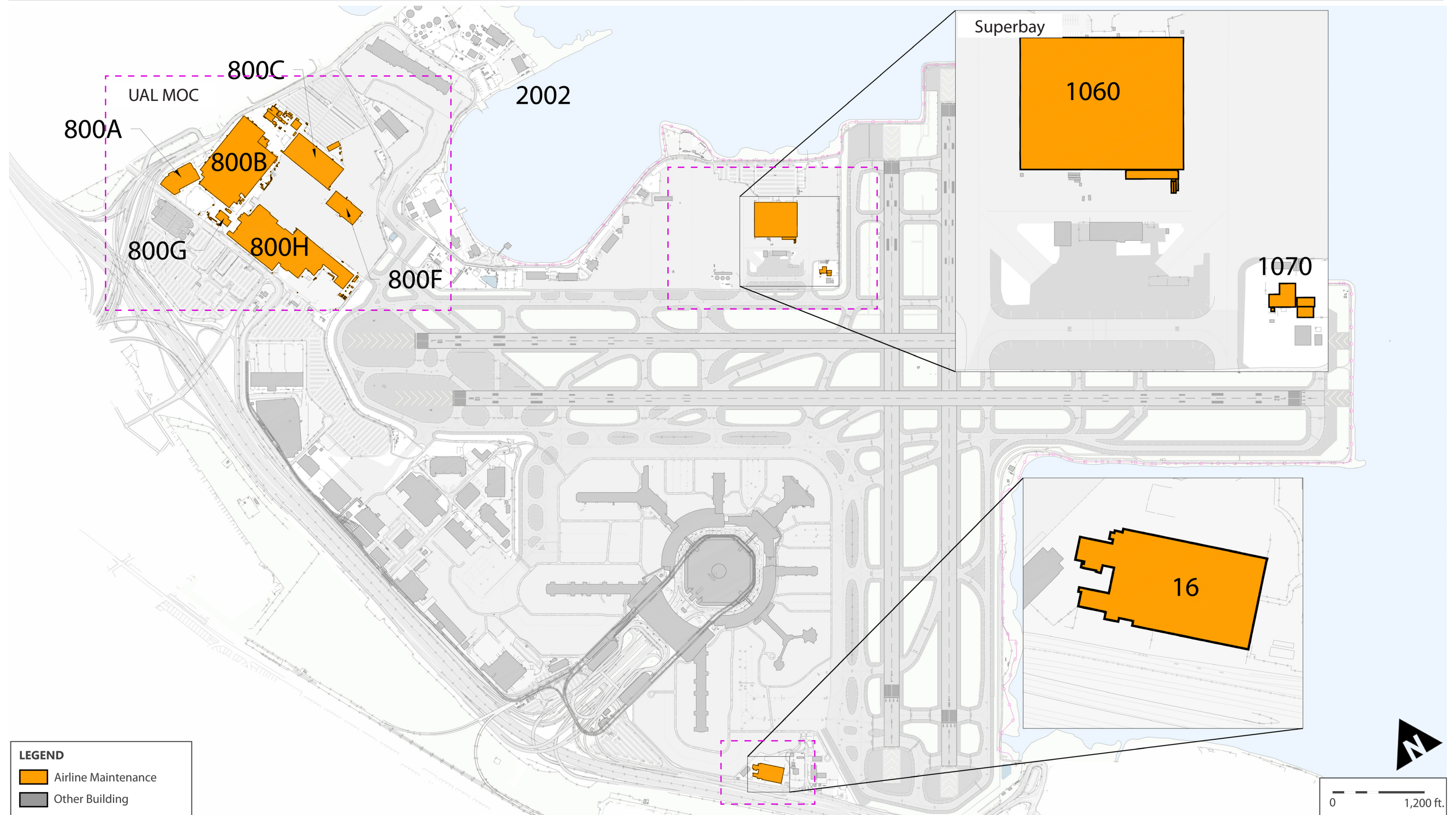
<sup>1</sup> Building 16 has multiple tenants, including non-airline maintenance tenants.

<sup>2</sup> The United Airlines Maintenance Operations Center consists of multiple buildings. The total building footprint (square feet) is provided for the nine largest buildings.

Source: RS&H, October 2014



Exhibit 3.6-16 | Airline Maintenance Facilities



Source: SFO Airport Layout Plan, 2014; RS&H, 2015; Ricondo and Associates, 2016

### 3.6.6 Summary of Support Facilities by Area

The previous sections inventory support facilities by facility type. This section summarizes them by geographic areas of the Airport—South Field, North Field, East Field, and West Field. Understanding the types and uses of adjoining facilities offers an overall planning context for land use planning and assessing the potential linkages between existing support facilities and future needs.

#### 3.6.6.1 South Field

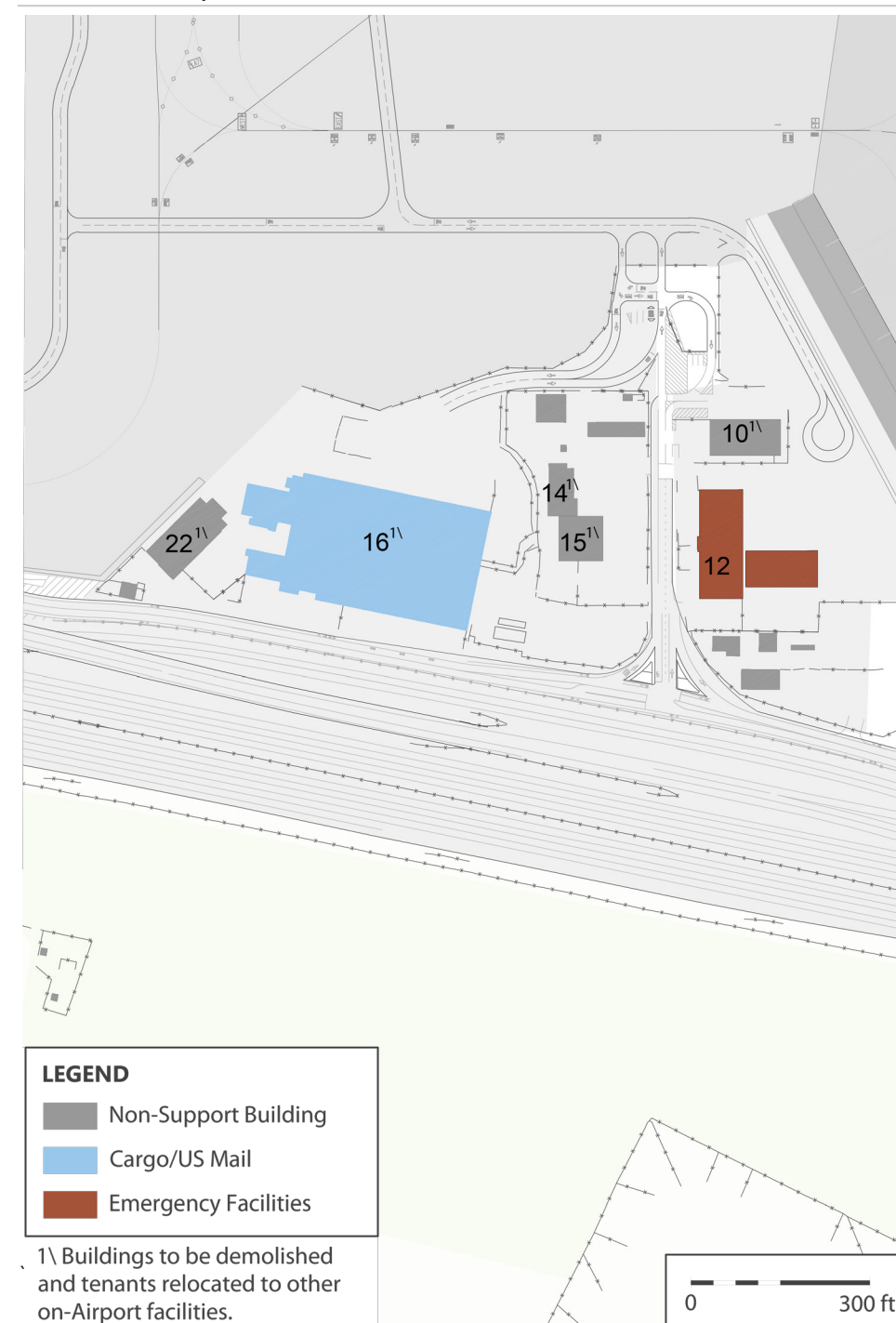
Various projects located in the South Field area include demolition of existing structures. Buildings identified for demolition are currently undersized to effectively serve their purposes, in poor condition, and/or nearing the end of their useful lives. The South Field Redevelopment Project includes the demolition and replacement of Building 12 (ERF #3) and the South Field Checkpoint. The footprint of Building 12 will be paved and included in the Air Operations Area (AOA) for use as an aircraft taxiway.

The remaining buildings in the South Field area would be demolished and their occupants relocated to existing facilities. **Exhibit 3.6-17** depicts the locations of existing support facilities in the South Field.

The remaining buildings slated for demolition and relocation of occupants on-Airport include:

- Building 10 – Airport Sign Shop Annex (Building 10 Demolition Project)
- Building 14 – GTU Office Building (Plot 700 Project)
- Building 15 – GTU Inspection Building (Plot 700 Project)
- Building 16 – TWA Cargo (South Field Cargo Demolition Project)
- Building 22 – TWA Commissary Building (South Field Cargo Demolition Project)

**Exhibit 3.6-17 | South Field Support Facilities**



*Notes: Non-support buildings, shown in grey, are not discussed in this section, but are shown in the exhibit for purposes of land use planning and developing alternatives that include consideration of connectivity and adjacencies by facility types and uses. Building 16 has multiple tenants. The primary use is air cargo; the secondary uses are GSE maintenance and airline maintenance.*

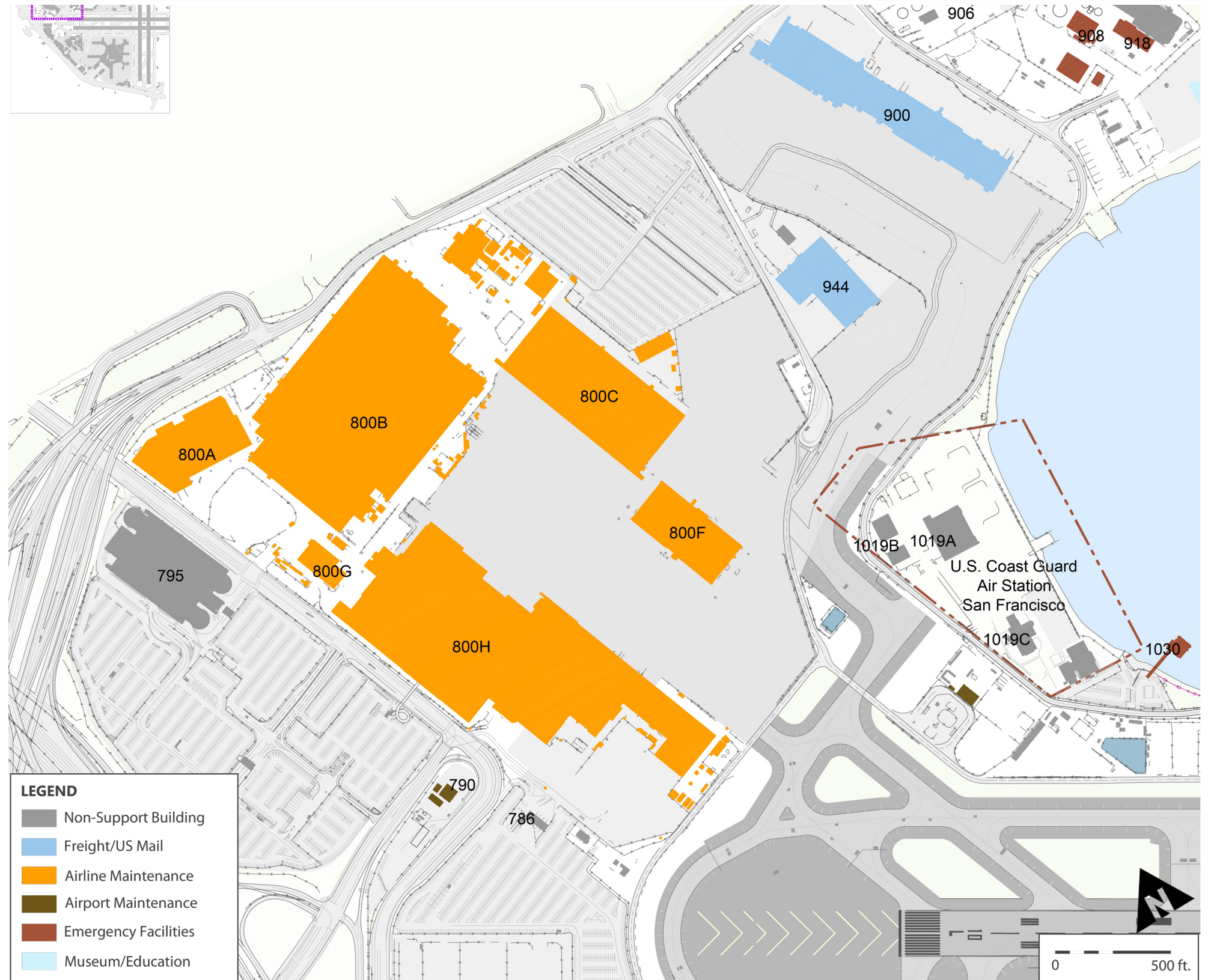
Source: SFO Airport Layout Plan, 2014; RS&H, 2015; Ricondo and Associates, 2016, RS&H, October 2014



3.6.6.2 North Field

**Exhibit 3.6-18** shows the locations of existing buildings in the North Field, which includes both support and non-support buildings. The support buildings in the North Field accommodate a mix of airline maintenance, air cargo, and emergency services.

**Exhibit 3.6-18 | North Field Support Facilities**



*Note: Non-support buildings, shown in grey, are not discussed in this section, but appear on the exhibit for purposes of land use planning and developing alternatives that include consideration of connectivity and adjacencies by facility types and uses.*

Source: SFO Airport Layout Plan, 2014; RS&H, 2015; Ricondo and Associates, 2016, RS&H, October 2014

### 3.6.6.3 East Field

**Exhibit 3.6-19** depicts the locations of existing buildings in the East Field, which include both support and non-support buildings. The support buildings in the East Field primarily accommodate GA, depicted in green on **Exhibit 3.6-19**. The other uses are the U.S. Coast Guard Air Station (which is adjacent to SFO property and is not included in the ADP), Airport administration, and airline maintenance.

**Exhibit 3.6-19 | East Field Support Facilities**



*Notes: Non-support buildings, shown in grey, are not discussed in this section, but appear on the exhibit for purposes of land use planning and developing alternatives that include consideration of connectivity and adjacencies by facility types and uses.  
Building 1070 has multiple tenants. The primary use is GSE maintenance; the secondary use is Airport maintenance.*

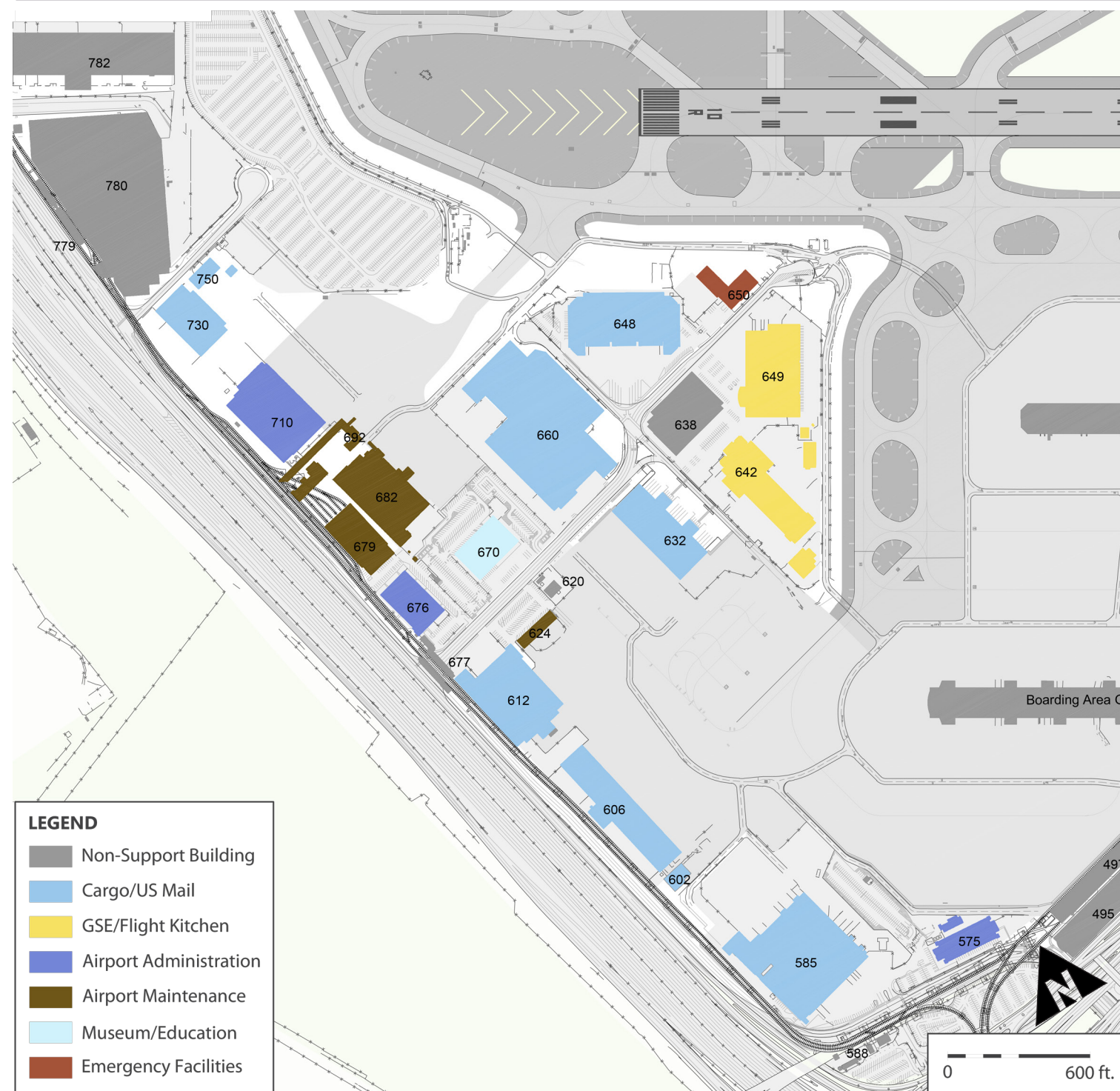
Source: SFO Airport Layout Plan, 2014; RS&H, 2015; Ricondo and Associates, 2016, RS&H, October 2014



## 3.6.6.4 West Field

**Exhibit 3.6-20** depicts the locations of existing buildings in the West Field, which include both support and non-support buildings. The support buildings in the West Field accommodate a mix of air cargo, ground handlers, flight kitchens, and Airport administration and maintenance.

Exhibit 3.6-20 | West Field Support Facilities



*Notes: Non-support buildings, shown in grey, are not discussed in this section, but appear on the exhibit for purposes of land use planning and developing alternatives that include consideration of connectivity and adjacencies by facility types and uses.*

*Building 575 has multiple tenants. The primary use is Airport administration; the secondary uses are Airport maintenance and the United Airlines Service Center.*

*Building 606 has multiple tenants. The primary use is air cargo; the secondary use is Airport maintenance.*

*Building 612 has multiple tenants. The primary use is air cargo; the secondary use is Airport administration.*

*Building 710 has multiple tenants. The primary use is Airport administration; the secondary use is air cargo.*

Source: SFO Airport Layout Plan, 2014; RS&H, 2015; Ricondo and Associates, 2016, RS&H, October 2014

### 3.6.7 Ongoing Support Facilities Projects

Several SFO support area projects are considered Ongoing Projects. These projects have been authorized to proceed by the Airport Commission or have been identified by Airport management as needing to be implemented in the near future, subject to Airport Commission and other necessary approvals. The ongoing support area projects are in various stages of planning, programming, design, or construction. Appropriate environmental reviews, as required under CEQA or NEPA, are completed, in process, or will be conducted. These projects are proceeding, or will proceed if approved, irrespective of any ADP Projects and do not address long-term demands and capacity needs. The following sections describe each ongoing support area project to provide a comprehensive understanding of the inventory.

#### 3.6.7.1 South Field

**Airport Hotel and AirTrain Station:** The Airport Hotel project (see **Exhibit 3.6-21**) will construct a new 350-room full-service hotel south of the interchange of U.S. 101 and the Airport entrance road. The hotel will be financed, constructed, and owned by the Airport and will be managed, operated, and maintained by Hyatt Corporation.

The hotel will include a new AirTrain station and pedestrian platform (see **Exhibit 3.6-22**) that measures approximately 14,100 square feet. A platform on an upper floor of the hotel will provide hotel guests with a direct pedestrian link to the new AirTrain station. The connection will allow guests originating in the San Francisco Bay Area to access the hotel via BART and the AirTrain.

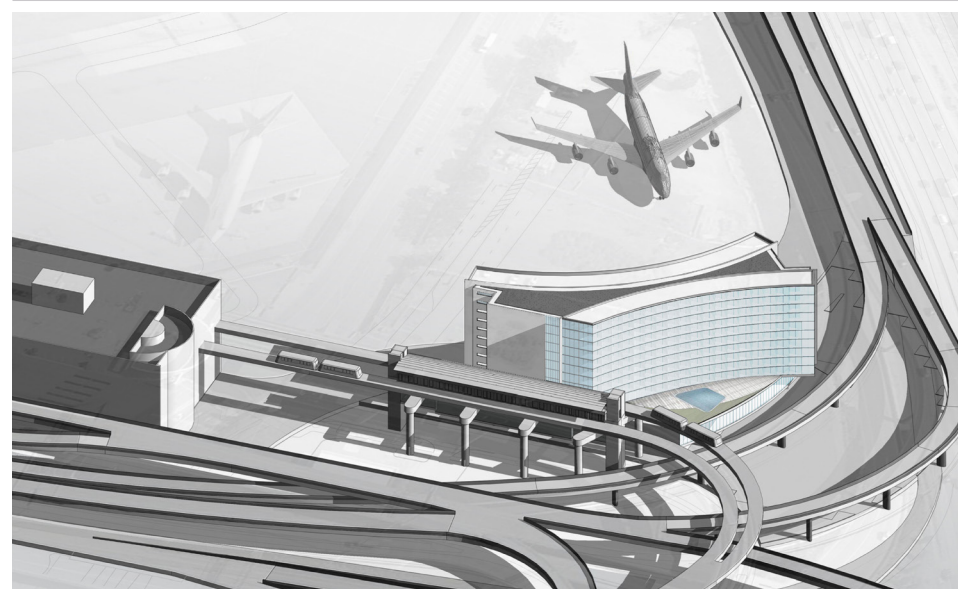
**ERF #3:** This project will construct a new facility that would include six apparatus bays, emergency response elements, administrative space, and living quarters. The existing ERF #3 (Building 12) will be demolished.

**South McDonnell Road Realignment and RON Parking:** South McDonnell Road will be realigned to enable the expansion of the B/A A RON ramp in the South Field. To better accommodate existing and near-term close-in RON demand, the ramp will accommodate six narrowbody or three widebody aircraft positions, as depicted in **Exhibit 3.6-23**. The relocated South McDonnell Road will provide vehicle access to the new Airport Hotel.

#### 3.6.7.2 North Field

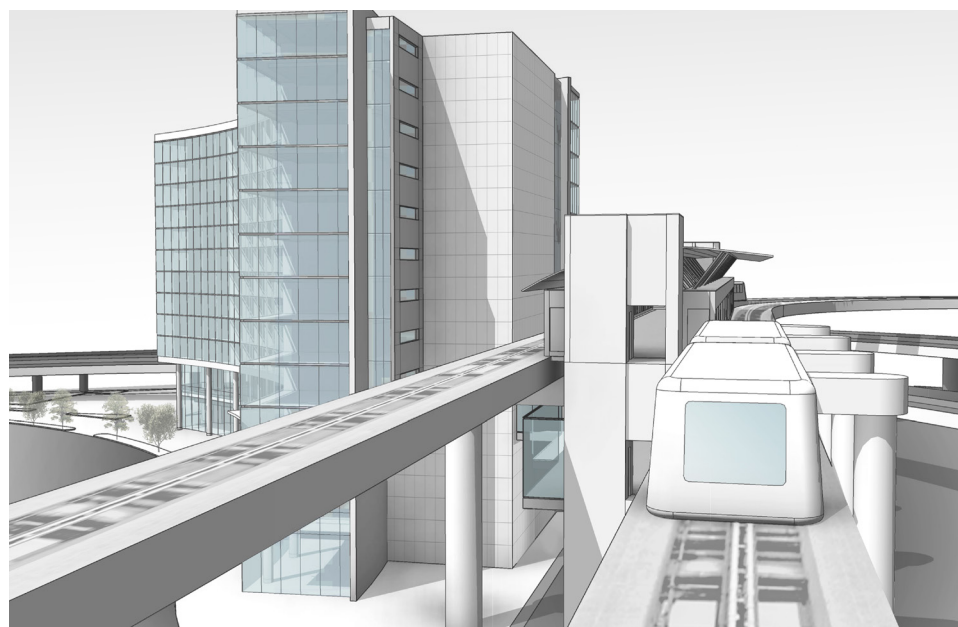
**Ground Transportation Unit Redevelopment Project:** This project will relocate and consolidate GTU facilities to Plot 700 in the North Field. The Radio Shop, bus parking, and fueling station will be relocated to this site, as shown in **Exhibit 3.6-24**.

**Exhibit 3.6-21 | New Airport Hotel and AirTrain Station, South Perspective**



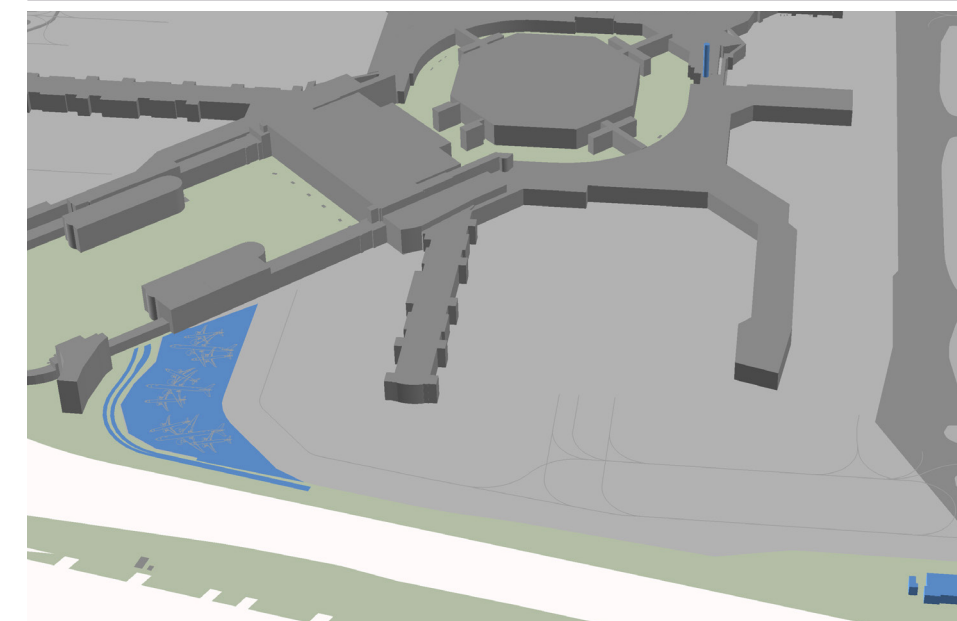
Source: The City and County of San Francisco Airport Commission, August 2015

**Exhibit 3.6-22 | Airport Hotel and AirTrain Station, East Perspective**



Source: The City and County of San Francisco Airport Commission, August 2015

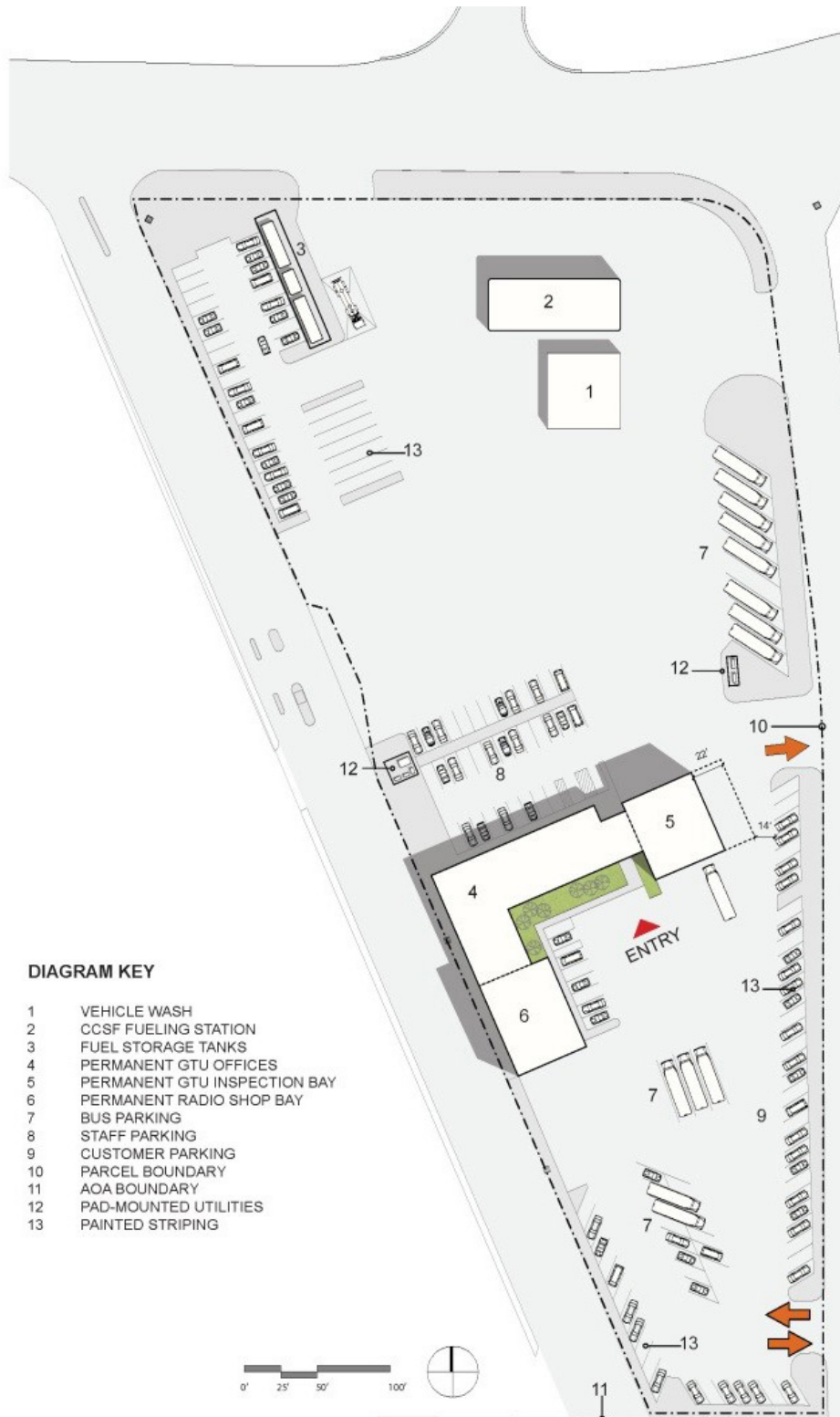
**Exhibit 3.6-23 | South Field Ongoing Projects**



Source: SFO Airport Layout Plan, 2014; Landrum & Brown, Inc., March 2016



Exhibit 3.6-24 | GTU Redevelopment Project



Source: GTU Relocation Project, MWA Architects and Paulett Taggart Architects, February 2016

### 3.6.7.3 East Field

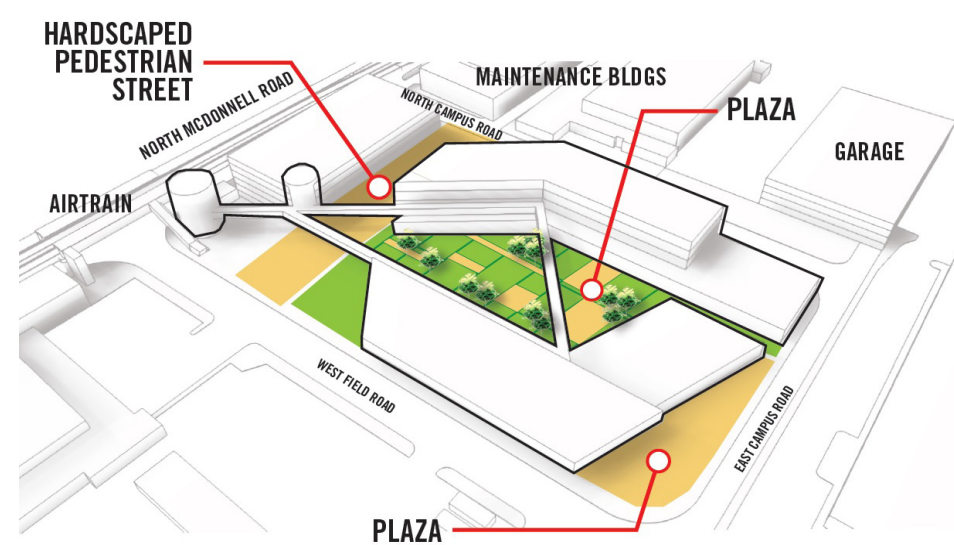
**Superbay Hangar Fire and Life Safety Systems Improvements:** This project will replace the fire suppression system and associated utilities within the Superbay Hangar. Improvements will provide abatement of asbestos and other hazardous materials from the Superbay Hangar.

**Relocate Fire Suppression Tanks:** This project will relocate the existing fire suppression tanks north of Taxiway C from near the Superbay Hangar to an area east of the Superbay Hangar Extension.

**Materials Testing Lab:** This project will replace the existing deteriorated materials testing lab trailer group with new ground-up lab structure.

**Police Training Range Improvements:** This project will replace the existing deteriorated facilities with public safety training and range facilities in the East Field area. The new facility would include new offices, indoor training classrooms, restroom facilities, gun cleaning/storage, K-9 facilities, and associated site improvements.

Exhibit 3.6-25 | Consolidated Administration Campus



Source: San Francisco International Airport

### 3.6.7.4 West Field

**Consolidated Administration Campus:** The CAC is a multiphase project that will accommodate office space for SFO Commission employees, as depicted in **Exhibit 3.6-25**. An employee parking structure located along North McDonnell Road will also be provided. The CAC will be adjacent to the West Field Road AirTrain Station, near the intersection of North McDonnell Road and West Field Road. This project will demolish the Jason Yuen Architecture & Engineering Building (Building 676) and the Airport Museum warehouse (Building 670). A new CAC central utility plant will be designed and constructed to supply energy to the facilities.

**High-Speed Gate Checkpoint:** The new High-Speed Vehicle Gate Security Checkpoint Project will upgrade existing vehicle checkpoints with new and more robust security features. Specifically, the project will install high-speed gates and crash barriers at the North Field, West Field, and Romeo Checkpoints. The scope of work also includes security fence infill, revised striping, new traffic loops, and the integration of the new security elements within the existing access system. The upgraded system will improve security access and provide consistency across the various checkpoints.

**West Field Cargo Facility:** The West Field Cargo Facility will be a two-level cargo facility totaling approximately 220,000 square feet with employee parking. Construction of the West Field Cargo Facility would replace Buildings 585, 602, 606, and 612 and require the demolition of Buildings 602, 606, and 612, which are in poor condition. Landside areas around the buildings would be used primarily to accommodate truck docks and storage.

**Demolish Aging West Field Cargo Buildings:** Aging Cargo Buildings 602, 606, and 612 in the West Field are at the end of their useful lives and would be demolished. Cargo tenants would be relocated to the new West Field Cargo Facility.

**Building 730 Conversion to Airline GSE and Airport Maintenance:** Building 730 would be converted from a belly cargo facility into a mixed-use building accommodating the relocation of Airport tenants.

**West Field Parking Garage #2:** An additional parking structure would be constructed in the West Field to accommodate Airport tenants, including federal, concessions, cargo, and airline employees. The parking structure would be located in Plot 11 between the U.S. Postal Service facility (Building 660) and the Airport Maintenance facility (Building 682).

**West Cargo Checkpoint Relocation:** Relocate and provide blast-proofing for the checkpoint guard shack between Building 606 and B/A G.

**West Field GSE Building 624 Replacement:** Demolish existing Building 624 and construct a new facility for GSE use.

The ongoing support area projects located in the North Field, South Field, East Field, and West Field are illustrated in their entirety in **Exhibit 3.6-26**, **Exhibit 3.6-27**, **Exhibit 3.6-28**, and **Exhibit 3.6-29**, respectively.

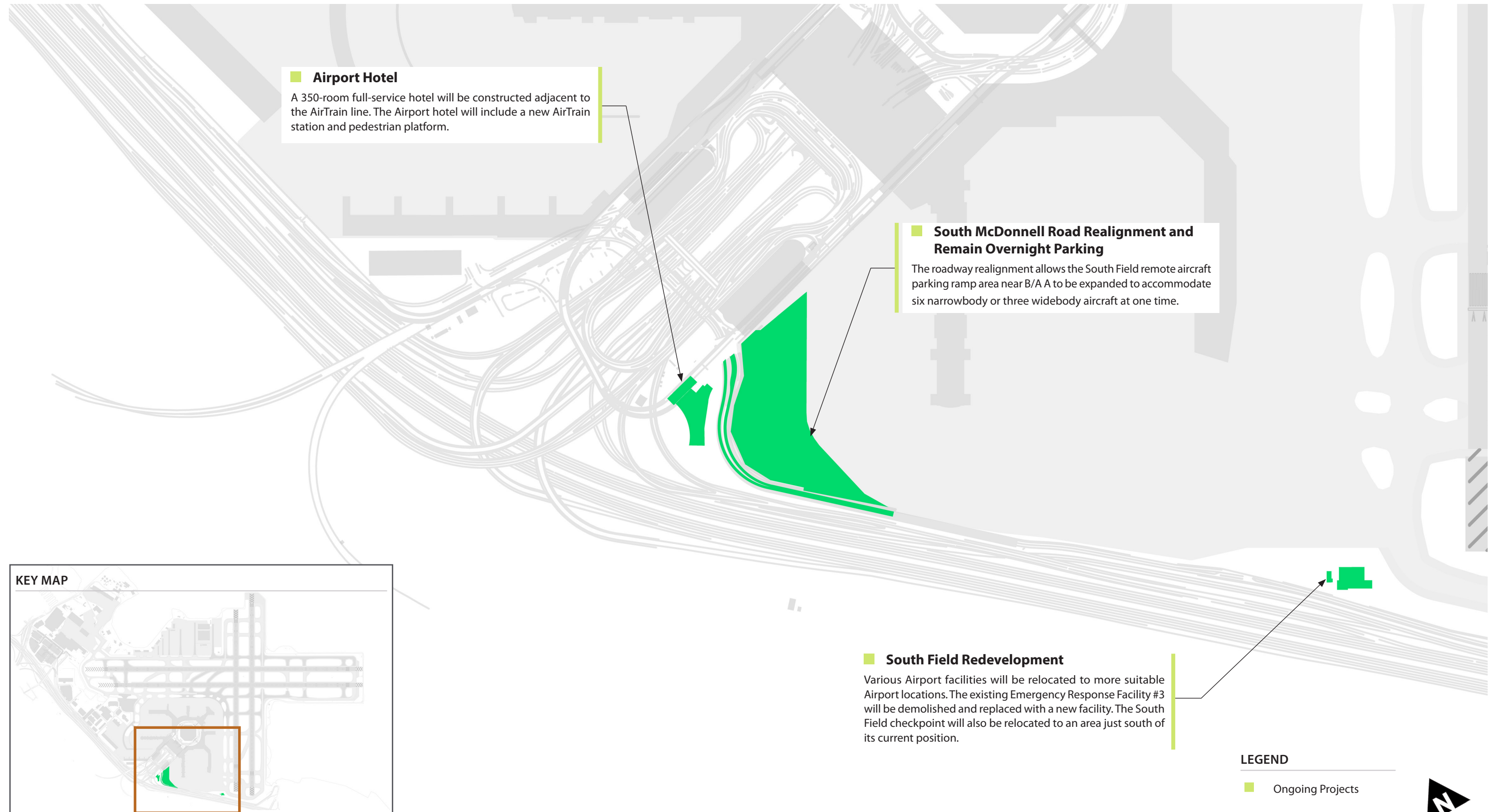
Exhibit 3.6-26 | Ongoing Support Facilities Projects – North Field



Source: SFO Airport Layout Plan, 2014 ; RS&H, October 2015; Landrum & Brown, Inc., June 2016

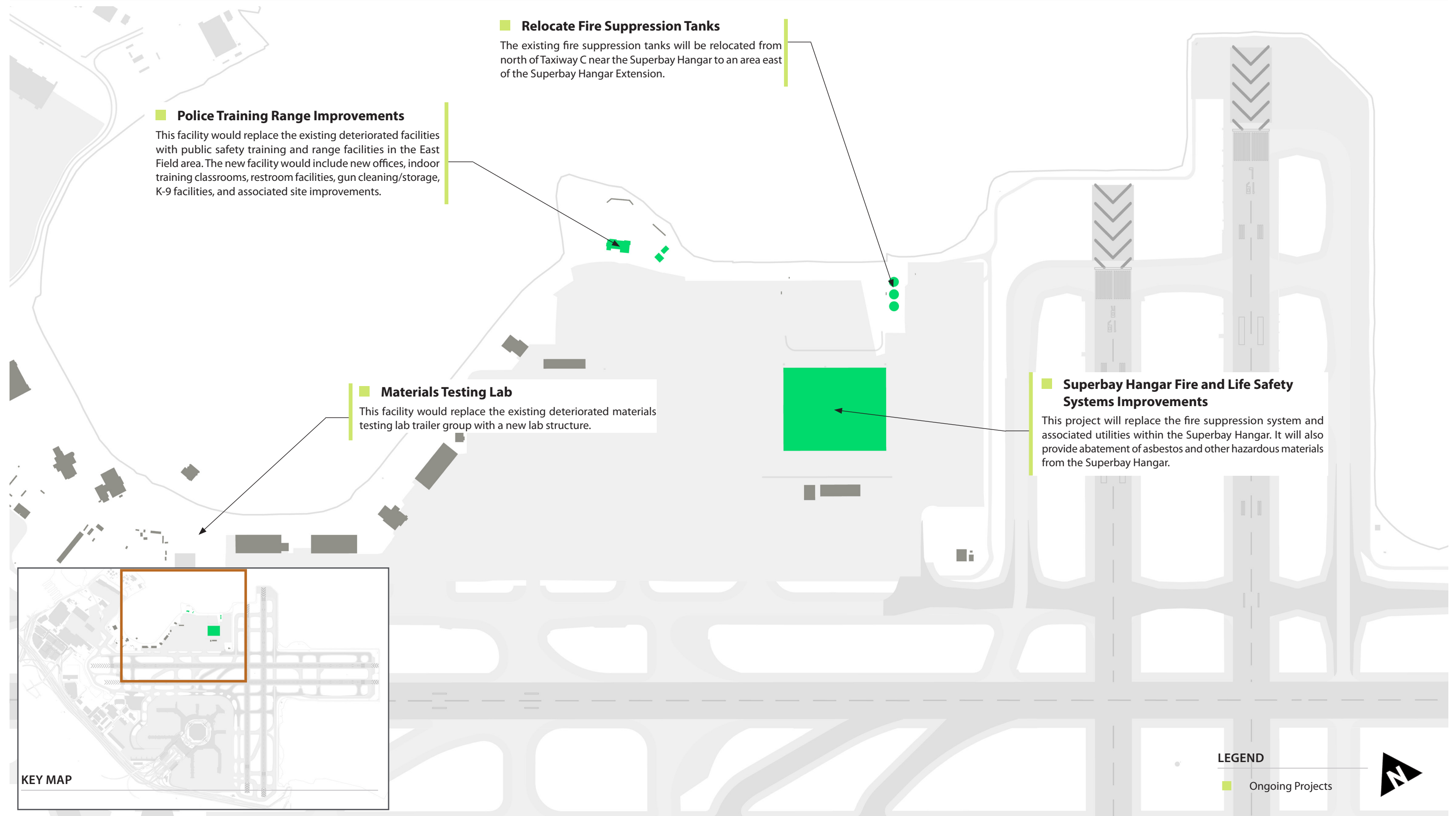


Exhibit 3.6-27 | Ongoing Support Area Projects – South Field



Source: SFO Airport Layout Plan, 2014 ; RS&H, October 2015; Landrum & Brown, Inc., June 2016

Exhibit 3.6-28 | Ongoing Support Facilities Projects – East Field



Source: SFO Airport Layout Plan, 2014; RS&H, October 2015; Landrum & Brown, Inc., June 2016



Exhibit 3.6-29 | Ongoing Support Facilities Projects – West Field

**Ground Service Equipment Maintenance Facility**

Convert Building 730 from a belly cargo facility to a mixed-use building accommodating the relocation of Airport tenants.

**West Field Parking Garage #2**

A new parking garage would be constructed for Airport tenants, including federal, concessions, and airline employees.

**Consolidated Administration Campus**

The Consolidated Administration Campus will accommodate office space and parking for Airport Commission employees.

**West Cargo Checkpoint Relocation**

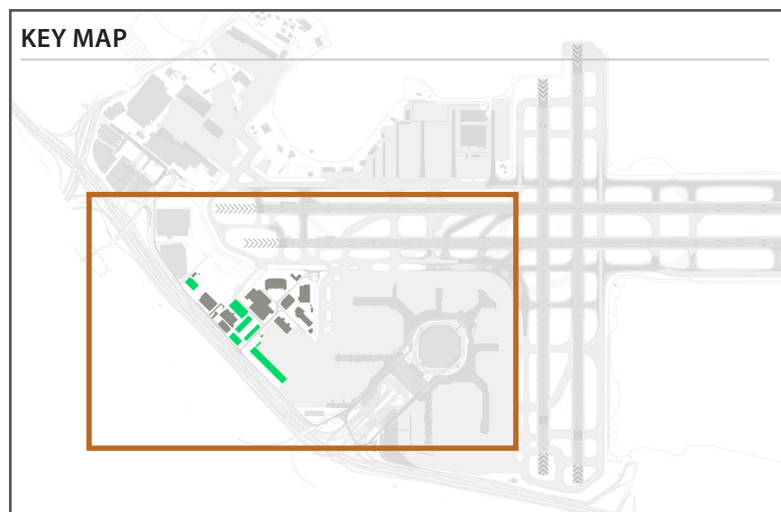
This project would relocate and provide blast-proofing for the checkpoint guard shack between Building 606 and B/A G.

**West Field GSE Building 624 Replacement**

The existing GSE maintenance building is in poor condition. This project would demolish the existing building and replace it with a similar GSE maintenance facility on the same site.

**West Field Cargo Facility**

This two-level cargo building will replace existing cargo buildings that are either in poor condition or being displaced for terminal expansion or Central Utility Plant relocation. Truck docks, employee parking, and equipment storage areas around the building will support the cargo operation.



**LEGEND**

■ Ongoing Projects



Source: SFO Airport Layout Plan, 2014 ; RS&H, October 2015; Landrum & Brown, Inc., June 2016

## 3.7 UTILITIES

SFO utility facilities support the distribution of electricity, fuel, water, waste, and communications throughout the Airport.

Inventories of the following systems are provided:

- Aviation Fuel
- Natural Gas
- Flood Control
- Potable/Fire Water
- Heating, Ventilation and Air Conditioning
- Storm Drainage
- Sanitary Sewer
- Industrial Waste
- Information Technology/Data Communication Infrastructure
- Power Distribution
- Ongoing Utilities Projects

### 3.7.1 Aviation Fuel

The aircraft fueling systems are currently leased and managed by SFO Fuel and operated pursuant to an agreement between SFO Fuel and ASIG and a permit issued by the Airport to ASIG. The current SFO Fuel agreement with ASIG expires in 2026.

The fuel farm at SFO, depicted in **Exhibit 3.7-1**, is located in the North Field, adjacent to the Mel Leong Treatment Plant. The storage capacity of the fuel farm consists of seven tanks ranging in capacity from 10,000 barrels to 75,000 barrels. The total storage capacity at SFO is 315,000 barrels, of which 269,000 barrels are usable.<sup>22</sup> Two 75,000-gallon tanks are dedicated for jet fuel storage and dispensing. This dedicated capacity provides a 3- to 5-day supply for the Airport, depending on the season and air traffic patterns.

In addition to on-site storage, the SFO Fuel Consortium leases backup storage at the nearby Shell storage facility, depicted in **Exhibit 3.7-2**. This offsite storage facility has a capacity of 250,000 barrels, of which 186,000 barrels are usable. The lease for this storage facility expires in 2017. Additional off-site storage at a facility in nearby Brisbane is being considered to address concerns regarding future fuel storage capacity.

The SFO fuel system is fed by a 12-inch Kinder-Morgan supply line, routed under the San Francisco Bay from the Richmond refinery. This is a dedicated line that serves either the Shell storage facility or SFO, but not both. However, if the fuel farm at OAK has a requirement for fuel, the supply to SFO fuel farm is temporarily discontinued. This 12-inch line has a capacity of 86,000 barrels per day.

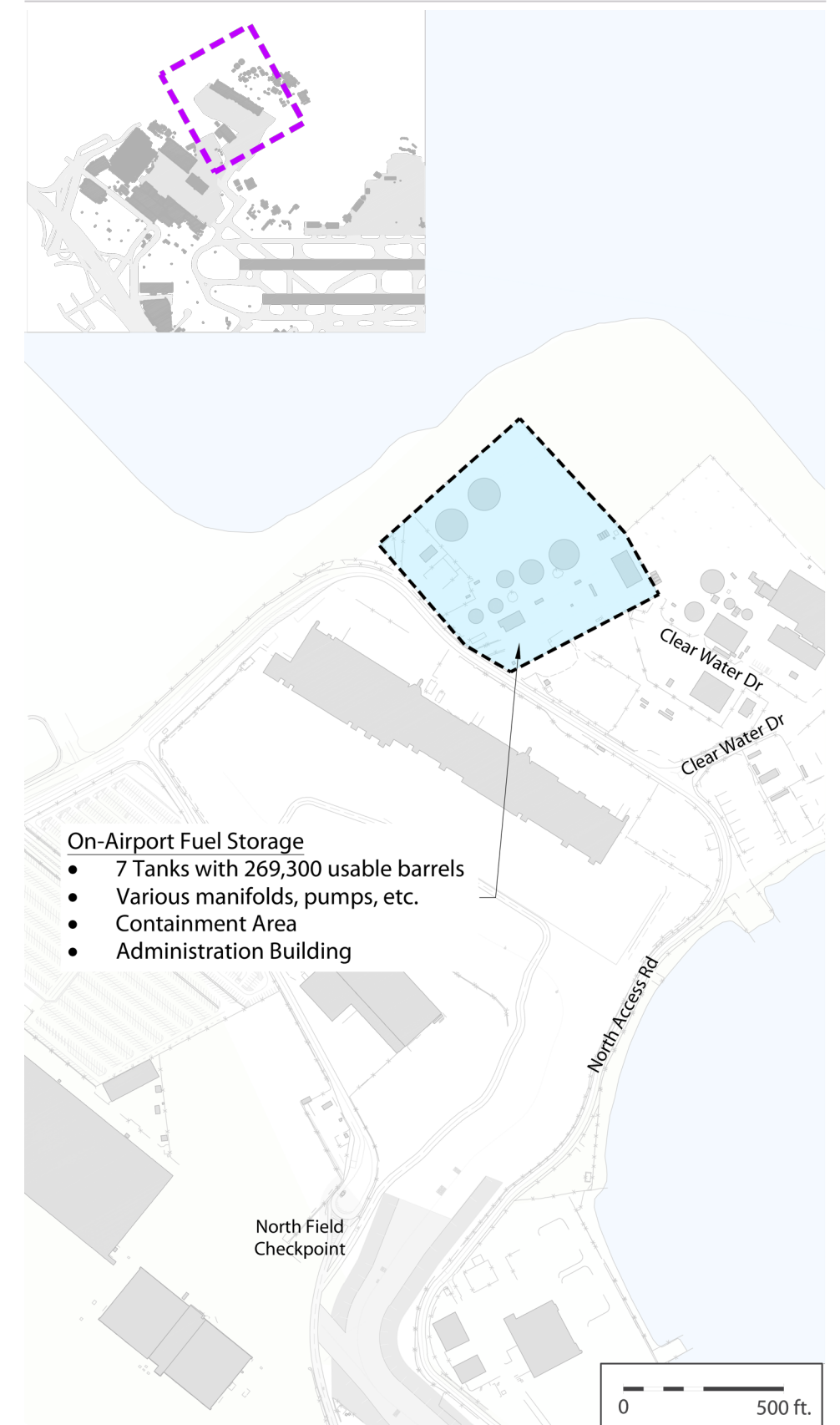
Because the SFO fuel farm is located at the terminus of the 12-inch Kinder-Morgan line, the SFO Fuel Consortium maintains an on-site test laboratory to test the quality of incoming fuel.

Fuel from the fuel farm is distributed to SFO via a 24-inch supply line. The fuel distribution system is served by 10 pumps, each generating 1,000 gallons per minute (gpm) of flow at a pressure of 150–180 pounds per square inch (psi). During average demand periods, four pumps operate to meet fuel flowage demands. During peak demand periods, six pumps operate to meet demand. The pumping system appears to have adequate redundancy and capacity for the existing operation and some future growth.

The distribution system around the terminal complex contains 13 fuel vaults. The on-Airport fuel distribution system is depicted in **Exhibit 3.7-3**.

<sup>22</sup> The reduced usable capacity is the result of the need to maintain a minimum volume in the storage facilities to avoid the introduction of sediments and particulates into the fuel distribution system.

Exhibit 3.7-1 | Fueling Systems – On-Airport Storage



Source: SFO Airport Layout Plan, 2014; RS&H, March 2015; Ricondo and Associates, 2016

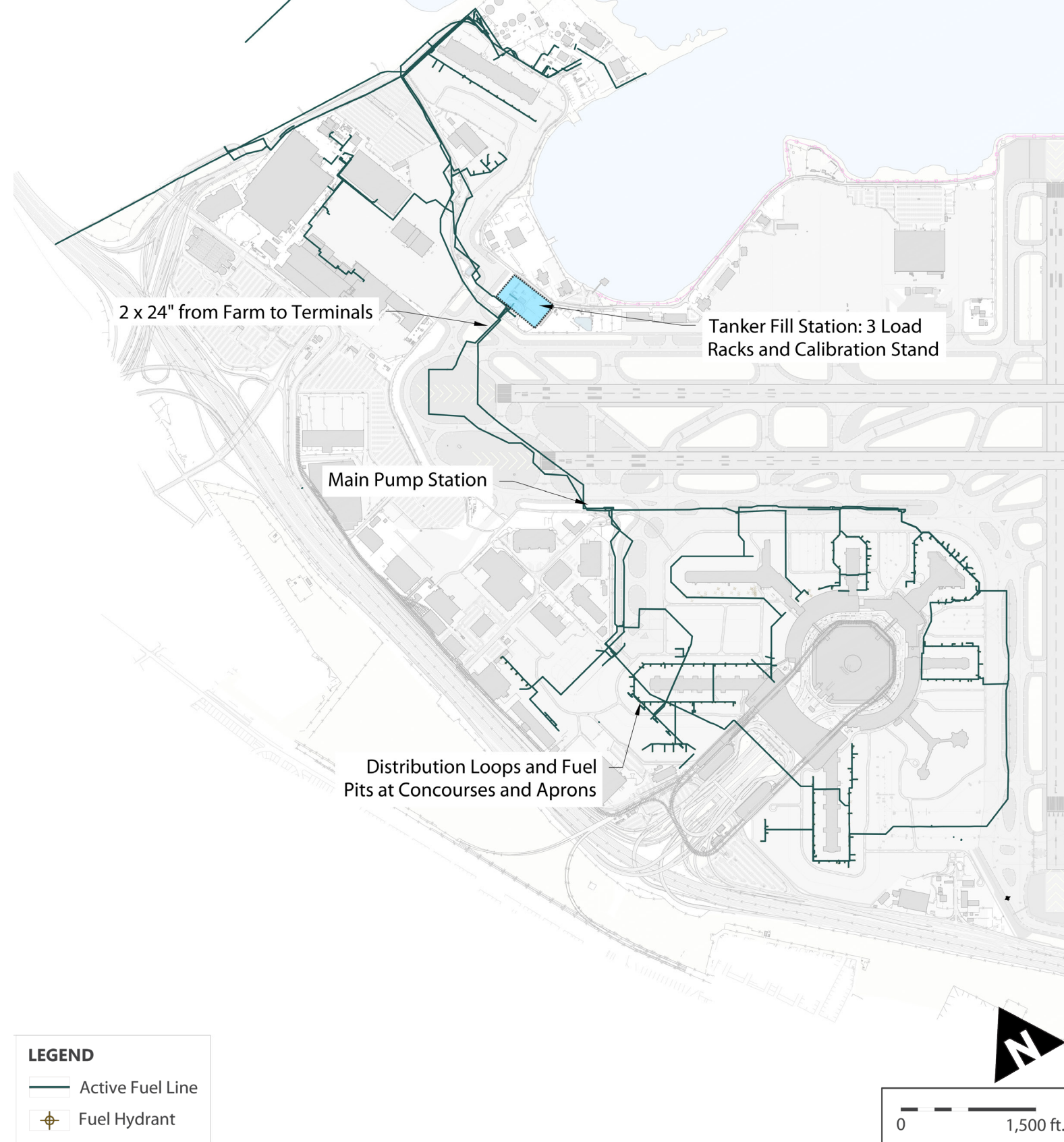


Exhibit 3.7-2 | Fueling Systems – Off Airport Storage



Source: SFO Airport Layout Plan, 2014; RS&H, March 2015; Ricondo and Associates, 2016, Google Earth Aerial, 2015

Exhibit 3.7-3 | Fueling Systems – On Airport Distribution System



Source: RS&H, SFO Infrastructure Information Management, Aviation Fueling System, September 2014; Ricondo and Associates, 2016



### 3.7.2 Natural Gas

Two high-pressure natural gas main lines from the Pacific Gas and Electric Company (PG&E) provide service to SFO. One 20-inch main connects north of San Bruno Avenue along South Airport Boulevard. One 16-inch main connects west of the U.S. 101 interchange just east of Santa Helena Avenue. **Exhibit 3.7-4** depicts the natural gas supply and distribution system. The total natural gas consumption from June 2013 to June 2014 was 2,936,584 therms or 3 billion British thermal units (Btus).

Exhibit 3.7-4 | Natural Gas System



Source: SFO Utilities Map, Natural Gas System, September 2014; RS&H, 2014; Ricondo and Associates, 2016



### 3.7.3 Flood Control

The Airport is surrounded on three sides by approximately 8 miles of shoreline. Based on information obtained from the Shoreline Protection Study, this 8-mile shoreline is divided into 12 different reaches. Each reach maintains a consistent shoreline levee or structural features that protect from wind and storm surge. Numerous system deficiencies were identified in the Shoreline Protection Study when the system was evaluated following the levee certification requirements listed in 44 CFR 65.10. The levees were evaluated using crest elevation, closures, embankment protection, embankment and foundation stability, and interior drainage. A summary of the deficiencies is provided in **Table 3.7-1**. Refer to the Shoreline Protection Study<sup>23</sup> for additional information. **Exhibit 3.7-5** depicts the Shoreline Protection System by reach.

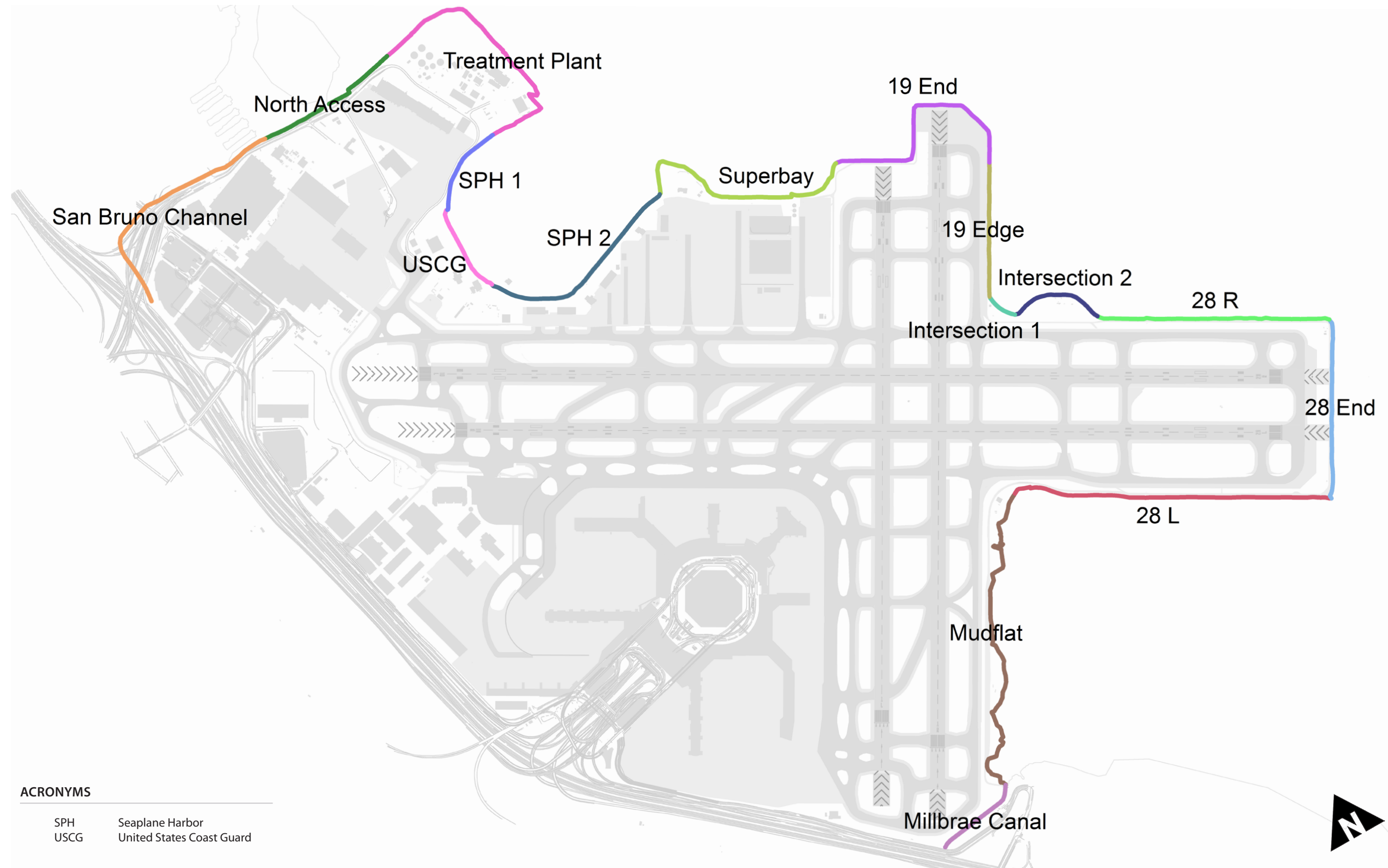
<sup>23</sup> SFO Shoreline Protection Feasibility Study Evaluations and Recommendations Report, Moffatt & Nichol + AGS Joint Venture, June 2015.

**Table 3.7-1 | Shoreline Protection System Deficiencies**

Reach	Crest Elevation			Closure	Embankment Protection	Foundation Stability
	Gaps	Freeboard	Settlement			
San Bruno Channel				●		
Treatment Plant		●				
Seaplane Harbor 1	●	●				
Coast Guard		●				
Seaplane Harbor 2	No Deficiencies Identified					
Superbay	●					
19 End	●	●			●	●
19 Edge			●			
Intersection 1		●				
Intersection 2					●	
28R	●					
28 End			●			
28L	●	●				
Mudflat	●	●				
Millbrae Canal						
<b>Other Flood Protection Elements</b>						
Additional Area	Deficiency					
Bayshore Freeway	No Deficiencies Identified — Coordination with Caltrans Recommended					
Interior Drainage	Backup Power Source Required					

Source: SFO Shoreline Protection Feasibility Study Evaluations and Recommendations Report, Moffatt & Nichol + AGS Joint Venture, June 2015.

Exhibit 3.7-5 | Shoreline Protection System



ACRONYMS

SPH	Seaplane Harbor
USCG	United States Coast Guard

Source: SFO Shoreline Protection Feasibility Study Evaluations and Recommendations Report, Moffatt & Nichol + AGS Joint Venture, June 2015.



### 3.7.4 Potable/Fire Water

The water supply infrastructure at SFO conveys both domestic water and fire water to the facilities located throughout the Airport (see **Exhibit 3.7-6**). The San Francisco Water Department supplies SFO from the Hetch Hetchy Aqueduct System through the Crystal Springs and San Andreas Reservoirs.

The SFO water supply system is connected to the regional water supply in two locations via three supply mains.

Water Main #1, a 24-inch supply main, runs east-west across U.S. 101 from Cedar Street to South McDonnell Road. The supply main originates from the 60-inch Crystal Springs Line No. 2 along the north side of El Camino Real, then turns east at Santa Paula Avenue and north along Bay Street.

Two 24-inch water supply lines cross U.S. 101 north of the terminal complex. Water Main #2 originates from the 60-inch Crystal Springs Line No. 2 along the north side of El Camino Real, then runs along San Felipe Avenue, crossing U.S. 101 near West Field Road.

Water Main #3 was added to the system to provide a third supply connection for SFO. A 12-inch main running from the 44-inch Crystal Springs Line No. 1. along San Felipe Avenue, turning north along the Caltrain and BART tracks, was extended with a 24-inch section running east from north of Lions Park under U.S. 101 to a point near Building 730.

The SFO system consists of a steel or ductile iron pipe network ranging in size from 4 to 24 inches. The system maintains a water pressure of 125 psi to 131 psi and the current average water demand is about 1.3 million gallons per day (MGD).

The SFO water supply system provides both domestic water and fire water supply through the same system of pipes. This requires the water lines to be sized for a peak fire protection flow. As a result, these lines are oversized relative to the domestic daily water demand, resulting in low flow velocities and generally stagnant water in the water lines. The overall water quality in this system is poor as a result.

To address this issue, SFO Utilities flushes the system on a regular basis and continually samples the domestic supply at multiple locations to ensure that all water quality requirements are maintained.

Exhibit 3.7-6 | Potable/Fire Water Supply System



Source: SFO Utilities Map, Potable Water System, September 2014; RS&H, 2014; Ricondo and Associates, 2016

### 3.7.5 Heating, Ventilation and Air Conditioning

Mechanical systems throughout the Airport vary by facility location and type. Many of the outlying facilities have their own stand-alone mechanical systems. These types of systems would be included as part of the local design of the water boilers and chillers and would not affect the capacity requirements of the Central Utility Plant (CUP).

Terminals 1, 2, 3, and the ITB are served by the CUP, which includes a cooling plant with four centrifugal chillers that provide approximately 15,000 tons of installed cooling capacity. The CUP is currently undergoing chiller replacements that will increase the installed capacity of the plant to 19,000 tons. The current maximum peak cooling demand for the CUP is 11,000 tons. Chilled water is distributed from the CUP via a primary/secondary/tertiary pumping system.

Heating for the terminals is provided by four natural gas fired boilers. These boilers provide high-temperature (300 degrees Fahrenheit), high-pressure (300 psi-gauge pressure) water. The boilers provide a total installed heating capacity of approximately 150 million Btus per hour. The boilers were refurbished or replaced between 2007 and 2009.

Chilled water piping and hot water piping are routed in a network loop around the Central Parking Garage via a tunnel system, with individual connections to a tertiary pump room in each terminal. The existing pumps, piping, and heat exchangers are in excellent condition.

The cooling towers for the CUP are located on the top level of the Central Parking Garage. The cooling towers have undergone recent renovations to improve efficiency and reduce water consumption. The current cooling tower capacity is adequate for approximately 13,680 tons of connected chiller capacity. There are no current plans to increase cooling tower capacity.

An existing low-temperature chilled water plant, for providing preconditioned air (PCA) to aircraft parked at the gates, is located in the ITB. This central chilled water plant is being phased out as SFO transitions to point-of-use PCA units installed at each gate.

The CUP is located on the ground level of the Central Parking Garage. This current location has adequate access points for equipment maintenance and replacement. However, the location of these access points requires a significant disruption of surface transportation traffic flows around the Central Parking Garage when any large-scale maintenance or replacement projects are implemented.

Additionally, the location and footprint of the CUP, depicted in **Exhibit 3.7-7**, are not conducive to future expansion without major disruption to the existing configuration and use of the Central Parking Garage.

Based on the SFO requirement for all new buildings to have a LEED Gold certification, the current chilled water and hot water capacity of the CUP is adequate to serve any future heating and cooling needs. The cooling tower system may require an increase in capacity depending on future growth. However, the SFO Carbon Neutrality initiatives may require replacement and/or relocation of the existing CUP because the current configuration of chillers and natural gas fired boilers is not conducive to meeting the objectives of those initiatives.

**Exhibit 3.7-7 | Central Utility Plant**



Source: RS&H, November 2014; Ricondo and Associates, 2016



### 3.7.6 Storm Drainage

The SFO basin area is approximately 2,100 acres in size and is divided into eight separate sub-basins, as shown on **Exhibit 3.7-8**. The majority of the basin area is impervious. The limited pervious areas are mainly located airside between the runways and taxiways.

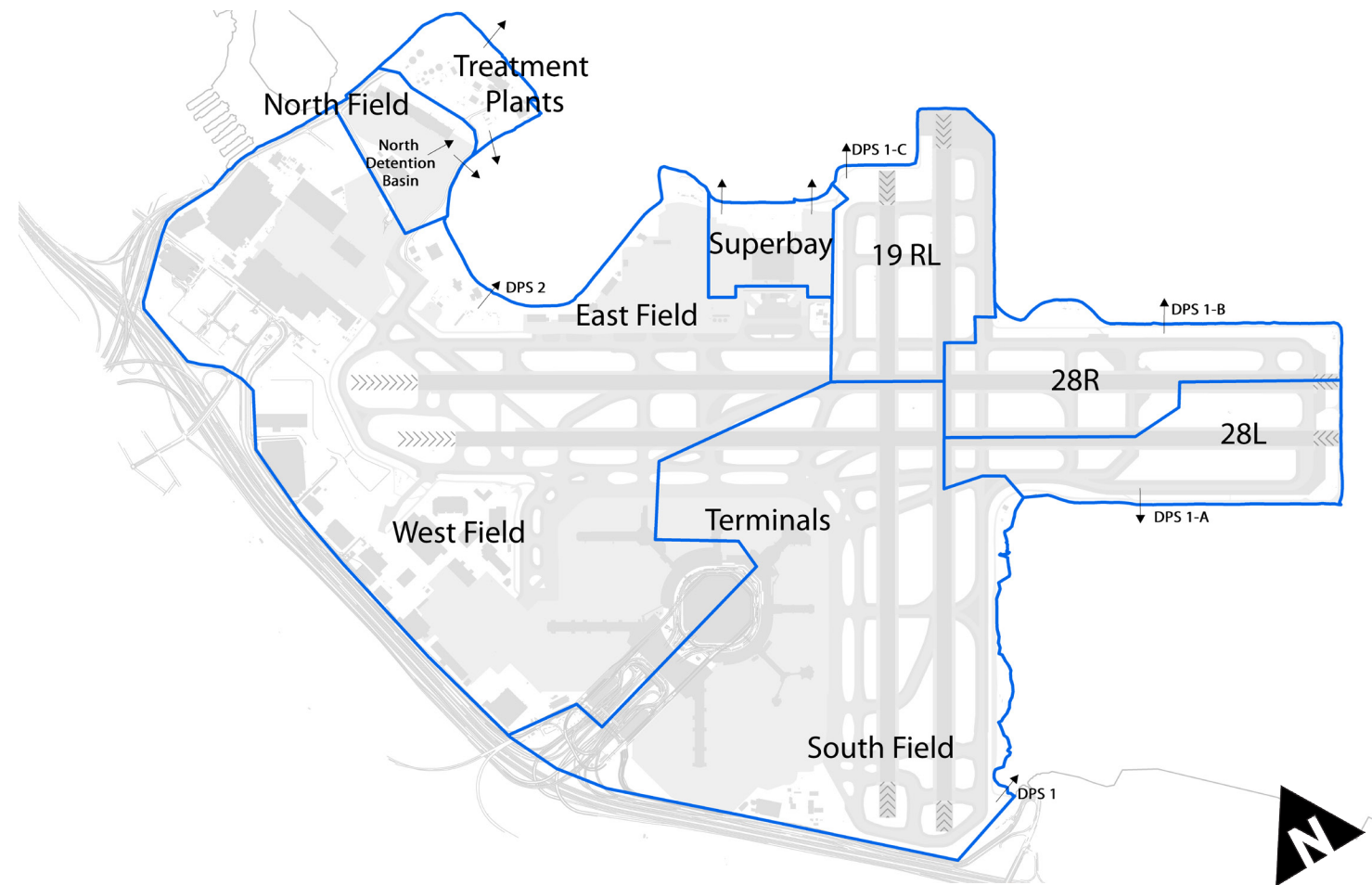
Stormwater from both the airside and landside areas is collected through a series of inlets and collection pipes. The collection pipes vary in size and materials, such as vitrified clay, cast iron, steel, or ductile pipe. The majority of the conveyance for the system is gravity; however, 19 major pump stations are included in the stormwater system.

The elevation of SFO is low and flat, with an average site elevation about 2.5 feet above the mean high tide elevation of San Francisco Bay. This requires that stormwater is discharged to the outfall locations via a stormwater pump station. With sea level rise projected, SFO is working to raise the stormwater outfall pipes to maintain a positive discharge to the Bay. These outfall modifications are being incorporated into ongoing system upgrades and are not listed as a separate capital project.

The first flush of a rainfall event carries a higher concentration of pollutant loading in the runoff from the impervious areas of each basin. Four detention basins divert the first flush of a rainfall event to the Industrial Wastewater Treatment Plant (IWTP). One detention facility is located in each of the following basins: North Field Cargo Basin, East Field Basin, West Field Basin, and South Field Basin.

Similar to the sanitary system, the stormwater system has multiple leaks and points of infiltration resulting from settlement and age. SFO management has implemented a capital project to inventory the pipe networks, identify leaks, and prioritize the required repairs.

Exhibit 3.7-8 | SFO Drainage Sub Basins



Note: DPS = Drainage Pump Station

Source: SFO Underground Utility Modeling: Study and Improvements, Storm Drainage System Technical Memorandum, May 2000

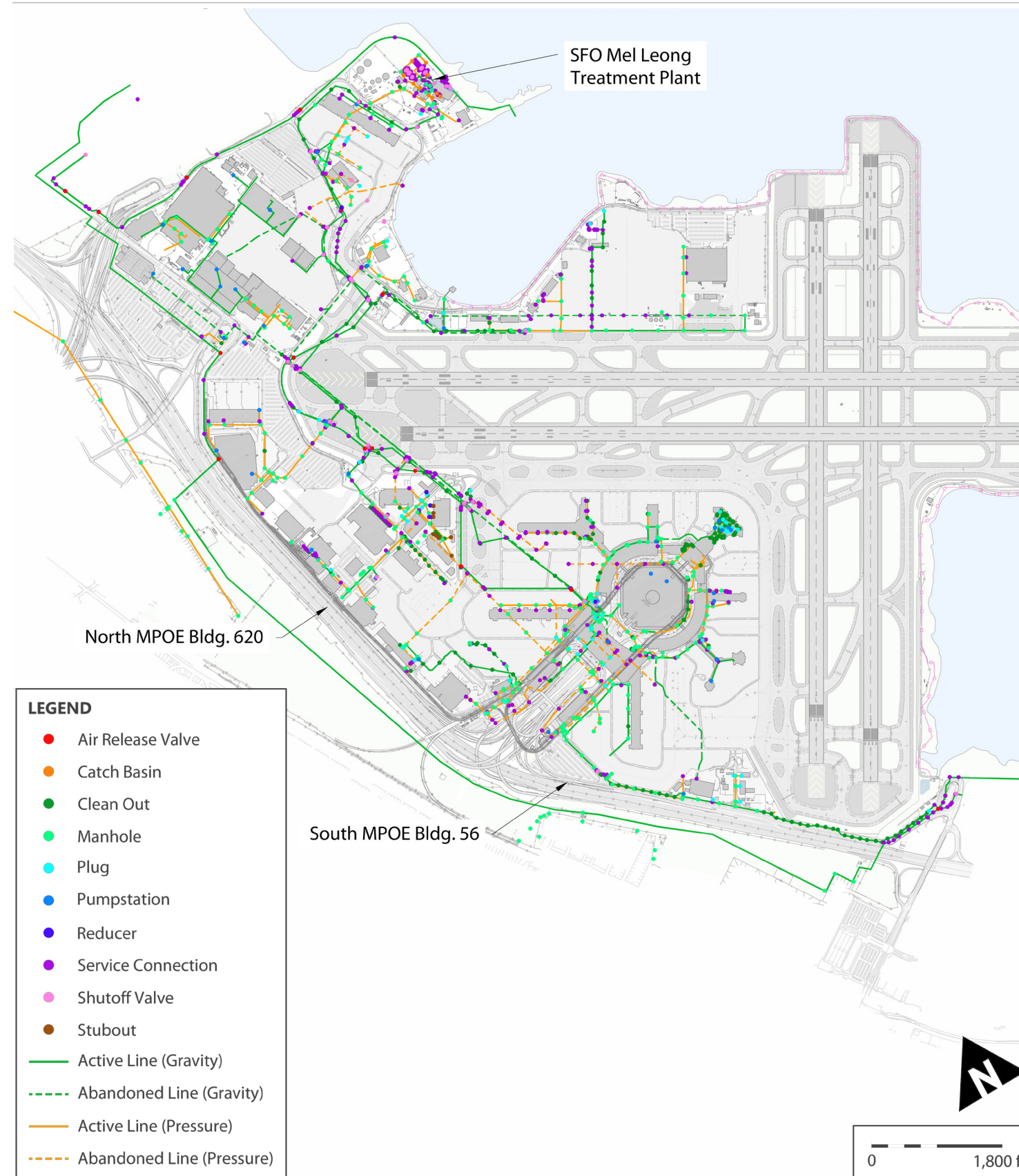
### 3.7.7 Sanitary Sewer

Sanitary sewage at SFO is collected and treated on-site at the Sanitary Waste Treatment Plant (SWTP) located in the north field area at the Mel Leong Treatment Facility. **Exhibit 3.7-9** depicts the layout and location of the SWTP and the sanitary waste transfer systems. As a result of the low, flat elevation throughout SFO, the sanitary system uses lift and pump stations to reach the treatment facility.

The SFO sanitary treatment facility (or water quality control treatment plant) is located directly adjacent to the industrial waste treatment facility. The Mel Leong Treatment Plant treats and discharges both the sanitary and industrial treatment processes. The sanitary treatment uses sequencing batch reactors to treat up to 4.4 MGD at peak flows. The solids are separated and the dried sludge is removed and hauled to a landfill. A portion of treated effluent is used as reclaimed water. The remaining effluent is pumped to the North Bayside System Unit, where the effluent is combined with effluent from surrounding municipalities for dechlorination and deepwater discharge into the Bay.

As a result of settlement and aging infrastructure, groundwater infiltrates into the sanitary system. The brackish water cannot be removed through the existing system and renders the reclaimed water unusable for many applications. To eliminate infiltration, the existing infrastructure will need to be reexamined and replaced as necessary.

Exhibit 3.7-9 | Sanitary Sewer System



Source: SFO Utilities Map, Sanitary Sewer System, September 2014, ; RS&H, 2014; Ricondo and Associates, 2016



### 3.7.8 Industrial Waste

Industrial waste is collected and treated on-site at the IWTP located in the north field area at the Mel Leong Treatment Facility. Industrial waste is collected and conveyed to the IWTP through a network of gravity and pressure pipes. Industrial waste is generated mainly by aircraft maintenance, car washing, wash racks, and other general cleaning required throughout the Airport. **Exhibit 3.7-10** shows the layout and location of the IWTP and wash racks associated with the industrial waste systems.

SFO has been producing and using recycled water at the Airport for irrigation, as well as washdown in and around the Mel Leong Treatment Plant. In addition, SFO has a recycled water truck fill station at the Mel Leong Treatment Plant, which is used to control dust and for street sweeping. The anticipated capacity of recycled water at the Industrial Wastewater Treatment Plant will be approximately 1.0 MGD for use in nonpotable applications, such as fixture flushing and landscape irrigation.

With a goal of expanding its recycled water program, SFO management began the master planning process and the final report, *SFO Recycled Water Master Plan*, was completed in December 2014 by Kennedy/Jenks Consultants. Although an underground supply is not currently provided from the Mel Leong Treatment Plant to the Airport, SFO management has included the near term phase of the Recycled Water Master Plan within the Airport Capital Improvement Program. In addition, new facilities being constructed have been designed to accommodate both a potable and a recycled water connection. The facility would be connected to recycled water when it comes online.

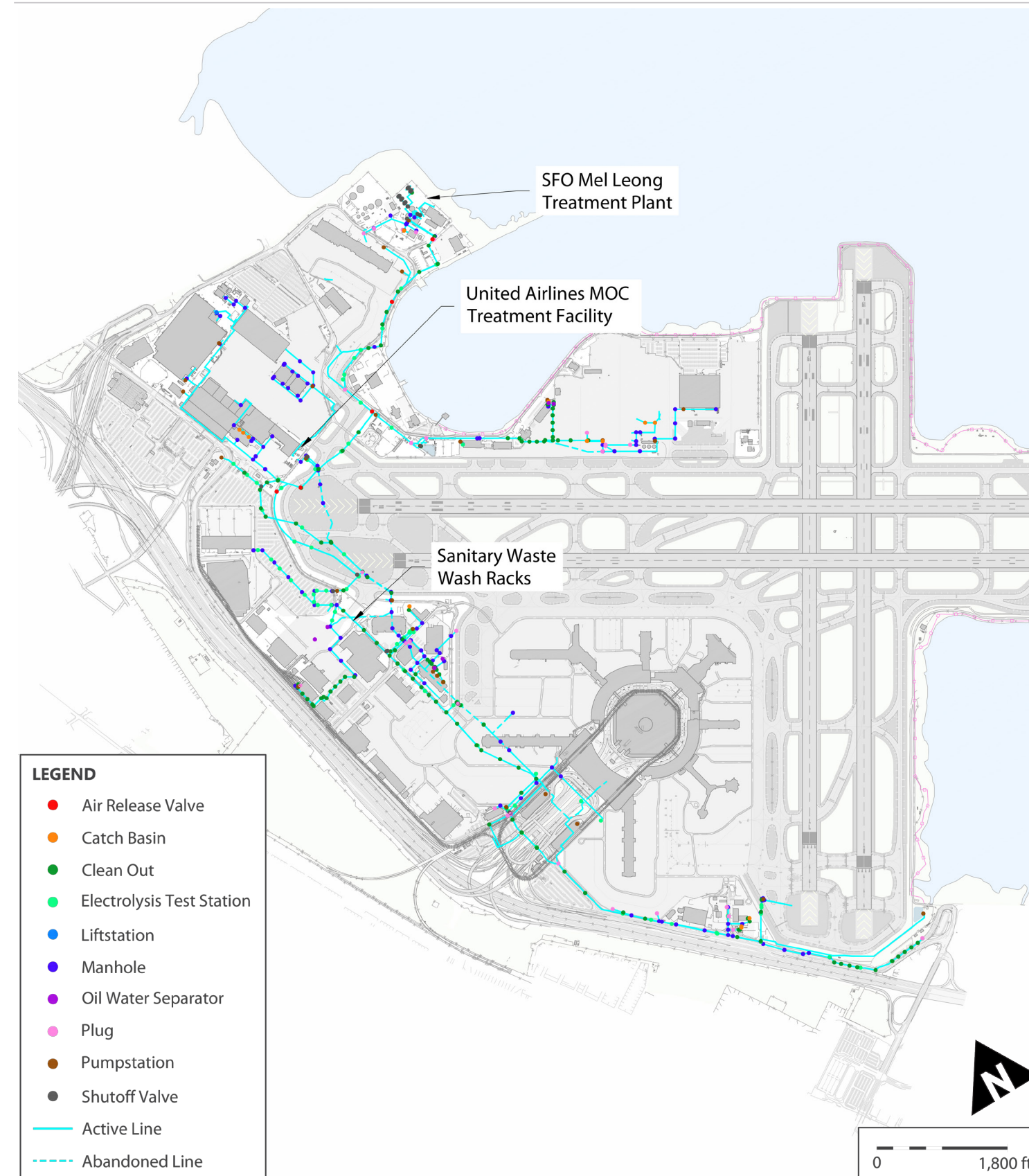
In addition to the industrial waste sources, the “first flush” stormwater from the site is retained, diverted, and pumped at a controlled rate to the IWTP to prevent pollutants from entering San Francisco Bay. Additional information on the first flush is provided in the discussion of stormwater infrastructure (see **Section 3.7.6**).

The United Airlines MOC has its own industrial waste treatment plant that discharges to the SFO IWTP for secondary treatment prior to discharge into the Bay.

The design peak capacity of the IWTP is 1.65 MGD. Currently, the plant is limited to 50 percent to 60 percent of peak capacity because of long-term buildup and maintenance issues. A capital project has been initiated to restore the IWTP to its design peak capacity of 1.65 MGD.

A portion of the effluent is retained and used by SFO as reclaimed water. The remainder of the effluent is combined with the sanitary waste effluent and discharged to the North Bayside System Unit in South San Francisco, where the effluent is combined with effluent from surrounding municipalities for dechlorination and deepwater discharge into the Bay.

Exhibit 3.7-10 | Industrial Waste System



Source: SFO Utilities Map, Industrial Waste System, September 2014; RS&H, 2014; Ricondo and Associates, 2016



### 3.7.9 Information Technology/Data Communication Infrastructure

The Airport has two buildings that are Main Points of Entry (MPOEs) from AT&T. The location of these MPOE buildings is indicated on **Exhibit 3.7-11**. A robust fiber optic system is distributed throughout the Airport site. Expansion throughout SFO property has consumed and continues to consume large amounts of the fiber optic cabling capacity for SFO and, as a result, a capacity increase may be required.

SFO is responsible for distributing all telecommunication and data lines from the MPOEs to all facilities and Airport tenants. The fiber and copper infrastructure from the MPOEs provides a redundant path for connectivity to AT&T. The connectivity to AT&T is provided through two different central offices to provide a reliable telecommunication/data service to SFO. The MPOEs have an uninterruptible power system and emergency generator backup. SFO provides all fiber and copper infrastructure to all tenants to bring them AT&T service.

An extensive communication duct bank system covers the entire Airport site. This duct bank contains the fiber and legacy copper infrastructure from AT&T. As communications technology has advanced, the use of fiber optic infrastructure has grown significantly while the use of copper cable has declined. Therefore, the communication duct bank may contain copper cables that are not in use or are partially used. Currently, there is a lack of complete, reliable information on existing system capacity and use.

A shared Class II data center is located near the South MPOE building. This data center is shared between SFO and the CCSF. Approximately 20 communication equipment cabinets are available for SFO use. Other equipment cabinets are designated for CCSF use. The data center is equipped with redundant uninterrupted power systems and emergency generators for redundancy.

Because modern IT systems place greater demand on the distributions system, SFO has three separate network configurations: one for administrative and security/closed circuit television (CCTV) functions, one for United Airlines, and one for all other airlines.

The use of an Ethernet network for communication and data has increased the need for additional fibers in both quantity and type of fiber. As SFO expands and technology systems require higher capacity, the lack of spare fibers from the MPOEs to the user is a major concern.

Exhibit 3.7-11 | Data Communication Infrastructure System



Source: SFO Utilities Map, Telecom (Fiber) Layout September 3, 2014; RS&H, 2014; Ricondo and Associates, 2016



### 3.7.10 Power Distribution

The Airport is currently served from two Pacific Gas and Electric Company (PG&E) substations, designated BA and M. The location of these substations is depicted in **Exhibit 3.7-12**. Both substations are provided with 115 kilovolt (kV) primary service that is stepped down to 13.2 kV (nominal) service. Substation BA includes two 55 megavolt-amperes (MVA) transformers and Substation M includes one 55 MVA transformer. The dual feed provides highly reliable electrical service.

SFO is served by a 13.2 kV power distribution system with a number of electrical load centers located throughout various buildings on the site that transform the 13.2 kV system to a 480 V distribution system in the buildings and other facilities.

Substation BA is served by PG&E from "San Mateo-Martin" 115 kV line No.5. Two 115 kV feeders are provided from the PG&E substation serving Substation BA. Substation M (Millbrae Substation) has a dual feed from the PG&E substation serving Substation M. PG&E has indicated that sufficient transmission capacity exists to expand Substation M, but confirmation would be needed when an expansion project is initiated.

The United Airlines MOC is served from the same PG&E substation from 115 kV line No.1 and by two 13.2 kV lines from the SFO 13.2 kV switchgear at Substation BA. These feeders from the SFO substations and one from PG&E via United Airlines cogeneration plant are designed to provide redundant services.

SFO has a current peak electrical demand of approximately 48 megawatts (MW). The peak demand in June 2011 was 48.25 MW and the peak demand in August 2014 was 47.25 MW.

SFO management has advanced a program to produce renewable energy, installing solar panels on Building 632 and Terminal 3. During June and July, the solar panels on Terminal 3 produce approximately 90,000 kilowatt hours (kWh).

Approximately 40 diesel-powered emergency generators are located throughout the Airport. The emergency generators are sized to provide power for only life safety and critical operations at the Airport and not normal "operational" loads such as HVAC and BHS.

SFO has a network-based electrical metering and monitoring system manufactured by Square D/Schneider Electric that allows SFO management and staff to manage the Airport's electrical system based on current real-time information.

Exhibit 3.7-12 | Electrical Systems Partial Site Plan



Source: SFO Utilities Map, Electrical 12 kV system, September 2, 2014; RS&H, 2014; Ricondo and Associates, 2016

### 3.7.11 Ongoing Utility Projects

Several SFO utility projects are considered Ongoing Projects. These projects have been authorized to proceed by the Airport Commission or have been identified by Airport management as needing to be implemented in the near future, subject to Airport Commission and other necessary approvals. The ongoing utility projects are in various stages of planning, programming, design, or construction. Appropriate environmental reviews, as required under CEQA or NEPA, are completed, in process, or will be conducted. These projects are proceeding, or will proceed if approved, irrespective of any ADP Projects and do not address long-term demands and capacity needs. The following sections describe each ongoing utility project to provide a comprehensive understanding of the inventory.

**Central Plant Improvements:** The Central Plant Chiller No. 1 Improvement Project would replace the existing Chiller No. 1 that has reached the end of its useful life, is leaking, and can no longer produce required tonnage. The new chiller would meet the terminal cooling loads more flexibly and efficiently. The project would preserve the condition of the Central Plant, make it more energy efficient, lower operating costs, and improve Airport sustainability.

**Airfield Utility Improvements:** These projects would modify airfield utilities to replace aging infrastructure, meet FAA Advisory Circular standards, and eliminate conflicts with recommended airfield modifications. These projects include:

1. **Airfield Lighting Building No. 1 Renovation:** Replace and upgrade switchgear and associated electrical equipment.
2. **Airfield Lighting 5kV Cable Replacement:** Replace the aging primary circuit cables feeding the runway and taxiways in various locations.
3. **Airfield Lighting System Upgrade:** Replace lighting, signage, cabling, and underground infrastructure to meet FAA Advisory Circular standards. The Airfield Lighting Control System Computer hardware and software would also be upgraded.

**Upgrade Substation M:** As future projects are developed, Airport electrical demand is expected to increase. Substation M has one 55 MVA transformer, unlike Substation BA, which has two 55 MVA transformers. To maintain full redundancy, this project would add a second 55 MVA transformer and related switchgear and protection equipment at Substation M.

**Airport Shoreline Protection Project – Flood Control:** The proposed project would include filling all remaining gaps within SFO's existing seawall along the San Francisco Bay shoreline and closing potential water infiltration paths on the north, west, and south sides of the Airport, thereby largely isolating the Airport from flooding that could occur in adjacent areas.

**Airport Shoreline Protection Project – Sea Level Rise:** The Airport continues to undertake shoreline protection improvements to protect against flooding. This project would consist of establishing additional seawall protection to address sea level rise. This could include adding protection outboard of existing seawalls to dampen wave energy, or increasing the strength and height of existing seawalls.

**Wastewater System:** These projects (see **Exhibit 3.7-13**) would upgrade and expand the sewer, wastewater treatment, and recycled water systems including:

- **Industrial Wastewater Treatment Plant Upgrade:** The existing IWTP is reaching the end of its design life. The proposed project would include refurbishment and replacement of existing wastewater treatment facilities and the construction of new systems and structures within the existing Mel Leong Treatment Plant property.
- **Recycled Water Distribution System:** This project would construct and install the pipelines and other infrastructure necessary to expand the use of recycled water at the Airport. The facility needed to recycle water already exists and has extra capacity. The additional recycled water could be used for cooling tower make-up water, construction work, irrigation, and other purposes. All new terminal projects at the Airport, including Terminal 2 and B/A E, include "purple pipe" infrastructure for use of recycled water in non-potable applications.
- **Storm Drainage Pipeline Improvements:** This project would repair and replace storm drainage pipelines that have been marked for improvement.
- **Sewer System Improvements:** This project would replace aging infrastructure for sewer system components.
- **New Sewer Outfall:** This project would install a new sewer outfall system from the Mel Leong Treatment Plant to South San Francisco. This sewer outfall is approximately 7,500 feet and would replace the existing 20-inch steel outfall that was installed in 1972 and has reached the end of its useful life.
- **Industrial Waste System Improvements:** This project would increase pipe sizes and provide mechanical/electrical improvements to pump stations. This project would install a parallel recycled waterline or repurpose sewer main pipelines as recycled water lines.

**Boarding Areas A and G 400 Hertz System Upgrade:** This project would install additional 400 hertz power systems to increase available capacity in B/As A and G to support the additional electrical loads required for many new widebody aircraft.

**New Fuel Storage Tanks:** This project would construct two 75,000-barrel fuel storage tanks to provide additional on-Airport storage capacity necessary to maintain sufficient supply during tank closures for regular maintenance, extended outages, and contingency for fuel supply interruptions.

**Fuel Supply Improvements:** This project would increase fuel supply throughput by upgrading the existing fuel supply pipeline or providing a supplemental pipeline.

**Perimeter Intrusion Detection System:** This project would install a ground-based radar perimeter intrusion detection system, comprising multiple radar units located at points on Airport property, to detect objects over large open areas such as the waterfront and airfield.

**Separation of Fire and Domestic Water Systems:** The existing combined fire main waterline and domestic waterline would be replaced with a dual-waterline system, preventing water stagnation in the potable water system.

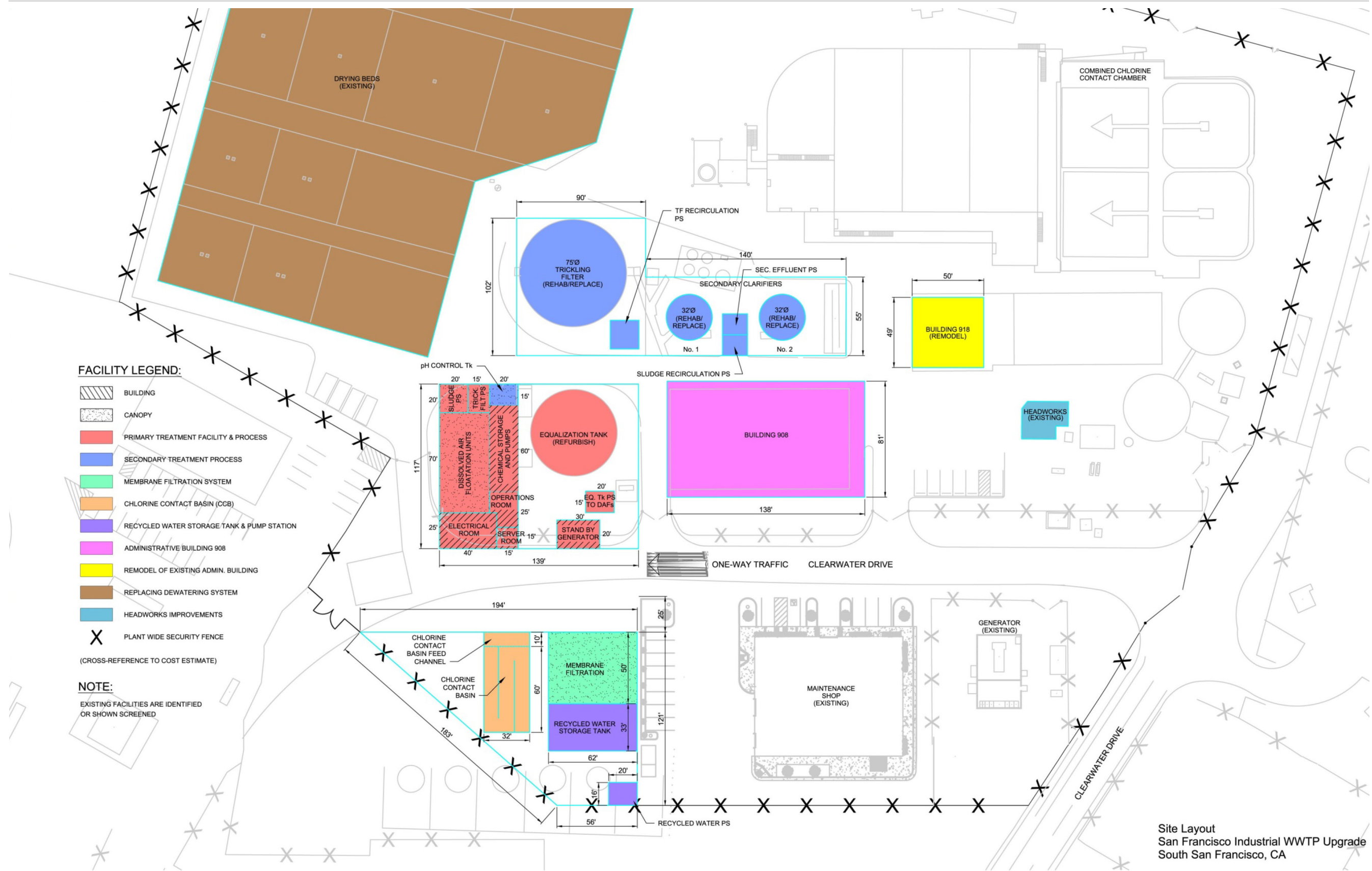
**SFO and City of Millbrae Water Tie-ins:** This project would install equipment to connect the domestic water systems between SFO and the city of Millbrae.

**Airport-Wide GSE Electrical Infrastructure:** This project would install or upgrade power distribution equipment and electrical infrastructure in support of electric-powered GSE vehicles.

The ongoing utilities projects are illustrated in **Exhibit 3.7-14**.

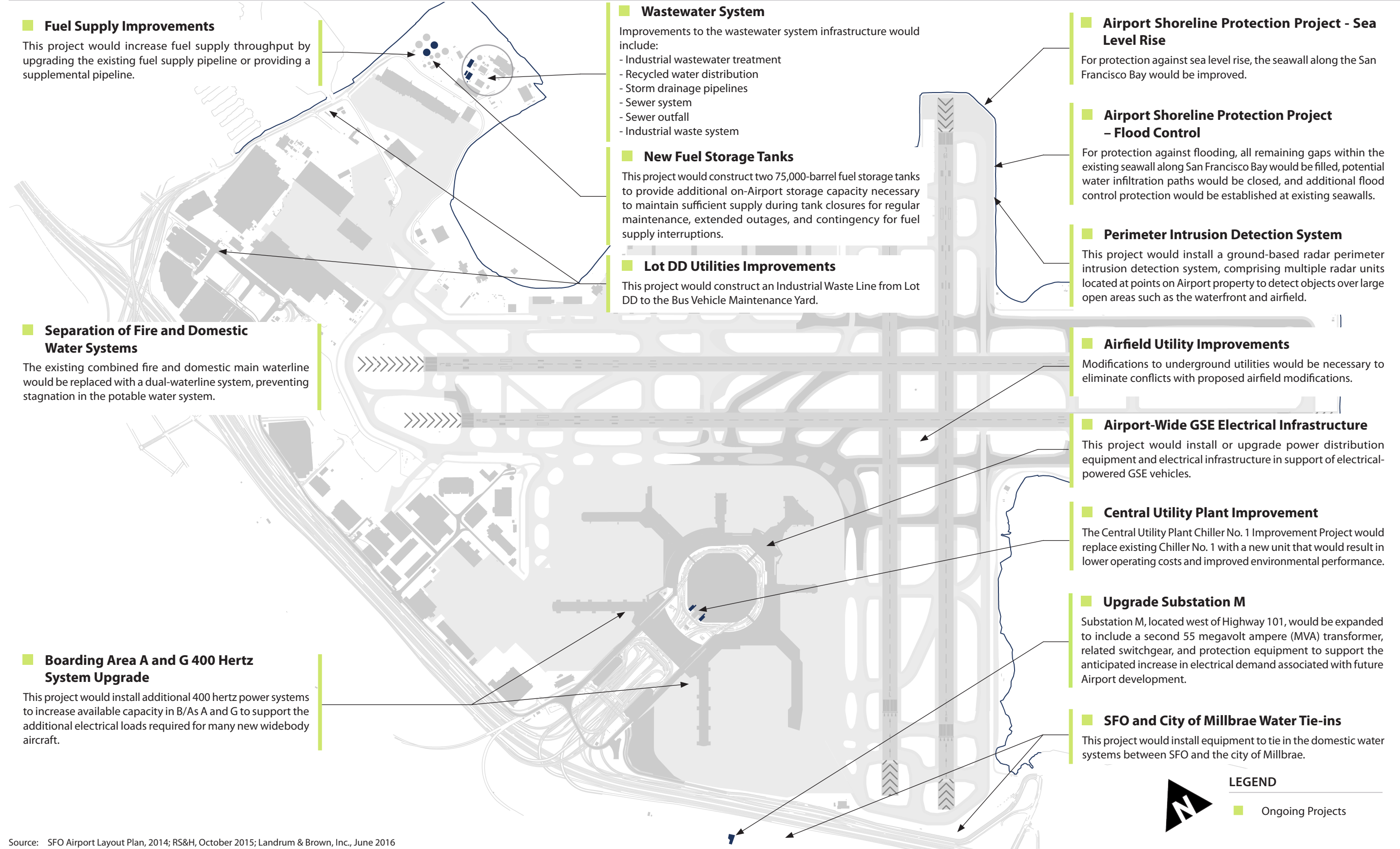


Exhibit 3.7-13 | Wastewater System Ongoing Projects



Source: San Francisco Industrial Wastewater Treatment Plant Upgrade, CH2MHill, February 2013

Exhibit 3.7-14 | Ongoing Utilities Projects



Source: SFO Airport Layout Plan, 2014; RS&H, October 2015; Landrum & Brown, Inc., June 2016



## 3.8 SUMMARY OF ONGOING PROJECTS

As described throughout the Inventory, there are a number of projects that are considered Ongoing Projects. These projects have been authorized to proceed by the Airport Commission or have been identified by Airport management as needing to be implemented in the near future, subject to Airport Commission and other necessary approvals. The Ongoing Projects are in various stages of planning, programming, design, or construction. Appropriate environmental reviews, as required under CEQA or NEPA, are completed, in process, or will be conducted. These projects are proceeding, or will proceed if approved, irrespective of any ADP Projects and do not address long-term demands and capacity needs. **Table 3.8-1** and **Exhibit 3.8-1** provide a tabular and graphic summary, respectively, of each of the Ongoing Projects to provide a comprehensive understanding of the inventory.

**Table 3.8-1 | Ongoing Projects**

Airfield	Support Facilities
Helipad	Airport Hotel and AirTrain Station
Taxiway C East	Building 730 Conversion to Airline and Airport GSE Maintenance
Taxiway C3	Consolidated Administration Campus
Taxiways E and J	West Field Cargo Buildings Redevelopment
Taxiway F East	ERF #3
Taxiway F West	West Field GSE Building 624 Replacement
Taxiway F1	GTU Redevelopment
Taxiway F2	High-Speed Gate Checkpoints
Taxiway N	Materials Testing Lab
Taxiway R North	Police Training Range Improvements
Taxiway R South	Relocate Fire Suppression Tanks
Taxiway S3	South McDonnell Road Realignment and RON Parking
Taxiways T and D	Superbay Hangar Fire and Life Safety Systems Improvements
Passenger Terminal	Taxiways H and M
B/A A, F, and G Near-Term BHS Screening Projects	West Cargo Checkpoint Relocation
B/A C Improvements	West Field Cargo Facility
B/A F Passenger Boarding Bridge and Modernization	West Field Parking Garage #2
Demolish Old Airport Traffic Control Tower	Utilities
Gate Enhancements	Airfield Utility Improvements
ITB Arrivals Level Improvements	Airport Shoreline Protection Project – Flood Control
ITB BHS Upgrade	Airport Shoreline Protection Project – Sea Level Rise
Terminal 1 Redevelopment and BHS	Airport-wide GSE Electrical Infrastructure
T2-T3 Secure Connector and Office Block	Boarding Areas A and G 400 Hertz System Upgrade
Terminal 2 Aircraft Parking Enhancement	Central Utility Plant Improvement
Terminal 3 West Expansion and Renovation	Fuel Supply Improvements
Ground Access and Parking	Lot DD Utilities Improvements
AirTrain Track Extension	New Fuel Storage Tanks
Long Term Parking Garage #2	Perimeter Intrusion Detection System
	Separation of Fire and Domestic Water Systems
	SFO and City of Millbrae Water Tie-ins
	Upgrade Substation M
	Wastewater System

Source: Landrum & Brown, Inc., 2016

### ACRONYMS

B/A	Boarding Area
BHS	Baggage Handling System
ERF	Emergency Response Facility
GSE	Ground Service Equipment
GTU	Ground Transportation Unit
ITB	International Terminal Building
RON	Remain Overnight

