# 5.0 AIRFIELD AND NON-TERMINAL ALTERNATIVES

The preceding chapters have established the projected activity levels at Sacramento International Airport and estimated the facilities that will be needed to accommodate this activity during the 20-year planning horizon. As indicated, a number of improvements will be needed to accommodate projected growth. As activity increases, it will be necessary to provide additional passenger terminal facilities, parking, airport access, airport support and cargo facilities at the Airport. Additionally, it's important to establish a direction for airfield facility expansion over the planning horizon and beyond. Determining the best option for airfield expansion allows the SCAS to establish a platform for terminal facilities and optimal locations for other facilities that will be unaffected by future airfield changes, thus enabling secure and long-lasting capital investments.

This chapter examines the alternatives for providing additional airfield facilities that will be necessary to accommodate projected growth. These airfield alternatives are formulated and evaluated to determine the best method for meeting future demands.

## 5.1 Airfield Alternatives

The airfield analysis begins with evaluation of preliminary alternatives (Level 1) using qualitative criteria developed from the vision and goals for the airport. This screening determines which, if any, of the alternatives meet the goals and objectives of the Airport and, if not, are eliminated from further consideration. The Level 1 alternatives analysis was completed prior to September, 2001. The alternatives not eliminated are retained for Level 2 refinement and additional evaluations. The Level 2 analysis began in January 2003 and is a more detailed and quantitative evaluation designed to identify which alternatives best meet the Airport's future development needs. The best alternatives are then refined and subjected to a Level 3 final analysis that includes additional evaluation factors and more detailed examination. Based on the

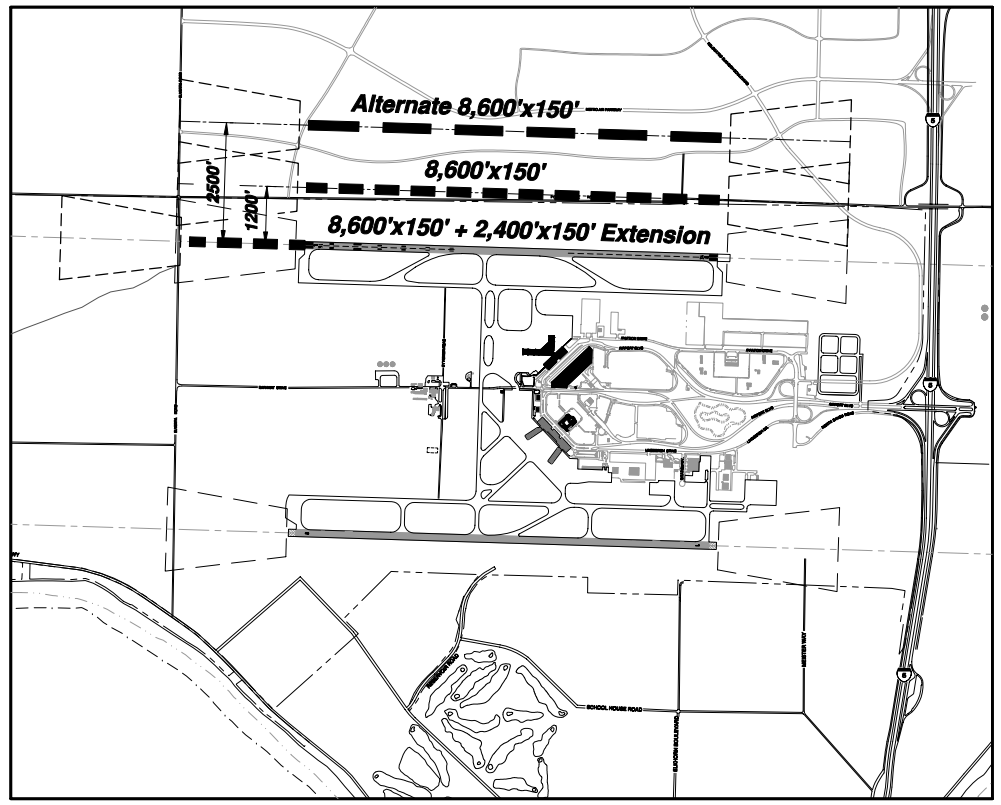
results of the Level 3 analysis, a Preferred Alternative is selected and integrated with the other facility improvement recommendations.

### *5.1.1 Identification of Preliminary Airfield Alternatives*

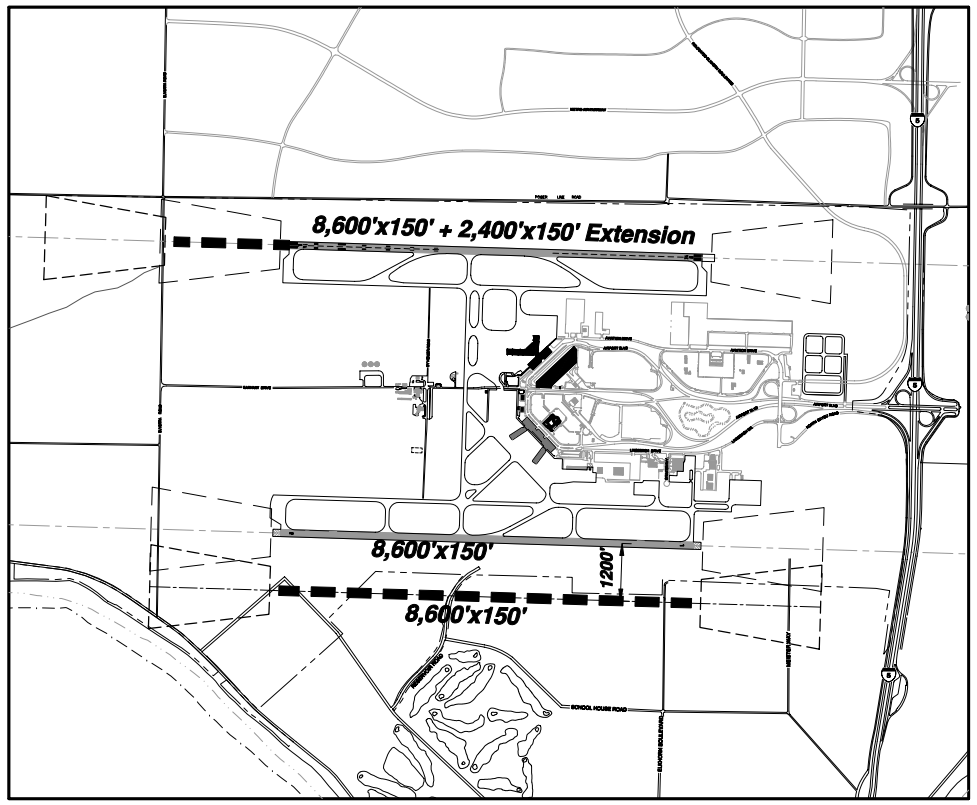
When identifying the airfield alternatives, it is important that a long-term plan to meet airfield facility requirements be established to allow passenger terminal and other airport facilities to be constructed and modified within the airport property. Six airfield expansion options shown in **Exhibit 5.1-1** Preliminary Airfield Alternatives, were developed with input from the Master Plan Advisory Committees, stakeholders, public agencies, professional groups, and elected officials.

The existing north-south runway orientation at the Airport provides more than 99 percent wind coverage in both visual and instrument weather conditions. Therefore, future planned runways should be parallel to the existing runways as this meets the FAA wind coverage requirements and provides an operationally efficient airfield layout.

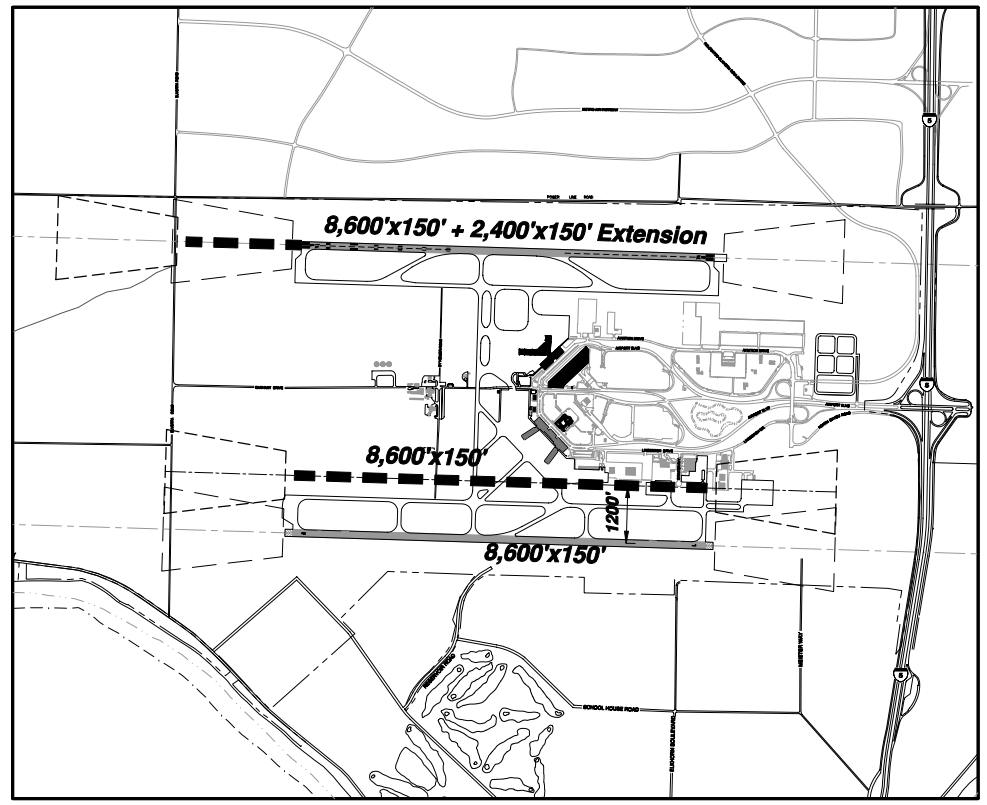
All of the airfield expansion alternatives include a 2,400-foot extension of Runway 16L, bringing the runway to a total length of 11,000 feet (see Section 4.1.5 for information on runway length requirements). The extension is recommended for Runway 16L/34R because it is anticipated that most long haul departures will be to the east, and a longer east Runway is more efficient from an airspace standpoint. During the Level 1 alternatives analysis, this runway extension were evaluated on the north end of the runway based on the assumption that extending a single end of a runway typically is easier to construct and more cost effective (without having the benefit of identifying environmental mitigation costs).



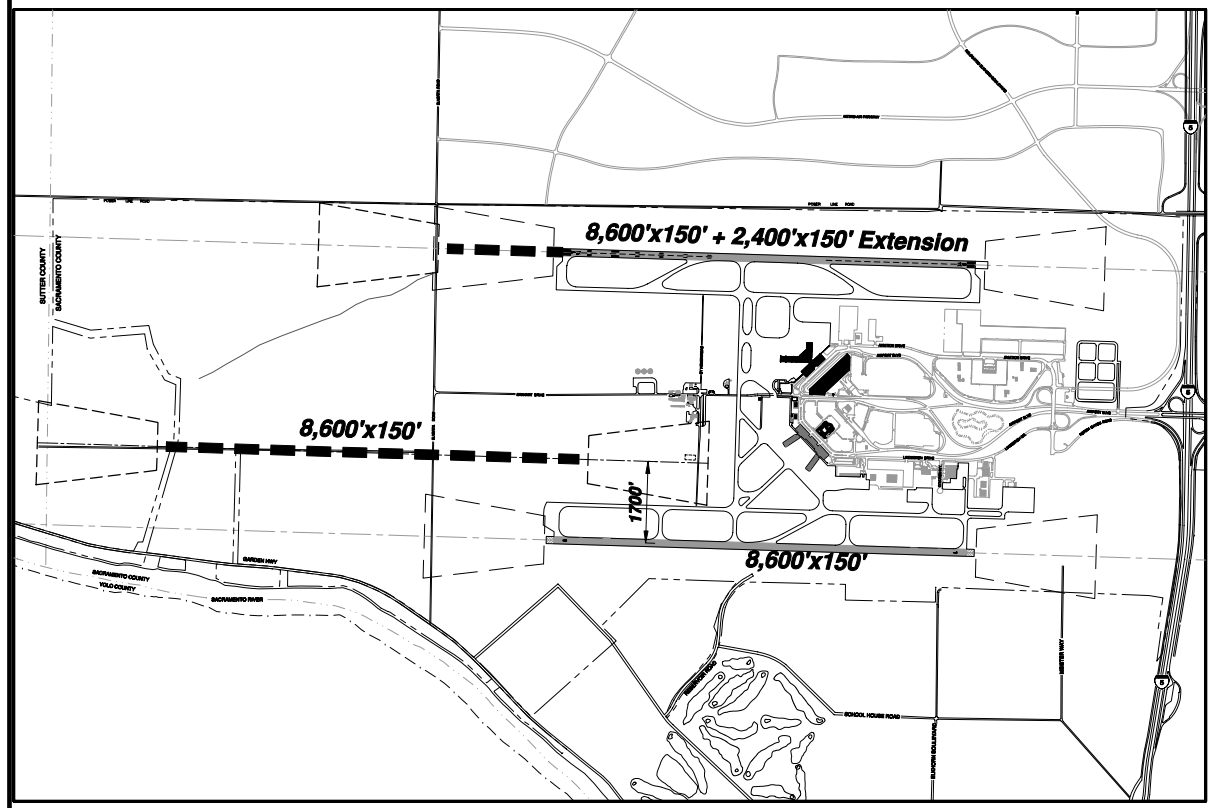

Airfield Alternative 1
Outboard East Runway



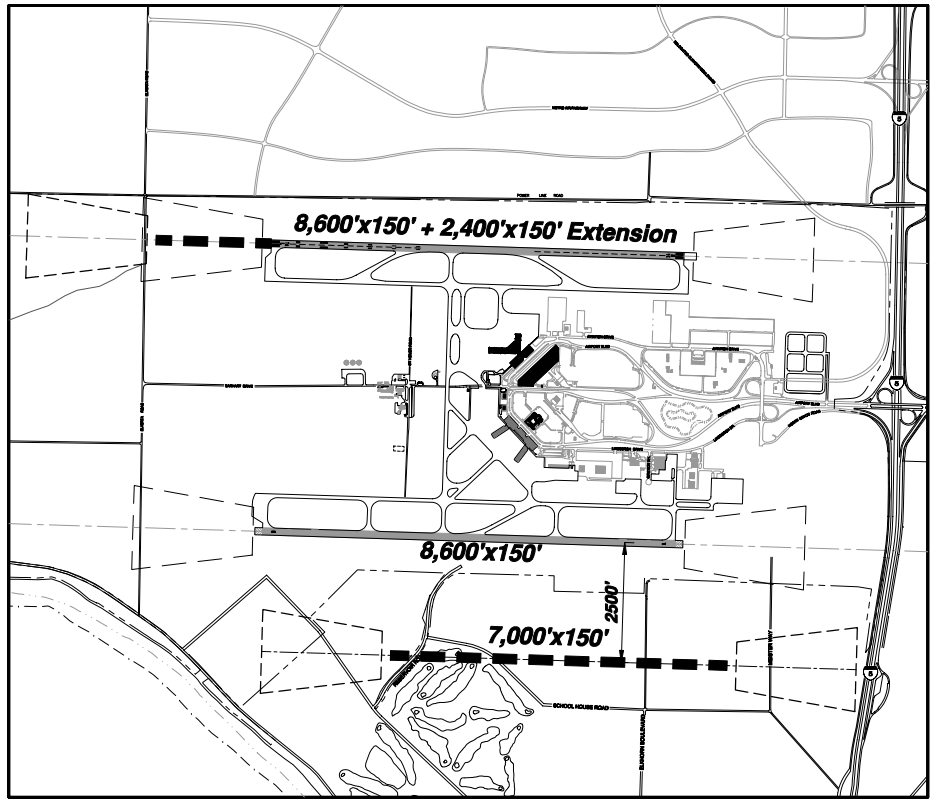

Airfield Alternative 2
Outboard West Runway



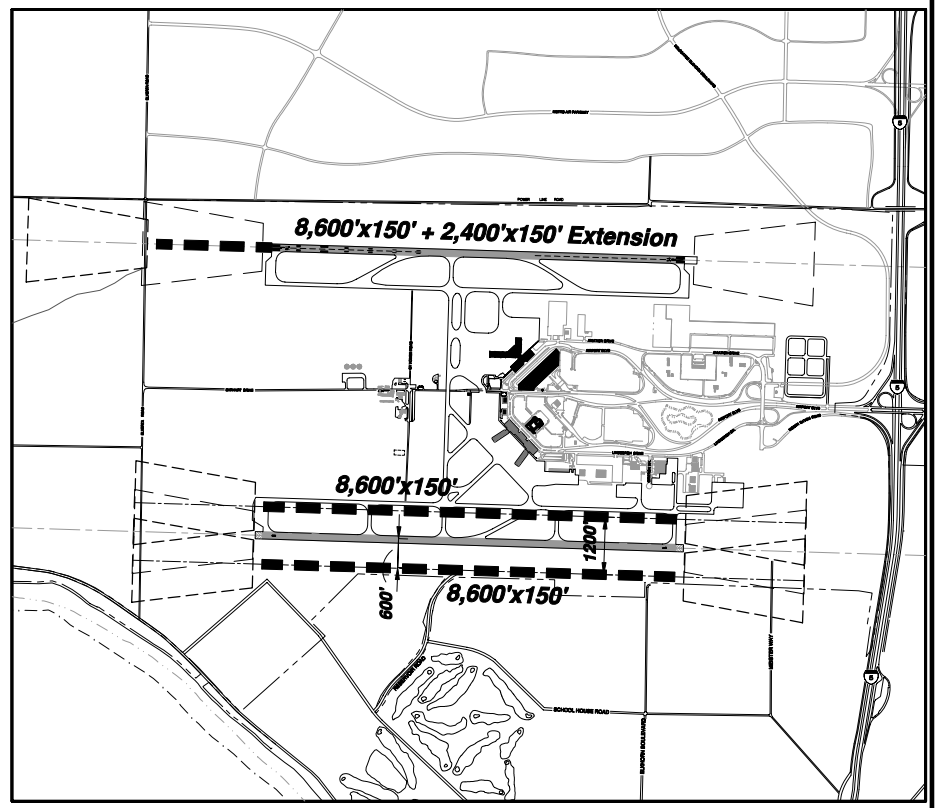

Airfield Alternative 3
Inboard West Runway




Airfield Alternative 4
Inboard North Runway




Airfield Alternative 5
Outboard West Runway - Widely Spaced




Airfield Alternative 6
Inboard West Runway/ Relocated Runway 16R/34L

SACRAMENTO COUNTY AIRPORT SYSTEM
6900 AIRPORT BLVD.
SACRAMENTO, CA 95837

**Sacramento International Airport**
**Master Plan Study**

PRELIMINARY AIRFIELD ALTERNATIVES

NORTH

4000' 2000' 0 4000'

EXHIBIT
5.1-1

alternatives\4-03_Rev\1-airf.dwg

PB AVIATION

To provide adequate operations capacity, parallel runways are planned for the airport with a minimum separation distance of 1,200 feet (centerline-to-centerline). The 1,200-foot runway spacing meets the FAA minimum runaway separation distance for Airplane Design Group V and VI, and allows for simultaneous aircraft operations in Visual Meteorological Conditions (VMC). The spacing with this runway configuration allows for flexibility to accommodate long term demand. When Instrument Meteorological Conditions (IMC) are present, the two existing runways at the airport can be operated independently due to the separation distance of 6,000 feet. Runways spaced at 1,200 feet cannot be operated independently in IMC conditions.

A 1,200-foot runway separation allows the construction of a parallel taxiway between the two runways that meets Group VI standards. This would allow the airfield to operate unimpeded while a Group VI aircraft is on the parallel taxiways between the runways. All the alternatives assume the addition of an ILS on Runway 34R.

The six preliminary airfield alternatives are as follows:

#### *5.1.1.1 Airfield Alternative 1 – Outboard East Runway*

Airfield Alternative 1 provides a new parallel runway 8,600 feet in length, located 1,200 feet to the east of existing Runway 16L/34R. This alignment is close to Power Line Road and would require re-routing of the road. The new runway would be on property designated as the Metro Air Park, a commercial/industrial development of 1,892 acres of Sacramento County farmland, including a proposed 278-acre golf course.

A variation on this concept includes locating the parallel runway at 2,500-foot spacing from existing Runway 16R/34L. Power Line Road would be relocated farther to the east in this variation and substantially more property would be required for development. The 2,500-foot spacing would allow for wake vortex independent operations on the two runways.

#### *5.1.1.2 Airfield Alternative 2 – Outboard West Runway*

Alternative 2 provides a new 8,600-foot parallel runway on the west side of the Airport, outboard of Runway 16R/34L and separated by a distance of 1,200 feet. This location is not within existing airport property and would require property acquisition. The new runway thresholds would be located parallel with the existing runway thresholds to allow each runway of the two runway system to be equal in terms of landing and take-off preference.

#### *5.1.1.3 Airfield Alternative 3 – Inboard West Runway*

Alternative 3 places a proposed new parallel runway, 8,600 feet in length, on the west side of the terminal area inboard of existing Runway 16R/34L at a spacing of 1,200 feet. A runway in this location would require the demolition and relocation of the general aviation apron, hangars, US Postal Service Facility, flight kitchen, and two air cargo buildings, and Terminal B. The size of the terminal development platform would be constrained by a runway in this location. However, this airfield alternative would not require land outside of the existing airport property boundary.

#### *5.1.1.4 Airfield Alternative 4 – Inboard North Runway*

Alternative 4 is a similar concept of an inboard dual runway on the west side of the terminal area. However, the runway would be separated from Runway 16R/34L by 1,700 feet with the location shifted to the north so that the edge of the southern RPZ would be located north of the crossfield taxiways. In this location a runway length of 9,000 feet could be constructed entirely on airport property. During south flow, aircraft would depart on existing Runway 16R/34L and arrive on the new runway. The reverse would occur during north flow with departures on the new runway and arrivals on the existing Runway 16R/34L. The separation between the new runway and Runway 16L/34R would be 4,300 feet, which would allow for simultaneous instrument approach capability between these two runways during IMC. This alternative would constrain the size of the terminal area just south of the new runway due to height limitations and safety precautions. No property acquisition would be required for a new runway in this location as the Airport has substantial property to the north.

#### 5.1.1.5 Airfield Alternative 5 – Outboard West Runway, Widely Spaced

Alternative 5 is comprised of a widely-spaced new runway 7,000 feet in length located 2,500 feet west of Runway 16R/34L. The runway length is constrained by the available property in this location between I-5 and the Sacramento River. A 7,000-foot runway length can accommodate corporate and general aviation, regional jet, and air carrier narrow-body aircraft on relatively short stage length flights. This runway would allow for the segregation of traffic by aircraft speed and would allow simultaneous departures on all three runways departures during VMC. The runway would be located on property currently outside the airport property boundary. With 2,500-foot spacing, the runways can be operated independently in VMC conditions but not in IMC conditions.

#### 5.1.1.6 Airfield Alternative 6 – Inboard West Runway/Relocated Runway 16R/34L

Alternative 6 is a variation on the Alternative 3 concept with a new runway, which will be 8,600 feet in length, constructed on the alignment of existing Taxiway A. To maintain the 1,200-foot runway spacing, existing Runway 16R/34L would be relocated to the west by approximately 450 feet. This alternative has less impact than Alternative 3 on terminal area size and facilities, but requires the construction of two new runways. Additionally, property acquisition would be required, but less would be needed than for Alternatives 2 and 5.

### 5.1.2 Screening of Preliminary Alternatives

An overall vision for the Airport was established at the start of the project and the elements of this vision were used to evaluate the preliminary alternatives. The vision states that in the future, the Airport:

*Is surrounded by compatible and supportive land uses*

- Provides adequate land for expansion and buffering
- Provides opportunities for compatible development
- Provides opportunities for compatible wildlife habitat

*Has high quality, multimodal, congestion-free access*

- Provides opportunities for multimodal access

- Facilitates a seamless trip for passenger between the point of origin and the gate
- Provides a secondary ground access route
- Considers ground access from the north

*Is customer friendly*

- Provides sufficient levels of convenience and efficiency
- Is easy to get into and out of
- Provides opportunities for additional passenger amenities such as a sit-down restaurant, close-in hotel and meeting place
- Improves passenger connectivity between terminals
- Ease of transfer (number of level changes) for physically challenged individuals

*Accommodates air travel needs of the region*

- Has the ability to serve domestic and international destinations (from Sacramento, travelers can get anywhere)
- Meets increasing travel needs of region's growing conference, convention and tourism activity

*Has adequate capacity to meet future needs*

- Is adequate to serve 20-year growth and beyond
- Has the ability to accommodate Group VI aircraft
- Accommodates cargo and general aviation, with flexibility to serve changing demand levels by these groups

*Is an international gateway*

- Has runway of adequate length to serve international markets
- Has a Federal Inspection Services (FIS) facility that is integral to the domestic flight facilities

*Operates safely and efficiently*

- Provides safe and secure operating environment
- Facility layout that enables passengers to move safely and efficiently
- Airfield has all-weather capability
- Airfield is compatible with airspace needs of other airports
- Resolves inefficiency of aircraft movement on the terminal apron inherent with V-shaped design of Terminal A's concourses

*Is attractive and conveys a Sacramento "sense of place"*

- Maintains sense of open and airy space
- Provides lots of trees (for aesthetic and "cool down" purposes)

*Is environmentally responsible*

- Airfield improvements minimize (or create new) impacts
- Airfield layout minimizes aircraft movements and congestion
- Terminal layout minimizes aircraft movements and congestion
- Circulation, parking, and curbside layout minimizes vehicular movements and congestion

*Is progressive*

- Has the flexibility to accommodate traffic activity changes such as more commuter traffic than forecast and more cargo traffic than forecast

*Is an economic engine*

- Airport plays a lead role in regional economic development efforts
- Metro Air Park impacts (i.e., does the alternative take land that could be used for economic development?)

Is financially solvent

- General perception of comparative capital cost of the alternatives
- General perception of comparative maintenance and operating cost of the alternatives (e.g. alleviates duplicate operating and maintenance costs of current two-terminal operation)

### 5.1.3 Methodology

Each of the preliminary alternatives was reviewed on a qualitative basis to determine which alternatives had the potential to meet the elements of the overall vision for the Airport and therefore should be retained for further analysis. This process included meetings with the Technical Advisory Committee, the various focus groups and other citizen stakeholders, and the County Board of Supervisors.

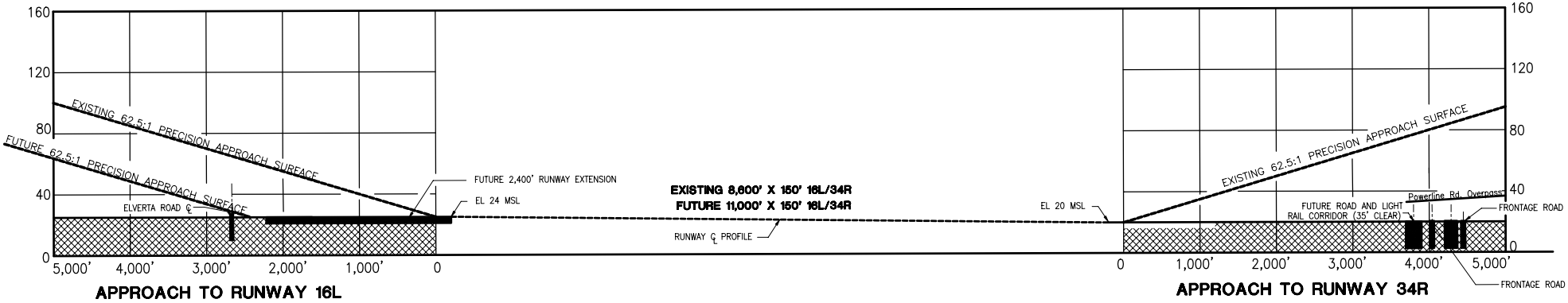
#### 5.1.3.1 Screening Results

With the exception of one alternative, all of the airfield concepts showed merit in meeting the vision and needs of the Airport. Airfield Alternative 1 would eliminate the economic viability of Metro Air Park resulting in a substantial negative effect on future economic growth in the region. In addition to the lost economic opportunities, such as jobs and tax revenues to the County, Alternative 1 would require property acquisition that would likely exceed $75 million. Therefore, due to these economic and cost considerations, Alternative 1 was eliminated from further analysis. The five other airfield alternatives were retained for further analysis.

### 5.1.4 Refinement Secondary Airfield Alternatives (Level 2)

The five preliminary airfield alternatives retained from the Level 1 screening were refined and developed to allow a more detailed Level 2 analysis. One element present in all five preliminary alternatives that warranted further analysis was the extension of Runway 16L/34R by 2,400 feet to the north. Future land uses were added to assist in the Level 2 evaluation.

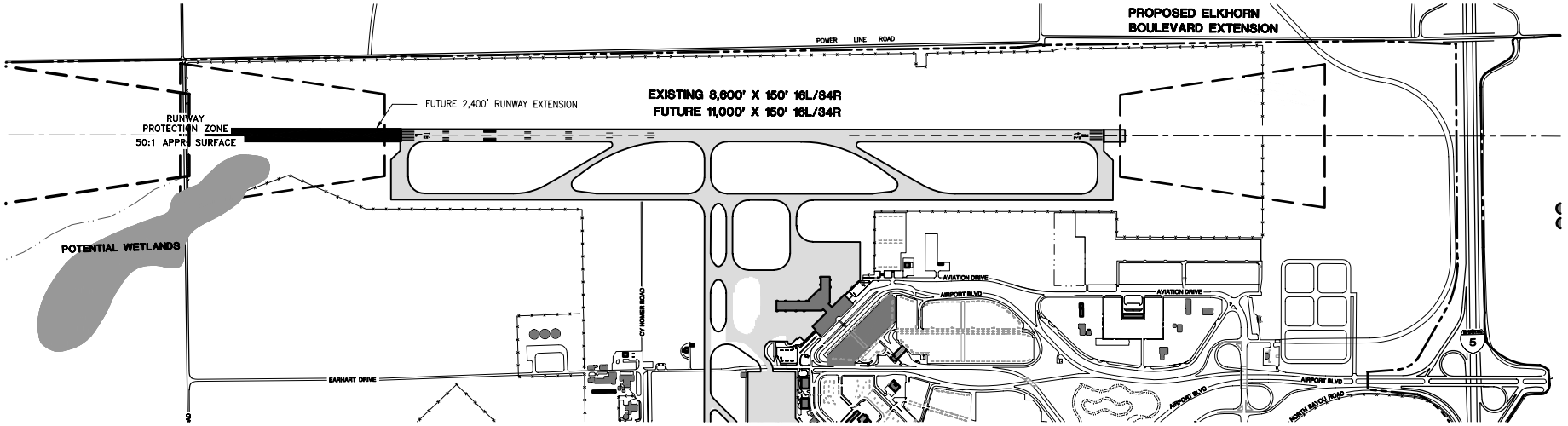
During the Level 1 analysis it was determined that extending Runway 16L/34R by 2,400 feet to the north was complicated by the location of the relocated runway safety area encroaching on the existing Elverta Road. **Exhibit 5.1-2** depicts the Runway 16L/34R plan and profile drawing of the runway extension to the north. FAR Part 77 regulations would require Elverta Road to either be displaced to the north, or lowered to meet regulations. Although lowering Elverta Road is a viable option for meeting FAR Part 77 regulations, there is a potential for drainage issues in this area during storm conditions, and lowering the road could exacerbate this issue. Another potential complication of extending Runway 16L/34R to the north is a conflict with an environmentally sensitive area of potential wetlands.




## PROFILE VIEW

VERTICAL 80' 40' 0 80'

HORIZONTAL 2,000' 1,000' 0 2,000'




## PLAN VIEW 16L/34R

NORTH

2,000' 1,000' 0 2,000'

| | | | |
|---|---|---|---|
| SACRAMENTO COUNTY AIRPORT SYSTEM 6900 AIRPORT BLVD. SACRAMENTO, CA 95837 | Sacramento International Airport Master Plan Study | RUNWAY 16L/34R PLAN AND PROFILE (ALL NORTH EXTENSION) | EXHIBIT 5.1-2 |

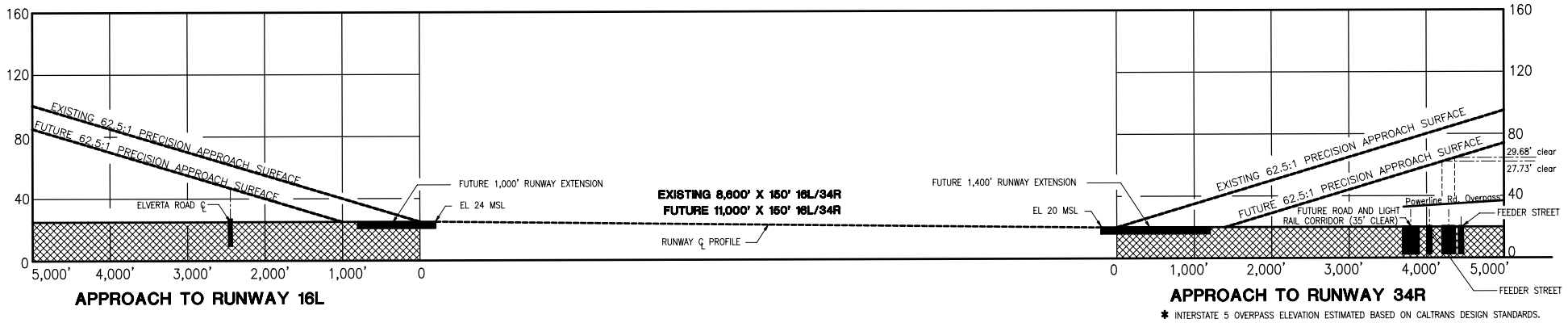
Sacramento/alt__/4-03__/5-1_2-plan-profile.dwg

PB AVIATION

**Exhibit 5.1-3** depicts another option to achieve a 2,400 foot extension; to balance Runway 16L/34R extension between the north and south in order to minimize access issues, drainage issues and environmental issues. To the south, the runway can be extended by 1,400 feet while maintaining a 200-foot-wide corridor for the light rail alignment and Elkhom Boulevard Extension. This southerly extension also allows sufficient vertical clearance for the road and a light rail alignment. Clearance over I-5 would be approximately 54 feet. Thus, only a 1,000-foot extension is needed on the north end of the runway to reach the required length of 11,000 feet. This split of extensions to the north and to the south provides sufficient clearance for aircraft approaches and departures over Elverta Road and minimizes impacts environmental sensitive area. Each of the Level 2 airfield alternatives depicts the "balanced" runway extension of Runway 16L/34R.

In each of the airfield alternatives it is important to provide for aircraft movement via crossfield taxiways (between the east and west runways). Where practical, two parallel taxiways should be provided to eliminate head-to-head aircraft conflicts that lead to queuing and delays. It should be noted that if space constraints prevent the development of parallel taxiways, an apron edge taxilane can be used in conjunction with a single crossfield taxiway. However, aircraft aprons typically are designated as non-movement areas by the FAA, meaning there usually is not positive aircraft movement control in these areas. Therefore, while an apron edge taxilane can be helpful in reducing the potential for head-to-head aircraft conflicts, parallel crossfield taxiways are recommended because they provide better airfield access under full air traffic control.

The following refinements were made to the remaining airfield alternatives prior to being evaluated under Level 2 analysis.

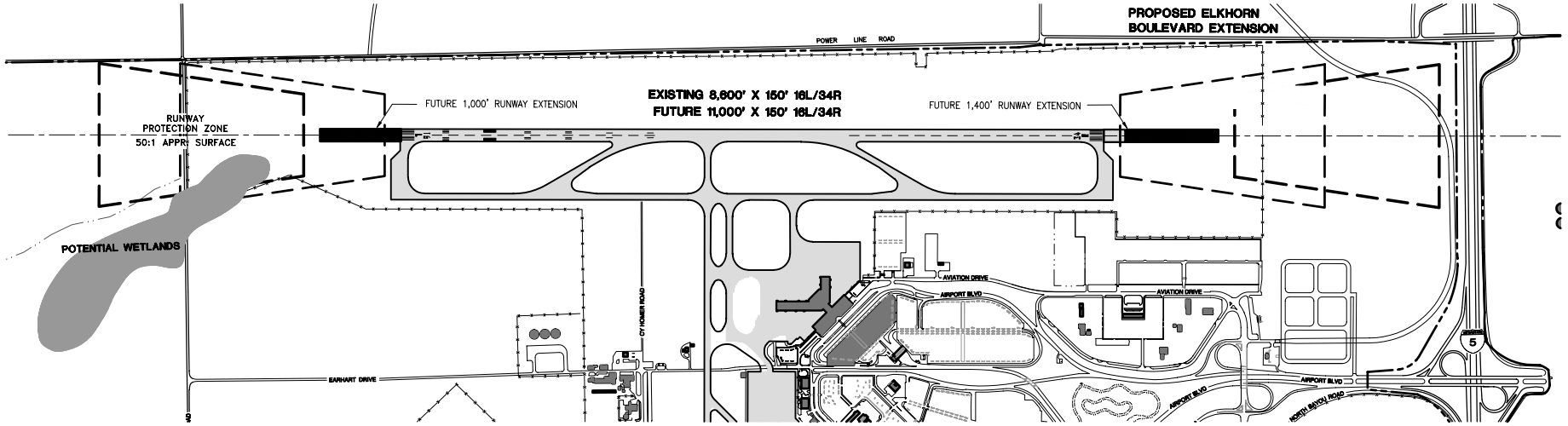



✱ INTERSTATE 5 OVERPASS ELEVATION ESTIMATED BASED ON CALTRANS DESIGN STANDARDS.

## PROFILE VIEW

VERTICAL 80' 40' 0 80'

HORIZONTAL 2,000' 1,000' 0 2,000'




## PLAN VIEW 16L/34R

NORTH

2,000' 1,000' 0 2,000'

SACRAMENTO COUNTY AIRPORT SYSTEM
6900 AIRPORT BLVD.
SACRAMENTO, CA 95837

**Sacramento International Airport Master Plan Study**

# RUNWAY 16L/34R PLAN AND PROFILE

EXHIBIT 5.1-3

Sacramento/alt___/4-03___/5-1_2-plan-profile.dwg

PB AVIATION

### 5.1.5 Alternative 2 – Outboard West Runway

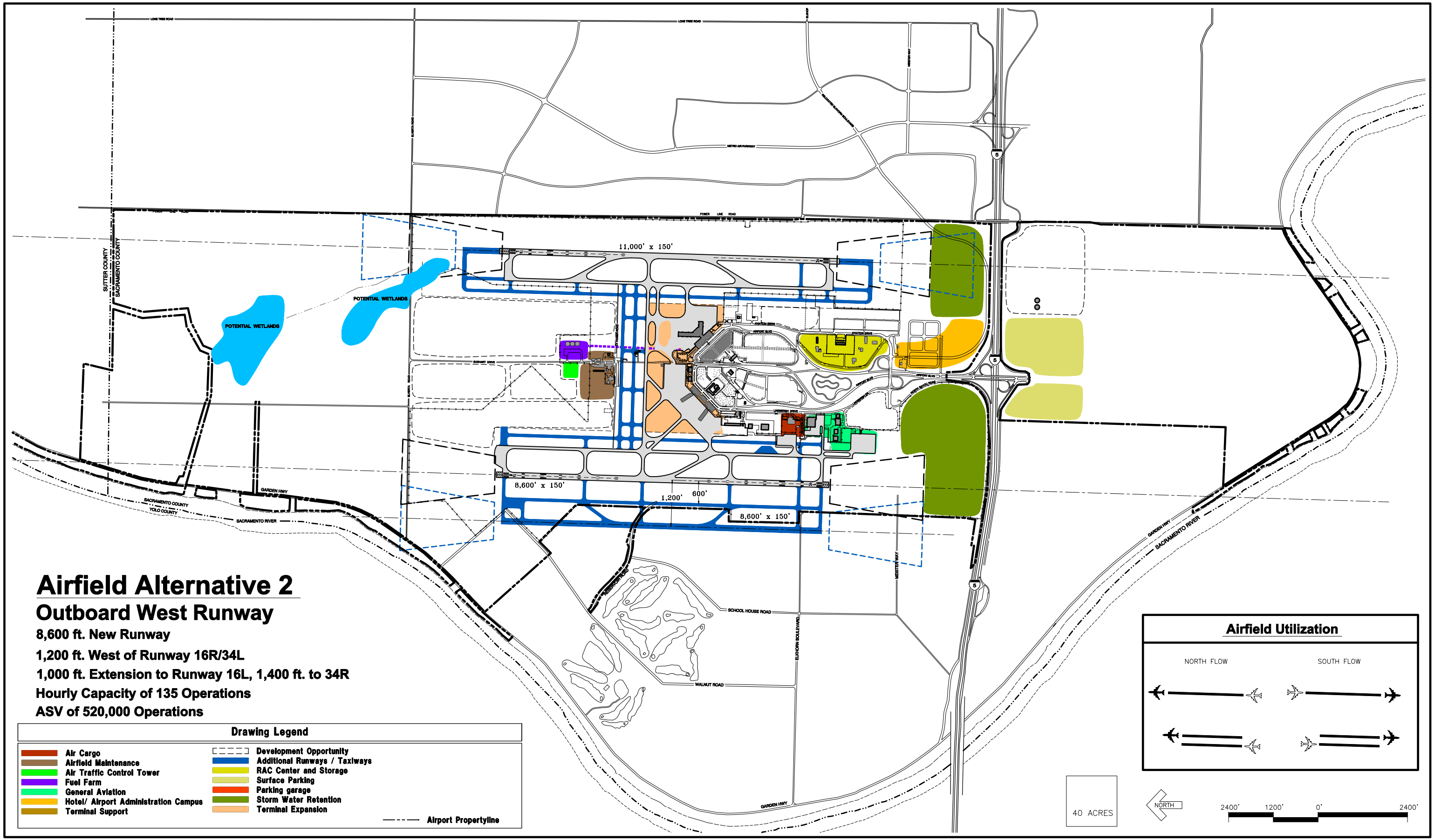
**Exhibit 5.1-4**, airfield Alternative 2 Outboard West Runway was developed with the addition of a full-length parallel taxiway between the two runways, 600 feet from each runway centerline. This taxiway allows Design Group VI aircraft movement and queuing between the runways with unconstrained runway usage. Additionally, a second full-length parallel taxiway was added to the Runway 16L/34R system to serve bi-directional aircraft movements from cargo, general aviation and other aviation developed land uses. The proposed new runway was configured with two acute-angled taxiway exits for capacity enhancement and a single perpendicular exit near the center of the runway.

### 5.1.6 Alternative 3 – Inboard West Runway

**Exhibit 5.1-5**, Airfield Alternative 3 Inboard West Runway, shows that the existing parallel taxiway to Runway 16R/34L would be relocated closer to the runway and centered between the existing runway and new runway which are separated by 1,200 feet. The new inboard runway is planned with dual parallel taxiways to serve aviation development areas.

### 5.1.7 Alternative 4 – Inboard North Runway

**Exhibit 5.1-6**, Airfield Alternative 4 Inboard North Runway shows this alternative configuration with the addition of taxiways and potential land uses. The new runway would have a full-length parallel taxiway. At the southern end, a new taxiway to the east would connect to the midfield cross taxiway system while a taxiway to the west connects to the taxiway system for Runway 16R/34L. The




# Airfield Alternative 2

## Outboard West Runway

**8,600 ft. New Runway**

**1,200 ft. West of Runway 16R/34L**

**1,000 ft. Extension to Runway 16L, 1,400 ft. to 34R**

**Hourly Capacity of 135 Operations**

**ASV of 520,000 Operations**

### Drawing Legend

- Air Cargo
- Airfield Maintenance
- Air Traffic Control Tower
- Fuel Farm
- General Aviation
- Hotel/ Airport Administration Campus
- Terminal Support
- Development Opportunity
- Additional Runways / Taxiways
- RAC Center and Storage
- Surface Parking
- Parking garage
- Storm Water Retention
- Terminal Expansion
- Airport Propertyline

### Airfield Utilization




40 ACRES

NORTH

2400' 1200' 0' 2400'

SACRAMENTO COUNTY AIRPORT SYSTEM
6900 AIRPORT BLVD.
SACRAMENTO, CA 95837

**Sacramento International Airport Master Plan Study**

AIRFIELD ALTERNATIVE 2 – OUTBOARD WEST RUNWAY–1200' SEPARATION

EXHIBIT 5.1–4

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PB AVIATION

# Airfield Alternative 3

## Inboard West Runway

**8,600 ft. New Runway**

**1,200 ft. East of Runway 16R/34L**

**1,000 ft. Extension to Runway 16L, 1,400 ft. to 34R**

**Hourly Capacity of 159 Operations**

**ASV of 612,000 Operations**

11,000' X 150'

8,600' x 150'

X 1,200'

8,600' x 150'

POTENTIAL WETLANDS

POTENTIAL WETLANDS

SUTTER COUNTY

SACRAMENTO COUNTY

SACRAMENTO COUNTY

YOLO COUNTY

LONE TREE ROAD

POWER LINE ROAD

METRO AIR PARKWAY

AIRPORT BLVD

AVIATION DRIVE

ENERGY DRIVE

LOGISTICS DRIVE

GARDEN HWY

SACRAMENTO RIVER

RIVERTOR ROAD

SCHOOL HOUSE ROAD

WALNUT ROAD

ELKHORN BOULEVARD

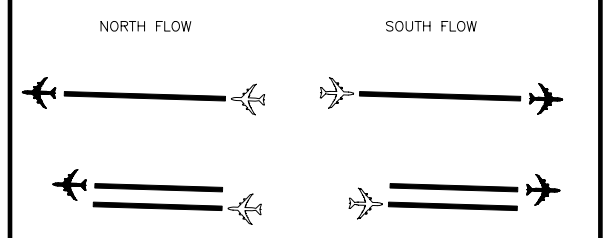
WEST BERRY AVENUE

5

### Drawing Legend

- Air Cargo
- Airfield Maintenance
- Air Traffic Control Tower
- Fuel Farm
- General Aviation
- Hotel/ Airport Administration Campus
- Terminal Support
- Development Opportunity
- Additional Runways / Taxiways
- RAC Center and Storage
- Surface Parking
- Parking garage
- Storm Water Retention
- Terminal Expansion
- Land to be Acquired
- Airport Propertyline

### Airfield Utilization




40 ACRES

NORTH

2400' 1200' 0' 2400'

SACRAMENTO COUNTY AIRPORT SYSTEM
6900 AIRPORT BLVD.
SACRAMENTO, CA 95837

**Sacramento International Airport Master Plan Study**

AIRFIELD ALTERNATIVE 3 – INBOARD WEST RUNWAY

EXHIBIT 5.1-5

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PB AVIATION

# Airfield Alternative 4

## Inboard North Runway

**9,000 ft. New Runway**

**1,700 ft. East of Runway 16R/34L**

**1,000 ft. Extension to Runway 16L, 1,400 ft. to 34R**

**Hourly Capacity of 159 Operations**

**ASV of 612,000 Operations**

**Drawing Legend**

- Air Cargo
- Airfield Maintenance
- Air Traffic Control Tower
- Fuel Farm
- General Aviation
- Hotel/ Airport Administration Campus
- Terminal Support
- Development Opportunity
- Additional Runways / Taxiways
- RAC Center and Storage
- Surface Parking
- Parking garage
- Storm Water Retention
- Terminal Expansion
- Airport Propertyline

**Airfield Utilization**

NORTH FLOW

SOUTH FLOW

40 ACRES

NORTH

2400' 1200' 0' 2400'

SACRAMENTO COUNTY AIRPORT SYSTEM
6900 AIRPORT BLVD.
SACRAMENTO, CA 95837

**Sacramento International Airport Master Plan Study**

AIRFIELD ALTERNATIVE 4 – INBOARD NORTH RUNWAY

EXHIBIT 5.1-6

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PB AVIATION

southern runway threshold is located to allow the RPZ to remain north of the cross field taxiway system. A 8,600 foot runway can be constructed entirely on property owned by the airport. The north RPZ extends slightly beyond airport property by approximately 150 feet and an avigation easement could be acquired for this property.

To minimize aircraft flight over the west side of the terminal area, it is assumed that in north flow operations, the new runway could be used as a departure runway while in south flow it would be best used as an arrival runway. This assumption reduces the amount of terminal platform that can be developed south of the midfield taxiways due to height and safety concerns. As shown, there are drainage and wetland areas in the north part of the airport that likely would be affected by this alternative. It should also be noted that Elverta Road would need to be relocated, eliminated, or depressed by a runway in this location.

### 5.1.8 Alternative 5 – Outboard West Runway, 2,500 Foot Separation

**Exhibit 5.1-7** Airfield Alternative 5 Outboard West Runway, Widely Spaced shows a 2,500-foot separation needed to establish a wake vortex independent runway, there is only enough space between I-5 and the Sacramento River to develop a 7,000-foot runway. To maximize the runway length, the southern RPZ is located adjacent to the highway. The southern end of Runway 16R/34L would be extended to keep the thresholds of the two west runways even, bringing the total length of Runway 16L/34R to 9,800 feet. This is recommended because of the tendency for pilots to request the closest runway threshold on landing and it allows the two runways to be equal in this respect.

# Airfield Alternative 5

## Outboard West Runway

**7,000 ft. New Runway**

**2,500 ft. West of Runway 16R/34L**

**2,000 ft. Extension to Runway 16L and 1,400 ft. Extension to 34R**

**1,200 ft. Extension to 34L**

**Hourly Capacity of 165 Operations**

**ASV of 635,000 Operations**

**Drawing Legend**

- Air Cargo
- Airfield Maintenance
- Air Traffic Control Tower
- Fuel Farm
- General Aviation
- Hotel/ Airport Administration Campus
- Terminal Support
- Development Opportunity
- Additional Runways / Taxiways
- RAC Center and Storage
- Surface Parking
- Parking garage
- Storm Water Retention
- Terminal Expansion
- Airport Propertyline

**Airfield Utilization**

NORTH FLOW

SOUTH FLOW

40 ACRES

NORTH

2400' 1200' 0' 2400'

SACRAMENTO COUNTY AIRPORT SYSTEM
6900 AIRPORT BLVD.
SACRAMENTO, CA 95837

**Sacramento International Airport Master Plan Study**

AIRFIELD ALTERNATIVE 5 – OUTBOARD WEST RUNWAY– 2,500' SEPARATION

EXHIBIT 5.1-7

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PB AVIATION

The new runway would have a full-length parallel taxiway and perpendicular access taxiways at each end. On the southern end, two perpendicular taxiways would provide efficient access into the existing and future airfield facilities and also serve as an aircraft bypass in the area between the parallel taxiways. As can be seen on Exhibit 5.1-7 this alternative would require substantial property acquisition. Additionally, this alternative would impact an existing privately-owned golf course located to the west of the Airport.

### 5.1.9 Alternative 6 – Inboard West Runway - Relocated Runway 16R/34L

**Exhibit 5.1-8,** Airfield Alternative 6 Inboard West Runway, shows that two new runways are provided on the west side of the Airport with a separation distance of 1,200 feet. This alternative allows additional acres for terminal development than Alternative 4 by constructing a new runway on the alignment of existing Taxiway A. A replacement runway for existing Runway 16R/34L would be developed 450 feet to the west of the existing runway, near the west Airport property edge. The runway system requires full-length parallel taxiways between the two runways and to the east of the new center runway.

Similar to Alternative 4, this alternative would require 471 acres of property acquisition but would have substantial impact on the available terminal area and existing terminal area facilities. As shown in Exhibit 5.1-8, many facilities would need to be demolished and replacement facilities constructed in another location due to the construction of the runway and taxiway system.

### 5.1.10 Evaluation of Secondary Airfield Alternatives (Level 2)

Based on the visions for the Airport, a comprehensive set of evaluation criteria were developed by the project team and representatives of SCAS. As

# Airfield Alternative 6

## Inboard West Runway
## Relocated Runway 16R-34L

**8,600 ft. New Runway**

**1,200 ft. West of Runway 16L/34R**

**1,000 ft. Extension to Runway 16L, 1,400 ft. to 34R**

**Hourly Capacity of 159 Operations**

**ASV of 612,000 Operations**

11,000' X 150'

1,200'

8,600' x 150'

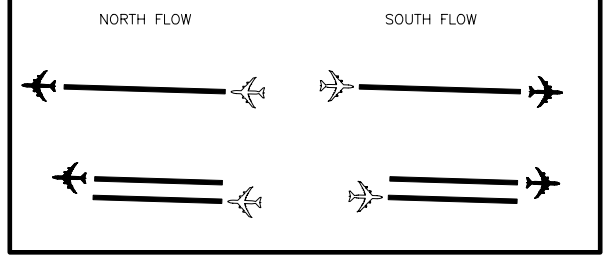
POTENTIAL WETLANDS

POTENTIAL WETLANDS

### Drawing Legend

- Air Cargo
- Airfield Maintenance
- Air Traffic Control Tower
- Fuel Farm
- General Aviation
- Hotel/ Airport Administration Campus
- Terminal Support
- Development Opportunity
- Additional Runways / Taxiways
- RAC Center and Storage
- Surface Parking
- Parking garage
- Storm Water Retention
- Terminal Expansion
- Airport Propertyline

### Airfield Utilization




40 ACRES

NORTH

2400' 1200' 0' 2400'

SACRAMENTO COUNTY AIRPORT SYSTEM
6900 AIRPORT BLVD.
SACRAMENTO, CA 95837

**Sacramento International Airport Master Plan Study**

AIRFIELD ALTERNATIVE 6 – INBOARD WEST RUNWAY – RELOCATED RW 16R-34L

EXHIBIT 5.1-8

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shown below, the intent was to ensure a through evaluation of each alternative, yielding the best alternatives for a final review. The criteria were developed within the following categories:

- Airfield
- Safety and Security
- Airport Revenue Generation
- Operation/Maintenance Cost
- Capital Cost
- Socioeconomic/Community Environment
- Natural Environment
- Construction Feasibility

**Table 5.1-1** Level 2 Alternatives Evaluation Data, compares each of the airfield alternatives with the Level 2 criteria. For each criterion, the quantitative score for each alternative was calculated or measured as shown in the table. For those criteria that are qualitative, the relative favorability of each alternative is provided in a subsequent ranking analysis.

#### *5.1.10.1 Airfield*

Average taxi distances were calculated from the midpoint of the terminal area to the closest runway threshold. For this level of analysis the intent was to establish an "order of magnitude comparison." The shortest distances (most favorable) are for Alternatives 3 and 4 while Alternative 5 has the longest (least favorable) taxi distances.

For the IMC and VMC Peak Hour Capacity, during this phase of the analysis, theoretical estimates were used as opposed the more detailed modeling effort that was performed for Level 3. The values in Table 5.1-1 are representative of the capacity of each alternative and all capacity estimates are comparable, allowing an evaluation of the relative merits of each alternative. The method for calculating these capacity estimates are as follows:

1. Select the runway-use configuration – north and south flows
2. Determine the percentage of Class C and D and calculate the mix index
3. Determine percent arrivals
4. Determine hourly capacity base (C*)

*TABLE 5.1-1*

*Sacramento International Airport*

*LEVEL 2 ALTERNATIVES EVALUATION DATA AND RANKING*

| Level 2 Criteria | Airfield Alternatives | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Alt 2 | | Alt 3 | | Alt 4 | | Alt 5 | | Alt 6 | |
| | Eval. Data | Ranking | Eval. Data | Ranking | Eval. Data | Ranking | Eval. Data | Ranking | Eval. Data | Ranking |
| **Airfield** | | | | | | | | | | |
| Average Taxi Distance (feet) | 9,500 | 3 | 8,700 | 5 | 9,800 | 2 | 10,100 | 1 | 9,100 | 4 |
| IMC Peak Hour Capacity, north flow (operations) | 115 | 4 | 115 | 4 | 115 | 4 | 115 | 5 | 115 | 4 |
| IMC Peak Hour Capacity, south flow (operations) | 115 | 4 | 115 | 4 | 115 | 4 | 125 | 5 | 115 | 4 |
| VMC Peak Hour Capacity, north flow (operations) | 159 | 4 | 159 | 4 | 159 | 1 | 165 | 5 | 159 | 4 |
| VMC Peak Hour Capacity, south flow (operations) | 159 | 4 | 159 | 4 | 159 | 1 | 165 | 5 | 159 | 4 |
| New Runway Aircraft Capability (type of aircraft) | B757-300 | 5 | B757-300 | 5 | B757-300 | 5 | B757** | 1 | B757-300 | 5 |
| Impact on Terminal Platform (acres remaining of usable Terminal Platform) | 156 | 5 | 87 | 1 | 91 | 3 | 156 | 5 | 89 | 2 |
| Annual Service Volume (operations) | 520,000 | 4 | 520,000 | 4 | 412,000 | 1 | 550,000 | 5 | 520,000 | 4 |
| Usable Facilities Demolished (square feet) | 0 | 5 | 1,086,328 | 5 | 26,000 | 3 | 0 | 5 | 1,002,828 | 2 |
| **Safety and Security** | | | | | | | | | | |
| ARFF Facilities Required (number of stations) | 2 | 5 | 2 | 5 | 2 | 5 | 2 | 5 | 2 | 5 |
| **Access and Parking** | | | | | | | | | | |
| Area Available for Parking Facilities (acres) | 101 | 5 | 96 | 1 | 101 | 5 | 101 | 5 | 98 | 2 |
| **Airport Revenue Generation** | | | | | | | | | | |
| Capability to Expand Existing Revenue Land Uses and Add New Uses | * | 4 | * | 1 | * | 3 | * | 5 | * | 2 |
| Non-Aviation Revenue Generation Opportunities (acres) | 1,537 | 5 | 1,497 | 3 | 1,223 | 1 | 1,537 | 5 | 1,497 | 3 |
| **Operation and Maintenance Cost** | | | | | | | | | | |
| Airfield Area to be Maintained (acres) | 356 | 3 | 337 | 4 | 453 | 1 | 434 | 2 | 323 | 5 |
| **Capital Cost** | | | | | | | | | | |
| Order of Magnitude Project Cost (millions) Airfield only | $270 | 3 | $96 | 4 | $93 | 5 | $280 | 1 | $272 | 2 |
| Functionality with Currently Programmed Facilities (professional judgement) | * | 5 | * | 2 | * | 5 | * | 5 | * | 2 |
| Cost of Facilities to be Relocated (millions) | $0 | 5 | $328 | 1 | $19 | 3 | $0 | 5 | $324 | 2 |
| Environmental Mitigation Costs | $143,500 | 3 | $0 | 5 | $7,800,000 | 1 | $143,500 | 3 | $56,200 | 4 |
| **Socioeconomic/Community Environment** | | | | | | | | | | |
| Land Acquisition Required (acres) (entire parcels) | 580 | 2 | 0 | 5 | 0 | 5 | 978 | 1 | 471 | 3 |
| Agricultural Land Impacted (acres) | 332 | 3 | 0 | 5 | 543 | 2 | 595 | 1 | 109 | 4 |
| Recreation Facilities Impacted (acres) | 0 | 5 | 0 | 5 | 0 | 5 | 52 | 1 | 0 | 5 |
| Historic or Archaeological Sites Affected (number) | 0 | 5 | 0 | 5 | 0 | 5 | 0 | 5 | 0 | 5 |
| General Land Use Compatibility (professional judgment) | * | 3 | * | 5 | * | 2 | * | 2 | * | 4 |
| Off-Airport Surface Transportation Impacts (professional judgment) | * | 5 | * | 5 | * | 1 | * | 5 | * | 5 |
| **Natural Environment** | | | | | | | | | | |
| Wetlands Affected (acres) | 0 | 5 | 0 | 5 | 13 | 1 | 0 | 5 | 0 | 5 |
| Endangered or Threatened Species Habitat (VELB units) | 58.2 | 2 | 0 | 5 | 0 | 5 | 58.2 | 2 | 0 | 5 |
| Tree Removal Required (15 gallan tree) | 260 | 3 | 0 | 5 | 0 | 5 | 260 | 3 | 260 | 3 |
| Reduction in Open Space (acres) | 332 | 3 | 0 | 5 | 543 | 2 | 647 | 1 | 109 | 4 |
| **Construction Feasibility** | | | | | | | | | | |
| Ease of Phasing for Airfield Construction (professional judgment) | * | 5 | * | 2 | * | 3 | * | 5 | * | 1 |
| Total Ranking | | 125 | | 112 | | 95 | | 114 | | 106 |

Source: PB Aviation

* Due to the nature of the category, these categories requiring professional judgment could not be quantiatively analyzed, but are ranked in the following Table 5.4-2, Ranking Analysis.

** Runway length of 7,000 feet usable by B737 for relatively short stage length flights only.

5. Determine the percentage of touch and go operations during VFR operations and determine the touch and go factor (T)
6. Determine the location of exit taxiways and determine the exit factor (E)
7. Calculate the hourly capacity by the following equation:

Hourly capacity of the runway component = C*xTxE

The following assumptions were used in the capacity estimates:

- Close parallel runways are spaced from 700 feet to 2,500 feet.
- In IMC conditions, operation of one runway is dependent upon the operation on the other runway.
- In VMC conditions, close parallel runways allow simultaneous arrivals and departures; i.e., arrivals may occur on one runway while departures are occurring on the other runway. Simultaneous arrivals to both runways and simultaneous departures from both runways are not allowed.

Intermediate parallel runways are spaced from 2,500 feet to less than 4,300 feet.

- In IMC conditions, an arrival on one runway is independent of a departure on the other runway. Intermediate parallel runways may be operated with simultaneous departures in a radar environment, if the centerline spacing is at 2,500 feet.
- In VMC conditions, intermediate parallel runways may be operated with simultaneous arrivals.

To determine the aircraft capability of each alternative's new runway, technical evaluations of runway length requirements for various types of aircraft were done and consultations with the airlines were held. All of the runway lengths except the 7,000-foot Alternative 5 runway can accommodate the B757 which is expected to remain one of the most demanding aircraft using the Airport in the future. The new runway in the Alternative 5 runway configuration can accommodate B737 operations on relatively short stage length flights (e.g. West Coast cities), but would not be sufficient to handle fully loaded air carrier aircraft departures on long distance flights.

The size of the available terminal platform is a key criteria in determining the future growth and expansion capability of the Airport. Given this criteria, each airfield alternative was evaluated to determine the

impact on the terminal platform. Alternative 3, Alternative 4, and Alternative 6 significantly impact the size of the usable terminal platform because these airfield alternatives encroach upon the terminal area. Alternatives 2 and 5 have no impact on the available terminal area and therefore are the best for this category.

Annual Service Volume (ASV), the annual number of aircraft operations that an airport can accommodate, was determined by using the Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5060-5, Airport Capacity and Delay Manual. A detailed description of the ASV methodology can be found in Chapter 4. The runway configuration with the highest ASV is Alternative 5 with an ASV of 550,000 operations. Alternatives 2, 3, and 6 rank equally with an ASV of 520,000 operations. Alternative 4 ranks the lowest with 412,000 operations.

Alternatives 3 and 6 would require significant demolition and replacement of existing cargo facilities, general aviation hangars and offices, the Airport's electrical lighting vault, postal facilities, airline catering building and other facilities. The configuration of these two airfield alternatives would require that existing facilities be removed and replaced elsewhere to accommodate a new runway and associated infrastructure and safety areas.

#### *5.1.10.2 Safety and Security*

Based on information from the Airport Fire Chief, the existing ARFF station meets the required time criterion to reach the existing runways; however, it appears doubtful that this criteria could continue to be met under any of the new runway alternatives. Therefore, it was assumed that any airfield development will require an additional ARFF station and the entire airfield alternative compared equally in this respect.

#### *5.1.10.3 Access and Parking*

For the Access and Parking criterion, Alternatives 3 and 6 would require the realignment of the terminal access road and also would reduce the area available for parking.

#### *5.1.10.4 Airport Revenue Generation*

The greatest amount of property available for non-aviation revenue-generating land development is under Alternatives 2 and 5. Alternatives 3, 4, and 6 limit the amount of property available for this as compared to Alternatives 2 and 5.

### 5.1.10.5 Operations and Maintenance Cost

The operations and maintenance cost is represented by the amount of airfield area to be maintained. Alternatives 4 and 5 have the greatest amount of airfield area and assumed to be the most costly to maintain. Alternative 6 has the least amount of airfield area to maintain and is assumed to be the least costly to maintain.

### 5.1.10.6 Capital Cost

Alternative 5 has the highest order of magnitude project cost (this criterion does not include demolition and facility replacement) while Alternative 4 has the lowest cost. These costs are not all-inclusive, but represent the major airfield development and construction items for each alternative and are sufficient to allow a comparison between the alternatives. The costs for Alternatives 2 and 5 include land acquisition estimates, while the cost for Alternative 6 includes the construction of two runways.

The demolition and replacement costs for the facilities noted above are shown in the Cost of Facilities to be Relocated criterion. As can be seen, the total development cost for Alternatives 3 and 6 is quite high when these replacement facility costs are considered.

The following section discusses of the potential environmental mitigation required for each alternative. Alternative 4, which extends to the north, has the potential to impact environmentally sensitive areas; therefore, a higher cost for environmental mitigation would be expected. There also are several areas of environmental concern that could lead to mitigation costs for Alternatives 2, 4, and 5, although these costs are relatively low.

### 5.1.10.7 Socioeconomic/Community Environment

Under the Socioeconomic/Community Environment category the land acquisition criterion was analyzed by assuming that entire parcels of land would be acquired for some of the airfield alternatives. The land acquisition required for Alternative 5 is the highest due to the runway's wider spacing from existing airport property. Alternative 2 would require some land acquisition to the west of the Airport, and Alternative 6 would also require land acquisition with the location of an outboard runway to the west. Alternatives 3 and 4 remain entirely on airport property.

Under the Agricultural Land Impacted category, Alternative 5 would consume the most agricultural land. It should be noted that Alternative 4 impacts the second largest acreage of agricultural land, all of

which is within the existing Airport's property boundary. **Exhibit 5.1-9**, Environmental Baseline Conditions shows all the airfield alternative configurations with environmental land use base map. The Alternative 5 configuration expands the Airport's footprint farthest to the west. This alternative is the only one to impact recreational facilities (52 acres representing the Teal Bend Golf Course).

It should be noted that none of the alternatives appears to affect any known historic or archeological sites in the Airport's vicinity.

#### *5.1.10.8 Natural Environment*

In the natural environment category, Alternative 4 potentially impacts wetlands in the north part of the Airport. In the Airport's vicinity, the Valley Elderberry Longhorn Beetle (VELB) is an endangered species and its habitat is the Elderberry Bush. Disruption of any of the Elderberry Bushes would require removal of the entire group of Elderberry Bushes. The units to be relocated are based on recent field surveys conducted by Sacramento County. All of the bushes would be relocated for Alternatives 2 and 5, as these runway alternatives clearly disrupt the majority of the bushes.

Under the tree removal criterion, the Cottonwoods and Oak trees were analyzed not by a tree-by-tree removal basis, but collectively as habitat replacement. Alternatives 2, 5, and 6 would each require removal of an area of trees used as nesting areas for the Swainson's Hawk, and other habitat areas as well.

Reduction in open space refers to the general amount of open land that would be taken up by each alternative. Alternative 5 uses the most open space, while Alternative 3 does not require any open space for development.

### *5.1.11 Comparative Level 2 Evaluation*

Following the data analysis, a ranking evaluation was developed to assist in determining which alternatives are most favorable. Each airfield alternative was ranked on a scale from one to five according to the evaluation criteria. The rank of five was given to the most favorable airfield alternative for each criterion, such the least expensive cost, or minimal impact, and the rank of one was given to


SACRAMENTO COUNTY AIRPORT SYSTEM
6900 AIRPORT BLVD.
SACRAMENTO, CA 95837

**Sacramento International Airport Master Plan Study**

# ENVIROMENTAL BASELINE CONDITIONS

EXHIBIT 5.1-9

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the least favorable. In the event of a tie, the value(s) that would have been in the ranking without the tie were skipped. For example if two alternatives were each ranked with a score of 5, the next best alternative would receive a score of 3 (the value of 4 would be skipped). Table 5.1-1 shows the rank and score of each airfield alternative.

***Airfield*** - Under the Airfield criteria, Alternative 2 Outboard West Runway-1,200' separation and Alternative 5 Outboard West Runway, 2,500' separation ranked most favorable. This was due to the overall higher ranking for peak hour capacity, and relatively good rankings in the other airfield criteria. Alternative 4, Inboard North Runway ranked least favorable due to the lower capacity that this alternative would have, the average taxi distance, and the impact on the terminal platform.

***Safety and Security*** - For the Safety and Security category, it was determined that under any new construction, one or two ARFF facilities would be needed. Therefore, the conclusion was to rank all the alternatives the same, giving them each a score of five.

***Access and Parking*** - Alternative 3 is the only alternative to affect the parking area therefore; it ranked the lowest in this category while all of the other alternatives were equal.

***Airport Revenue Generation*** - Under the Airport Revenue Generation criteria, Alternatives 2 and 5 ranked the most favorable as they allowed the most area for future development, that could be non-aviation related. Under the Capability to Expand Existing Revenue Land Uses and Add New Uses, Alternatives 3 and 6 ranked the least favorable, as they offer the least available land for new land uses.

***Operation Maintenance Cost*** - Airfield Alternative 4, Inboard North Runway, ranked least favorable under the category Operation Maintenance Cost due to the new runway extending so far to the north, and requiring more airfield area than currently exists. Alternatives 3 and 6 ranked most favorable as they consume the least amount airfield area.

***Capital Cost*** - Under the Capital Cost criteria, Alternative 2 ranked highest as it needed little adjustment to be functional with currently programmed facilities and required minimal facilities to be relocated, which considerably affected cost. Alternatives 4 and 5 ranked next most favorable with tying scores. Alternative 6 ranked lowest, followed in order by Alternative 3.

***Socioeconomic/Community Environment*** - Under the Socioeconomic/Community Environment, Alternative 3 ranked most favorable. This is based on the minimal complications with land acquisition required, or agricultural land impacted. The configuration of Alternative 3, developing within the existing airport property, shows that there is no impact to agricultural land. The remaining airfield alternatives develop more of airport property, or require off-airport land to be acquired and impacts the surrounding agricultural land.

***Natural Environment*** - The configuration of Alternative 3 shows that the footprint of the existing Airport presents no future threats to biotic communities. The remaining airfield alternatives develop more of airport property, or require off-airport land to be acquired, thus impacting the surrounding biotic communities.

***Construction Feasibility*** - When analyzing the Construction Feasibility category for each of the airfield Alternatives, Alternatives 2 and 5 ranked most favorable because they can be constructed with very little impact to continuing airport operations. Alternatives 3 and 6 would be very disruptive to operations during the construction phase.

The results of the Level 2 evaluation are as follows:

| | |
|---|---|
| Alternative 2 (Outboard West Runway)-1,200' Separation | 125 |
| Alternative 3 (Inboard West Runway) | 112 |
| Alternative 4 (Inboard North Runway) | 95 |
| Alternative 5 (Outboard West RW)-2,500' Separation | 114 |
| Alternative 6 (Inboard West RW/Relocated RW 16R/34L) | 106 |

Based on these ranking results, three of the five airfield alternatives clearly ranked highest above the other two. For these reasons, the following three airfield alternatives were selected for refinement and evaluation with Level 3 Criteria:

- Alternative 2 (Outboard West Runway)-1,200' Separation
- Alternative 3 (Inboard West Runway)
- Alternative 5 (Outboard West Runway)-2,500' Separation

## 5.2 REFINEMENT OF AIRFIELD ALTERNATIVES

The three most favorable alternatives were subjected to additional refinements to support a more detailed Level 3 evaluation. The airfield refinements for Alternatives 2, 3, and 5 consisted of:

- Airfield exits
- Crossfield Taxiway spacing
- Location of holdpads
- Taxiway and taxilane distances

Common to all three alternatives, the cross taxiways between the two existing east and west runways were repositioned as far north as possible to provide the maximum available area for terminal development.

It was also determined that the existing east runway, Runway 16L/34R would be planned for the future accommodation of Group VI aircraft (given the future extension to an 11,000 foot length). To accommodate Group VI aircraft needing to cross between the runways, the northern crossfield taxiway would also be planned for Group VI requirements. The future west runway and the future southern cross field taxiway would be planned to meet Group V requirements. **Table 5.2-1** below shows selected FAA dimensional criteria for runways and taxiways for Group V and VI aircraft.

***TABLE 5.2-1***

***Sacramento International Airport***

***FAA DIMENSIONAL CRITERIA***

| FAA Design Criteria | Airplane Design Group | |
|---|---|---|
| | Group V | Group VI |
| Runway Width (feet) | 150 | 200 |
| Runway centerline to taxiway to centerline (feet) | 400 | 600 |
| Taxiway Width (feet) | 75 | 100 |
| Taxiway centerline to parallel taxiway centerline (feet) | 267 | 324 |
| Taxiway Object Free Area width (feet) | 320 | 386 |

Source: FAA Advisory Circular AC 150/5300-13

## *5.2.1 Level 3 Evaluation of Detailed Airfield Alternatives*

A detailed Level 3 analysis was conducted for Alternatives 2, 3, and 5 using criteria in the following categories: Airfield, Terminal Complex Development Area, Safety and Security, Access and Parking, Cargo, Airport Revenue Generation, Operations and Maintenance Cost, Capital Cost, Financial Feasibility, Socioeconomic/Community Environment, Natural Environment, and Construction Feasibility. The following **Table 5.2-2** shows the Level 3 evaluations for the criteria in these categories:

***Airfield*** - The Airfield evaluation included a simulation analysis to determine aircraft delay and runway crossing delay. SIMMOD, the FAA, Airport

*TABLE 5.2-2*

*Sacramento International Airport*

*LEVEL 3 DETAILED ALTERNATIVES EVALUATION DATA AND RANKING*

| Level 3 Criteria | Airfield Alternatives | | | | | |
|---|---|---|---|---|---|---|
| | Alt 2 | | Alt 3 | | Alt 5 | |
| | Eval. Data | Ranking | Eval. Data | Ranking | Eval. Data | Ranking |
| **Airfield** | | | | | | |
| Average Aircraft Delay-south flow-VFR (min.) | 1.52 | 5 | 1.54 | 1 | 1.36 | 10 |
| Average Aircraft Delay-north flow-VFR (min.) | 1.58 | 10 | 1.64 | 5 | 1.67 | 1 |
| Average Aircraft Delay-south flow-IFR (min.) | 1.87 | 1 | 1.81 | 5 | 1.68 | 10 |
| Average Aircraft Delay-north flow-IFR (min.)[1] | 1.72 | 5 | 1.72 | 5 | 1.70 | 10 |
| Maximum Throughput VMC (operations/hour) | 159 | 5 | 159 | 5 | 165 | 10 |
| Maximum Throughput IMC (operations/hour) | 115 | 5 | 115 | 5 | 125 | 10 |
| Annual Service Volume (operations) | 520,000 | 5 | 520,000 | 5 | 520,000 | 10 |
| Impact on Terminal Platform (acres remaining) | 147 | 10 | 99 | 1 | 147 | 10 |
| Annual Aircraft Delay Costs (year 2020, millions)[2] | $10.61 | 1 | $10.56 | 5 | $9.81 | 10 |
| Maximum number of aircraft parking positions | * | 10 | * | 1 | * | 10 |
| **Terminal Complex Development Area** | | | | | | |
| Maximizes the service life of the existing facilities | * | 10 | * | 1 | * | 10 |
| Maximizes the flexibility in expanding the terminal complex within the bounds of the existing airfield and roadways | * | 10 | * | 1 | * | 10 |
| **Safety and Security** | | | | | | |
| ARFF Facilities Required (number of stations) | 2 | 10 | 2 | 10 | 2 | 10 |
| Secured/Patrolled Area (acres) | 356 | 5 | 337 | 10 | 434 | 1 |
| Number of Runway Crossings | 22 | 5 | 16 | 10 | 26 | 1 |
| **Access and Parking** | | | | | | |
| Area Available for Parking Facilities (acres) | 101 | 10 | 96 | 1 | 101 | 10 |
| **Cargo** | | | | | | |
| Distance from Ramp to Belly Cargo Facilities (feet) | 3,930 | 5 | 2,300 | 10 | 3,930 | 5 |
| Distance from Cargo Facilities to Highway Interchange (feet) | 5,360 | 10 | 7,600 | 1 | 5,360 | 10 |
| **Airport Revenue Generation** | | | | | | |
| Non-Aviation Revenue Generation Opportunities (loss of acres) | 0 | 10 | 312 | 1 | 0 | 10 |
| Aviation Related Revenue Generation Opportunities (acres) | * | 10 | * | 1 | * | 10 |
| **Operations and Maintenance Cost** | | | | | | |
| New Airfield Area to be Maintained (acres) | 356 | 5 | 337 | 10 | 434 | 1 |
| New Airfield Pavement to be Maintained (acres) | 6,450 | 5 | 5,913 | 10 | 6,660 | 1 |
| Minimum terminal operations and maintenance costs | * | 10 | * | 1 | * | 10 |
| **Capital Cost** | | | | | | |
| Order of Magnitude Project Cost (millions) | $94.4 | 5 | $85.7 | 10 | $136 | 1 |
| Cost of Facilities to be Relocated (millions) | $0 | 10 | $328 | 1 | $0 | 10 |
| Environmental Mitigation Costs | $1.28 | 5 | $0.50 | 10 | $1.56 | 1 |
| Minimum terminal capital costs | * | 10 | * | 1 | * | 10 |
| **Financial Feasibility** | | | | | | |
| Estimated Additional Airline Landing Fees (millions) | $2.14 | 10 | $5.84 | 1 | $2.88 | 5 |
| Additional Airline Cost per Enplaned Passenger | $6.07 | 10 | $12.41 | 1 | $7.01 | 5 |

*TABLE 5.2-2(continued)*

*Sacramento International Airport*

*LEVEL 3 DETAILED ALTERNATIVES EVALUATION DATA AND RANKING*

| Level 3 Criteria | Airfield Alternatives | | | | | |
|---|---|---|---|---|---|---|
| | Alt 2 | | Alt 3 | | Alt 5 | |
| | Eval. Data | Ranking | Eval. Data | Ranking | Eval. Data | Ranking |
| **Socioeconomic/Community Environment** | | | | | | |
| Land Acquisition Required (minimum acres) | 14 | 5 | 0 | 10 | 110 | 1 |
| Prime Agricultural Land Impacted (acres) | 332 | 5 | 0.2 | 10 | 595 | 1 |
| Delays development of airport-owned farmlands | * | 10 | * | 1 | * | 10 |
| Recreation Facilities Impacted (acres) | 0 | 10 | 0 | 10 | 52 | 1 |
| Public Parks in 60 CNEL (number) | 0 | 10 | 0 | 10 | 0 | 10 |
| Noise Sensitive Facilities in 70 CNEL | 18 | 5 | 8 | 10 | 19 | 1 |
| Historic or Archaeological Sites Affected (number) | 0 | 10 | 0 | 10 | 0 | 10 |
| Off-Airport Surface Transportation Impacts (professional judgement) | * | 1 | * | 10 | * | 1 |
| Hazardous Material Sites Impacted (number) | 1 | 10 | 3 | 1 | 1 | 10 |
| **Natural Environment** | | | | | | |
| Air Quality Operations Impacts | *** | 5 [1] | *** | 1 [1] | *** | 10 [1] |
| Air Quality Construction Impacts | * | 10 | * | 1 | * | 5 |
| Wetlands Affected (acres) | 1.8 | 5 | 0.8 | 10 | 2.3 | 1 |
| Endangered or Threatened Species Habitat | 58.2 | 5 | 0 | 10 | 58.2 | 1 |
| Tree Removal Required | 47 | 5 | 0 | 10 | 100 | 1 |
| Reduction in Open Space (acres) | 332 | 5 | 0.2 | 10 | 647 | 1 |
| **Construction Feasibility** | | | | | | |
| Ease of Phasing for Airfield Construction (professional judgment) | * | 5 | * | 1 | * | 10 |
| Duration of Construction | * | 5 | * | 1 | * | 10 |
| Maintenance of Aircraft Traffic | * | 10 | * | 1 | * | 10 |
| Minimized disruptions to terminal operations during new facility construction | * | 10 | * | 1 | * | 10 |
| Total | | 268 | | 243 | | 232 |

Source: PB Aviation

* Due to the nature of the category, these categories requiring professional judgment could not be quantiatively analyzed, but are ranked in the following Table 5.4-2, Ranking Analysis.

** Runway length of 7,000 feet usable by B737 for relatively short stage length flights only.

*** Refer to the analysis of Air Quality Operations Impacts following evaluation table.

[1] Refer to Table 5.#-# Operational Air Pollutants

[2] Refer to Table 5.#-#

and Airspace Simulation Model were used to evaluate the operational aspects of each airfield alternative. SIMMOD input data includes the airspace route structure in the airport terminal area, airfield characteristics, air traffic control rules and procedures, aircraft ground control rules and procedures, aircraft operating characteristics, and aircraft operations schedules. The fleet mix and aircraft operational schedule for the year 2020 was used in this analysis.

(Additional information on the simulation assumptions and procedures can be found in Section 4.1.2).

The results of the simulation analyses are shown in **Table 5.2-3** SIMMOD Results. While a no-build scenario is not technically a development alternative, the airfield operational characteristics were simulated to allow an evaluation of the effects that would result from not constructing one of the airfield alternatives.

***TABLE 5.2-3***

***Sacramento International Airport***

***SIMMOD RESULTS***

| | Flow Pattern | Weather Condition | Maximum Throughput | Arrival Delay (minutes) | Departure Delay (minutes) | Runway Crossings[1] | Runway Crossing Delay (seconds) |
|---|---|---|---|---|---|---|---|
| **No-Build** | **South Flow** | VFR | 120 | 3.56 | 2.40 | 0 | 0 |
| | | IFR | 110 | 4.44 | 3.28 | 0 | 0 |
| | **North Flow** | VFR | 120 | 4.43 | 1.63 | 0 | 0 |
| | | IFR | 56[2] | 12.81[2] | 2.43 | 0 | 0 |
| **Alternative 2** | **South Flow** | VFR | 159 | 1.50 | 1.54 | 22 | 27.0 |
| | | IFR | 115 | 1.47 | 2.26 | 22 | 13.6 |
| | **North Flow** | VFR | 159 | 1.79 | 1.37 | 22 | 19.0 |
| | | IFR | 115 | 2.26 | 1.17 | 22 | 15.9 |
| **Alternative 3** | **South Flow** | VFR | 159 | 1.50 | 1.57 | 16 | 74.6 |
| | | IFR | 115 | 1.50 | 2.11 | 16 | 33.3 |
| | **North Flow** | VFR | 159 | 1.82 | 1.46 | 16 | 4.4 |
| | | IFR | 115 | 2.26 | 1.17 | 16 | 4.3 |
| **Alternative 5** | **South Flow** | VFR | 165 | 1.38 | 1.34 | 26 | 95.9 |
| | | IFR | 125 | 1.50 | 1.86 | 26 | 305.8 |
| | **North Flow** | VFR | 165 | 2.03 | 1.31 | 26 | 7.9 |
| | | IFR | 125 | 2.06 | 1.34 | 26 | 49.6 |

Source: PB Aviation

[1] Peak hour runway crossings

[2] No ILS on Runway 34R

Generally, all three alternatives have similar levels of delay projected for the year 2020. However, Alternative 5 has slightly higher throughput due to the wider runway spacing.

Alternative 3 has the lowest number of runway crossings during the peak hour while Alternative 5 has the highest number of runway crossings.

It should be noted that if one of the airfield alternatives is not constructed, operational delays as shown in the "no-build" alternative will be significant and this will lead to degradations in air quality as well as higher operating costs at the airport.

***Terminal Complex Development*** - The terminal complex development area category included the airfield size and configuration that maximizes the service life of existing facilities, and maximizing the flexibility in expanding the terminal complex within the bounds of the existing airfield and access roadways. The two criteria were used to evaluate the impact of each airfield alternative on the terminal platform, and the scoring of these criteria is shown in the **Table 5.3-1**.

***Safety and Security*** - The safety and security analysis related to the number of ARFF facilities required, the areas of land that need to be secured and patrolled, and the number of runway crossings during peak hour operations. It was assumed that with any new development on the airfield, an additional ARFF station would be required. Alternative 5 has the most airfield property to be secured and the highest number of runway crossings during the peak hour.

***Access and Parking*** - The access and parking category analyzed the area available for parking facilities. This category and the results are the same as the Level 2 Evaluation. Alternative 3 is the only airfield alternative that encroaches on the parking area.

***Cargo*** - The cargo category analyzed the distance from the cargo ramps to the belly cargo facilities and the distance from the cargo facilities to the highway interchange (I-5) with the three different airfield alternatives. Alternative 3 has the shortest distance from the cargo ramp to the belly cargo facility while Alternatives 2 and 5 have the same (longer) distance. However, when measuring the distance from the belly cargo facility to the highway interchange, Alternatives 2 and 5 again have the same distance, but this distance is shorter than Alternative 3.

***Airport Revenue Generation*** - Non-aviation and aviation-related revenue generation opportunities were analyzed in this category. The aviation-related revenue generation was based on the land that could potentially be developed in the future for aviation uses. The runway/taxiway configuration for Alternative 3 encroaches on land that could potentially be used in the future for aviation development. The non-aviation revenue generation opportunities are based on evaluating areas that potentially be developed for each alternative. The results for each Alternative are shown in Table 5.3-1.

***Operations and Maintenance Cost*** - The cost to operate and maintain the airfield for each alternative was analyzed in this category. The criteria include new airfield area to be maintained, new airfield pavement to be maintained, and minimum terminal operations and maintenance costs. Alternative 3 has the least amount of airfield area and pavement to be maintained. Alternative 5, which would develop considerably off the existing airport property would require new airfield area and pavement (434 acres).

***Capital Cost*** - The capital cost category included project development costs, the cost of facilities to be relocated, environmental mitigation costs, and the impact on terminal development costs. These costs are "order of magnitude"

estimates and they allow the comparison between alternatives but they do not represent the actual total cost of development.

Alternative 5 has the highest development and environmental mitigation costs due to land acquisition and environmental impacts associated with the land required. Alternative 3 has the highest cost for facility replacement.

***Financial Feasibility*** - The estimated additional airline landing fees and the additional airline costs per enplaned passengers are the two criteria under the financial feasibility criteria. Alternative 3 has the highest additional airline landing fees and overall cost per enplaned passenger.

***Socioeconomic/Community Environment*** - The socioeconomic and community environment category has nine criteria. The first three deal with land; land acquisition, agricultural land impacted, and the development of airport-owned farmland. Alternative 3, when analyzed has very minimal impacts in these criteria. Alternative 5 has the highest impacts due to the development distance from the existing airport property line.

Recreation facilities, public parks, and noise sensitive facilities, such as homes, schools, churches, and nursing homes are also included in this category. When evaluated and compared against each other, Alternative 5 has the highest amount of impacts, affecting the Teal Bend Golf Course and impacting the highest amount of noise sensitive facilities by affecting more residential units with noise impacts. The orientation of the airfield in Alternative 5 expands the noise impact area slightly toward the residential units that exist along the Sacramento River.

The final criteria of the socioeconomic/community environment category are off-airport surface transportation impacts and the number of hazardous material sites that would be impacted due to each alternative. Surface

transportation impacts for each alternative are presented in Table 5.3-1. Alternative 3 potentially impacts three hazmat sites while the other two alternatives each impact only one site.

***Natural Environment*** - The natural environment category includes air quality, wetlands, threatened and endangered species, tree removal, and the reduction of open space.

There are two types of air quality impacts to be evaluated, operational and construction related. The operational impacts, as shown below in **Table 5.2-4** are based on aircraft delay. The idling of aircraft waiting to take off is responsible for these emissions. Alternative 3 has slightly higher emissions that the other two alternatives.

*TABLE 5.2-4*

*Sacramento International Airport*

*OPERATIONS EMISSIONS*

| Operations Emissions by Pollutant | | | |
|---|---|---|---|
| **Alternatives** | **Hydrocarbons** | **Carbon Dioxide** | **Nitrogen Oxides** |
| No-Build | 58.11 | 414.77 | 69.83 |
| Alternative 2 | 29.54 | 210.86 | 35.50 |
| Alternative 3 | 29.93 | 213.63 | 35.97 |
| Alternative 5 | 27.53 | 196.49 | 33.08 |

Source: EIP Associates

The air quality construction impacts are based on the total development program for each alternative, including demolition and replacement of facilities. Alternatives 2 and 5 require a minimal amount of demolition and require approximately 6,500 square feet of airfield pavement construction. Alternative 3 requires the least airfield pavement construction, approximately 5,913 square feet, but the greatest amount of demolition and replacement. Alternative 3 has the

highest construction related air quality impacts because it requires the highest level of overall construction when the size and scope of facility demolition and replacement is considered.

Alternative 5 impacts the largest amount of wetlands, 2.3 acres due to the development of the airfield off-airport property into open space areas and agriculture-use areas. Alternative 2 impacts 1.8 acres with minimal development off airport property, while Alternative 3 impacts the least amount of wetlands, 0.8 acres which mainly consist of drainage ditches and canals.

One local habitat for endangered and species is the Elderberry Bush, which is habitat for the Valley Elderberry Longhorn Beetle (VELB). Disruption of any of the Elderberry Bushes would typically require removal of all the Elderberry Bushes. The units to be relocated are based on recent field surveys conducted by Sacramento County. All of the bushes would be relocated for Alternatives 5. The implementation of the airfield for Alternative 2 would not directly impact the Elderberry bushes.

The Swainson's Hawk, which is a species of special concern, requires large nesting trees such as Valley Oaks and Cottonwoods. Removal of trees would remove nesting sites for the Swainson's Hawk. The number of trees to be removed was estimated using the proposed alternative maps and data collected during surveys of the Master Plan Area. Alternative 2 would require a total of 46 Valley Oaks and one Cottonwood tree to be removed. Alternative 3 would not require any trees to be removed as all the development would take place on existing airport property. Alternative 5 would require the most tree removal with a total of 100 trees.

Similar to the other natural environment categories, Alternative 5 would consume the most open space, Alternative 2 would consume the second most amount of open space, and Alternative 3 would consume no open space.

The construction feasibility for implementing the airfield alternatives is based on ease of phasing for airfield construction, the duration of construction, the maintenance of aircraft traffic during construction, the minimization of disruptions to terminal operations during new facility construction. These evaluations are presented in the Ranking Table found later in this section.

Following the detailed Level 3 Evaluation, each criteria category was ranked. The ranking for the Level 3 Alternatives was similar to the ranking for the Level 2 Alternatives. To ensure that the difference between alternatives was appropriately quantified, the following rankings were applied to each criterion:

- Least favorable – 1
- Next least favorable – 5
- Most favorable – 10

Table 5.2-2 shows the results of the ranking analysis.

***Airfield*** - Airfield Alternative 5 ranked the highest with the highest scores (91 out of 100) in almost all of the categories. The spacing of the runways in Alternative 5 allows for less delay, has no impact on the terminal platform, and allows for the maximum number of aircraft parking positions. Alternative 3 ranked the least favorable in the Airfield categories (28 out of 100). This alternative has a major impact on the terminal platform, has higher aircraft delays and does not offer as many aircraft parking positions.

***Terminal Complex Development and Access and Parking Ranking*** - Under the terminal complex development category, Alternatives 2 and 5 were ranked equally favorable due to no encroachment on the terminal area, while Alternative 3 ranked least favorable and only scored 2 of the possible 20 ranking points due to encroachment on the terminal area. For the access/parking, Alternatives 2 and 5 also ranked most favorable, while Alternative 3 ranked least favorable.

***Safety and Security*** - Alternative 3 ranked most favorable for the safety and security criteria because this airfield alternative is more compact and therefore easier to secure and patrol. The number of runway crossings is also lower for Alternative 3 therefore this alternative has a higher safety ranking.

***Cargo Ranking*** - As mentioned in the Evaluation section of this Chapter, Alternative 3 has the shortest distance from the cargo ramp to the belly cargo facility while Alternatives 2 and 5 have the same (longer) distance. However, Alternatives 2 and 5 exhibit the same distance from the belly cargo facility to the highway interchange and this distance is shorter than Alternative 3.

***Airport Revenue Generation Ranking*** - Alternative 3 ranks the least favorable in the airport revenue generation category as the airfield layout consumes significant prime revenue-generating property for both aviation and non-aviation related development.

***Operations and Maintenance Cost Ranking*** - Alternative 5 ranked least favorable in this category. The large area of land that would be acquired for Alternative 5 would increase the area to be maintained and there also is more airfield pavement to be maintained. Alternatives 2 and 3 have very similar rankings.

***Capital Cost Ranking*** - Alternative 2 ranked the most favorable for capital cost, scoring 30 of the 40 possible points. Alternative 5 has the highest environmental mitigation and land acquisition costs. Alternative 3 has a high cost for demolition and replacement of existing facilities.

***Financial Feasibility Ranking*** - Alternative 2 is the most favorable in terms of airline operating costs. Due to the high overall development costs,

Alternative 3 has the most impact on future airline landing fees and cost per enplaned passenger.

***Socioeconomic/Community Environment Ranking*** - Alternative 3 clearly ranks most favorable in the socioeconomic and community environment category scoring 72 of the possible 100 points. This is due to the airfield infrastructure being constructed within existing airport property. Alternative 5 ranked least favorable as the majority of the criteria were negatively impacted by the proposed development of the widely-spaced runway system.

***Natural Environment Ranking*** - The results of the natural environment category are very similar to the results of the socioeconomic and community environment. Alternative 3 clearly ranks most favorable scoring 42 of the possible 60 points. Alternative 5 again ranked least favorable as the majority of the criteria were impacted by the widely-spaced runway system.

***Construction Feasibility Ranking*** - The construction feasibility was based on the ease of construction phasing, construction duration, the ability to maintain aircraft traffic, and the disruptions to the terminal during construction. Alternative 5 ranked most favorable as the construction area would be the most remote from existing airport operations for this alternative. Alternative 3 ranked the lowest as the interior runway/taxiway system would be challenging to construct while maintaining the active airfield and also this would contribute to longer construction duration.

## 5.3 SELECTION OF PREFERRED AIRFIELD ALTERNATIVE

Based on the Level 3 evaluation and ranking, it was determined that Airfield Alternative 2, Outboard West Runway-1,200' Separation was the best overall airfield alternative. Airfield Alternative 2 ranked most favorable based on the analysis of 47 criteria in the above mentioned categories. Although Airfield Alternative 2 did not score

the highest possible points in each category, airfield Alternatives 3 and 5 scored very low in several categories therefore advancing Airfield Alternative 2 to the highest ranking position. Alternative 2 scored the highest possible points in two main categories; Capital Cost and Financial Feasibility. **Exhibit 5.3-1** depicts Alternative 2, the Recommended Preferred Alternative following the stages of revisions. A re-cap of the evaluation totals, shown below in **Table 5.3-1**, shows the total points scored under each category for each alternative by category.

Alternatives 3 and 5 scored and ranked very poorly in several categories while Alternative 2 did not score the lowest in any category. In general, Alternative 3 has severe impacts on the available terminal development platform and high costs for development, therefore negatively impacting the long-term potential of the Airport. Alternative 5 has the highest potential environmental impacts while offering only marginally higher airfield capacity.

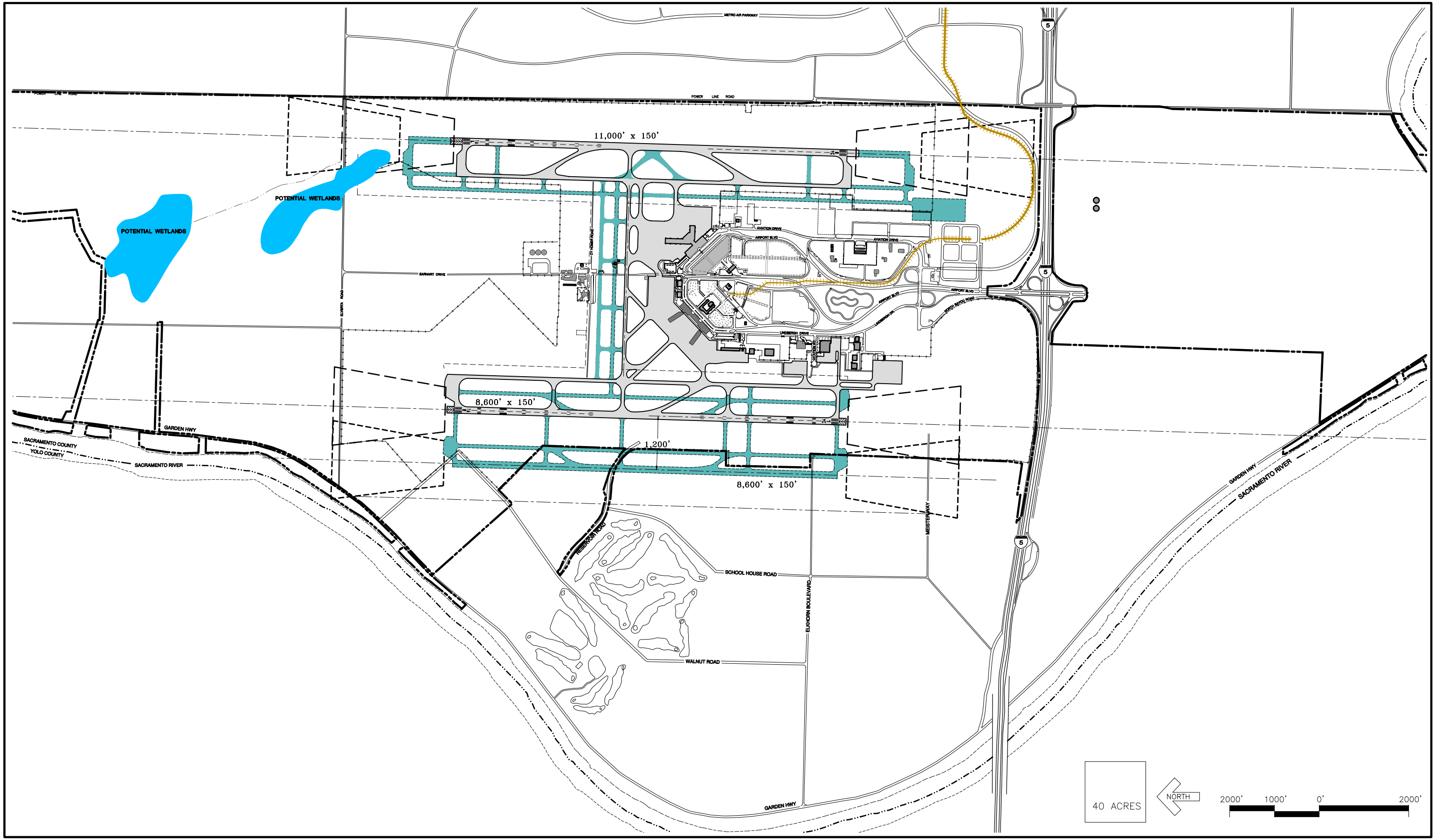
***TABLE 5.3-1***

***Sacramento International Airport***

***LEVEL 3 EVALUATION RANKING SUMMARY***

| Criteria Category | Alt 2 Outboard West Runway | Alt 3 Inboard West Runway | Alt 5 Outboard West Rwy Widely Spaced |
|---|---|---|---|
| Airfield | 57 | 38 | 91 |
| Terminal Complex Development Area | 20 | 2 | 20 |
| Safety and Security | 20 | 30 | 12 |
| Access and Parking | 10 | 1 | 10 |
| Cargo | 15 | 11 | 15 |
| Airport Revenue Generation | 20 | 2 | 20 |
| Operations and Maintenance Cost | 20 | 21 | 12 |
| Capital Cost | 30 | 22 | 22 |
| Financial Feasibility | 20 | 2 | 10 |
| Socioeconomic/Community Environment | 66 | 72 | 45 |
| Natural Environment | 35 | 42 | 19 |
| Construction Feasibility | 30 | 4 | 40 |
| **Total Score** | **343** | **247** | **316** |
| **Final Comparative Ranking** | **1** | **3** | **2** |

Source: PB Aviation

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# RECOMMENDED PREFERRED ALTERNATIVE

EXHIBIT
5.3-1

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## 5.4 Access Alternatives

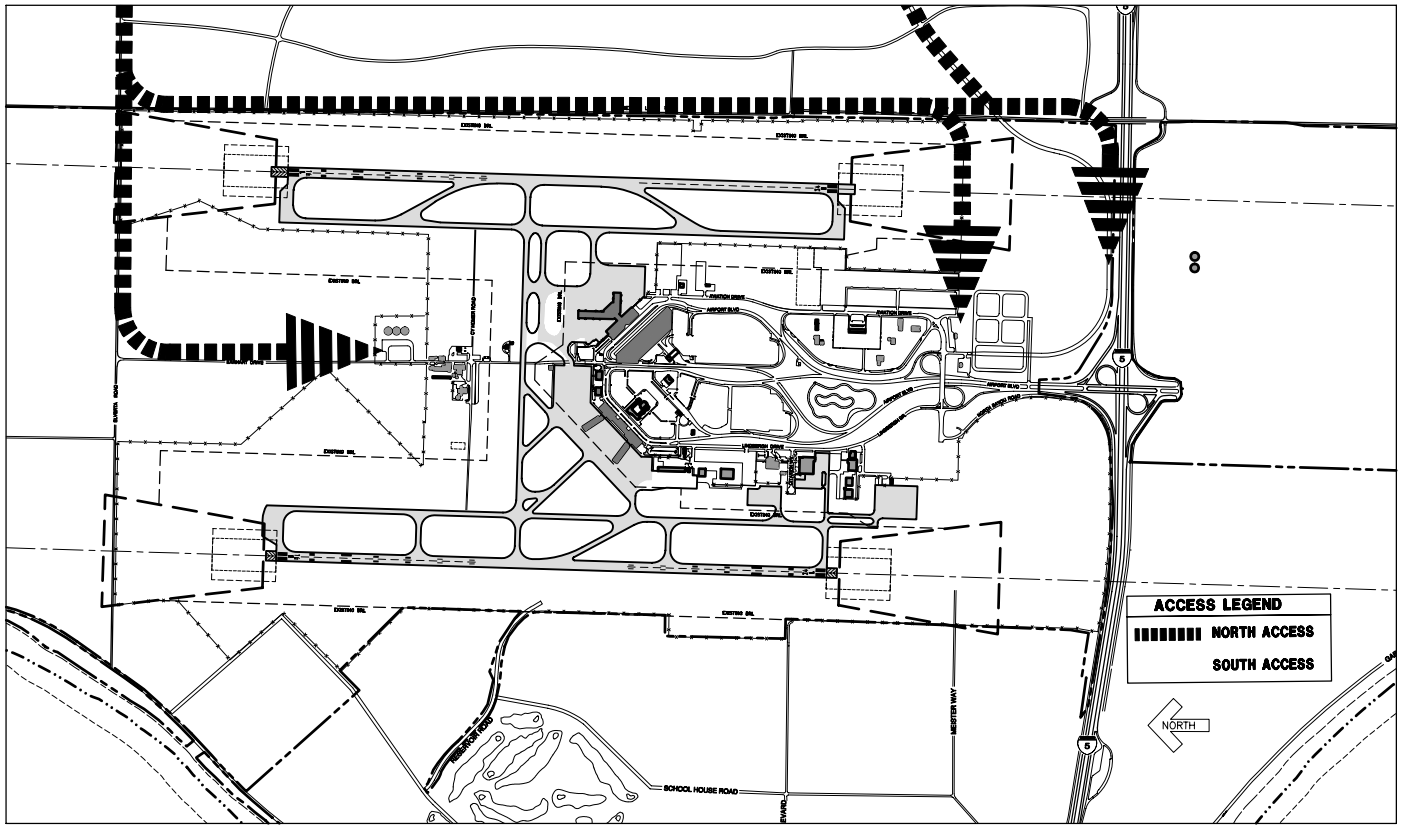
One of the goals of this Airport Master Plan is to maintain convenient access to airport facilities from all areas of the region, including road access and transit access. Providing alternatives to using I-5, which can be congested due to unforeseen conditions or maintenance or construction, is important to maintaining an operating airport and allowing passengers to reach the airport for time-certain departures. Integration of additional transit capability into the Airport can help enhance airport access. A final access component of this section is Transportation Demand Management. The Airport's support for TDM encourages ride-sharing and other options that can reduce traffic and congestion due to single-occupant vehicle trips to the airport.

### 5.4.1 Identification of Preliminary Access Alternatives

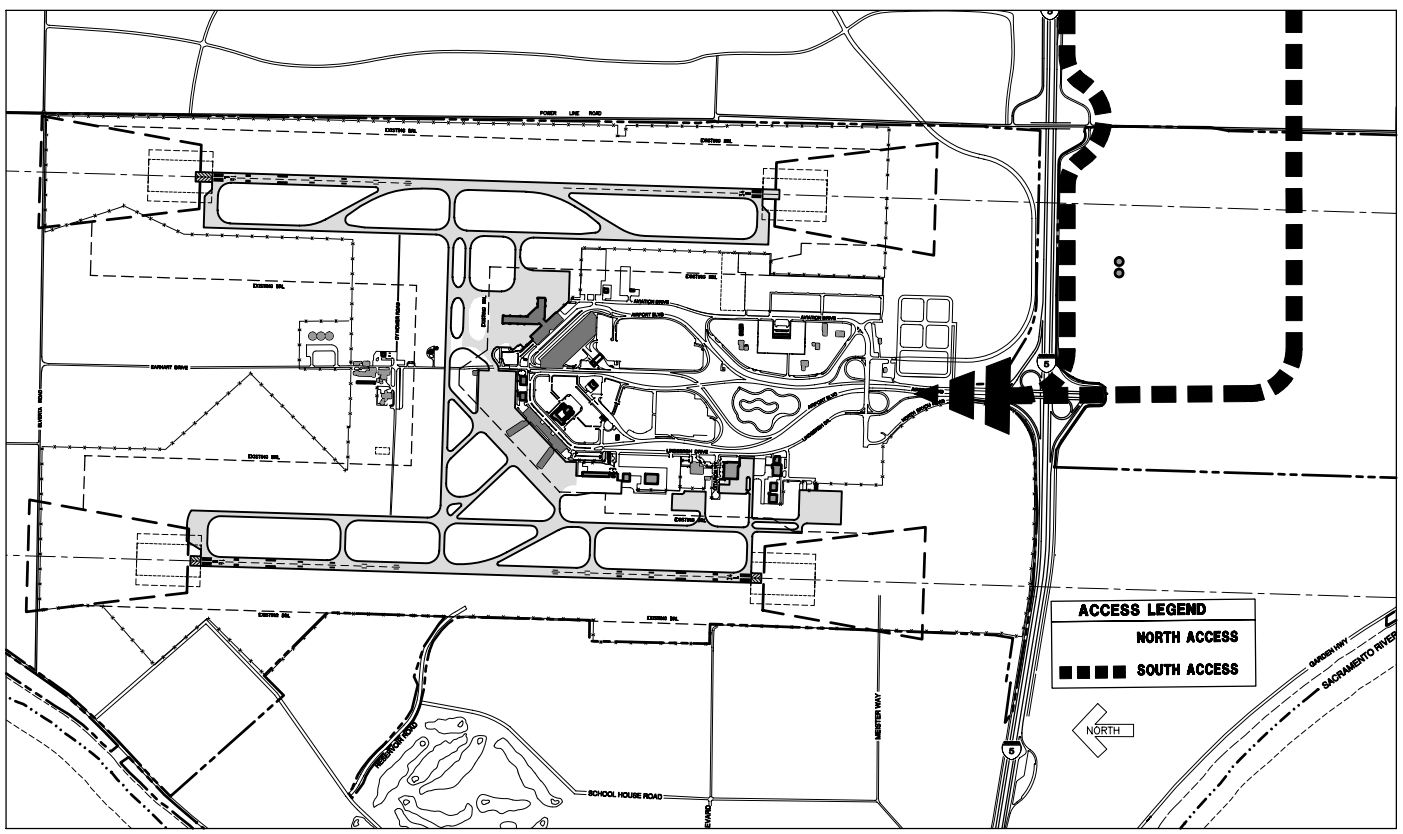
#### 5.4.1.1 Preliminary Road Access Alternatives

As airport activity continues to grow, additional access capability will be needed to maintain an acceptable level of service and minimize congestion. Airport access alternatives were formulated with the goal of making sure the airport remains accessible for passengers and employees. The two road access alternatives are shown on **Exhibit 5.4-1,** Preliminary Access Alternatives.

The North Access Road Alternative shows entry into the terminal area from Power Line Road which would allow access from the north independent of I-5. This alternative also shows access into the north part of the airport for future Airport-related development. The South Access Alternative maintains the primary entrance to the airport via I-5 and adds




Access Alternative 1 North Access




Access Alternative 2 South Access

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PRELIMINARY ACCESS ALTERNATIVES

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potential new access routes by extending Del Paso Road to the Airport and upgrading North Bayou Road into the terminal.

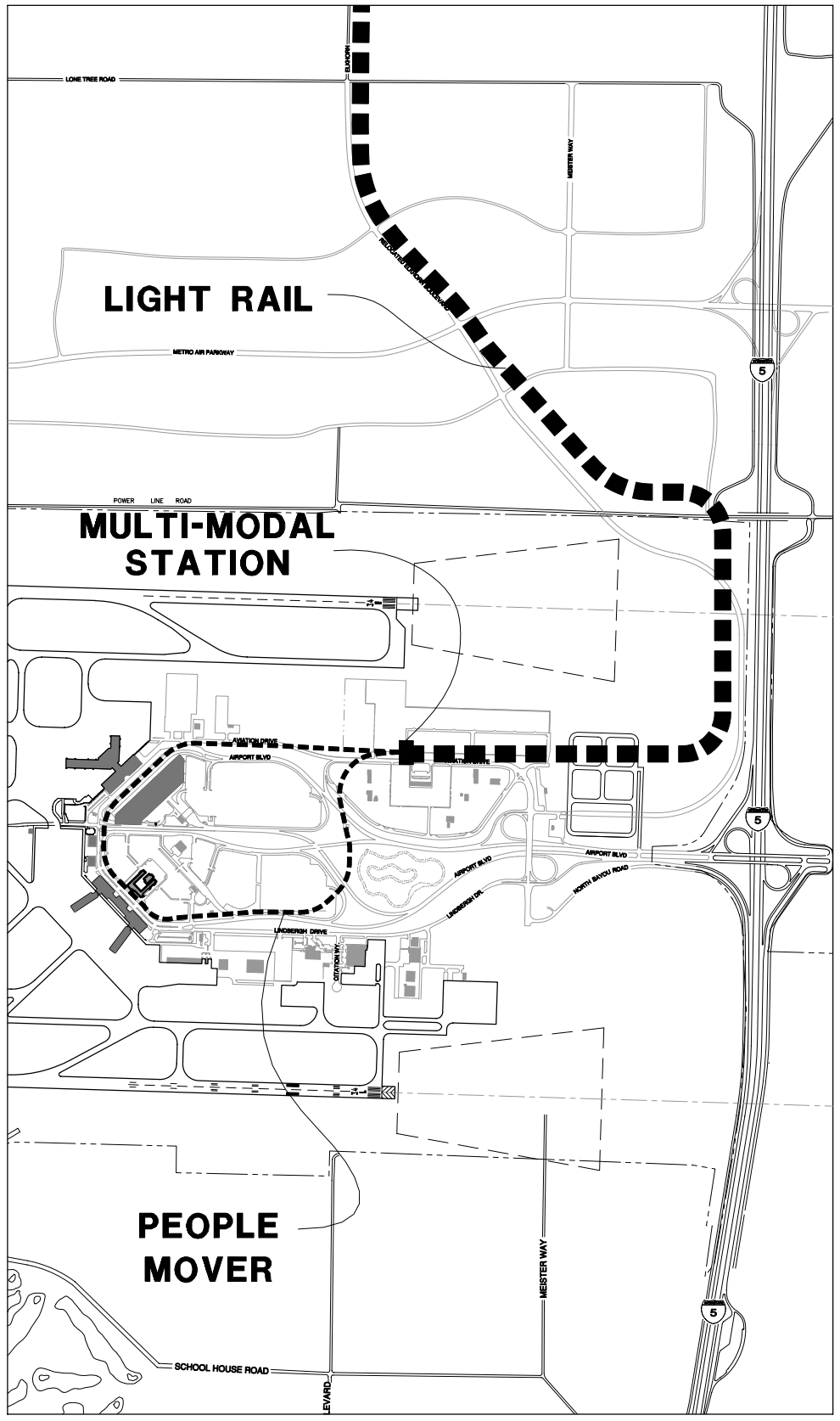
#### *5.4.1.2 Preliminary Light Rail Access Alternatives*

Sacramento Regional Transit (RT) is studying the feasibility of extending transit service to the Airport. This Downtown-Natomas-Airport (D-N-A) corridor study includes both light rail and bus rapid transit (BRT) alternatives. In coordination with the D-N-A corridor study the Master Plan will reserve an on-airport corridor for light rail or BRT use. The three preliminary light rail alternatives are shown on **Exhibit 5.4-2,** Preliminary Light Rail Alternatives. The preliminary alternatives are: Alternative 1, East Side Alignment; Alternative 2, Central Spine Alignment; and Alternative 3, Terminal Loop. All three light rail alternatives enter the airport property from Metro Air Park with an access corridor located near I-5.

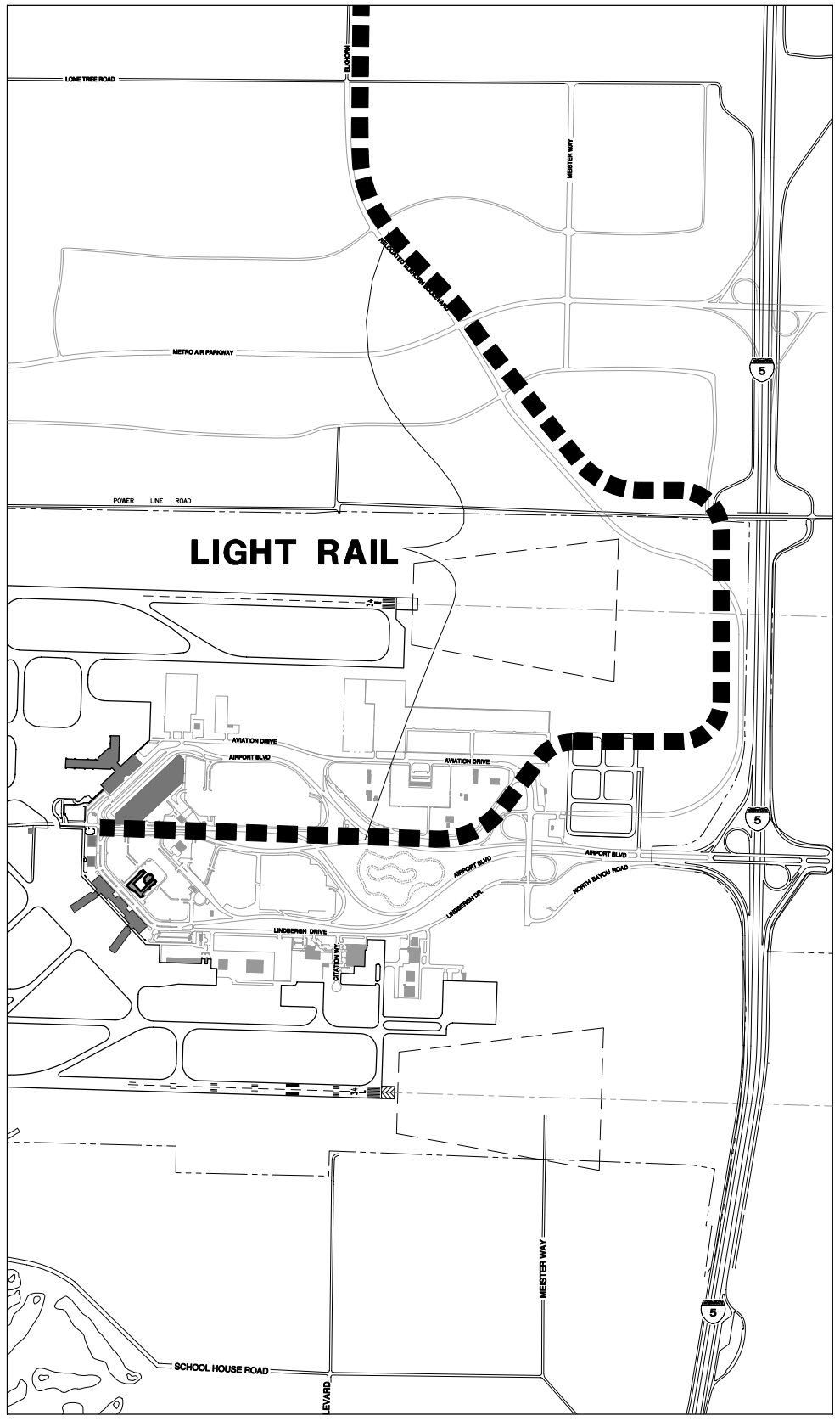
In Alternative 1, East Side Alignment, the rail line would enter the Airport boundary south of Runway 16L/34R near I-5. The alignment turns north to the rental car terminal and on to Terminal A. In this alternative, the light rail station could either be located at Terminal A, or a remote, multi-modal station could be constructed in conjunction with an on-airport Automated People Mover System (APM).

In Alternative 2, the rail corridor continues parallel to I-5 for an additional distance prior to turning northward. The corridor then runs parallel to the Terminal Access Road until termination in the center of the terminal area south of Terminals A and B. Like Alternative 1, this alternative also can be developed with a station between the two terminals or a remote station that connects with an APM.

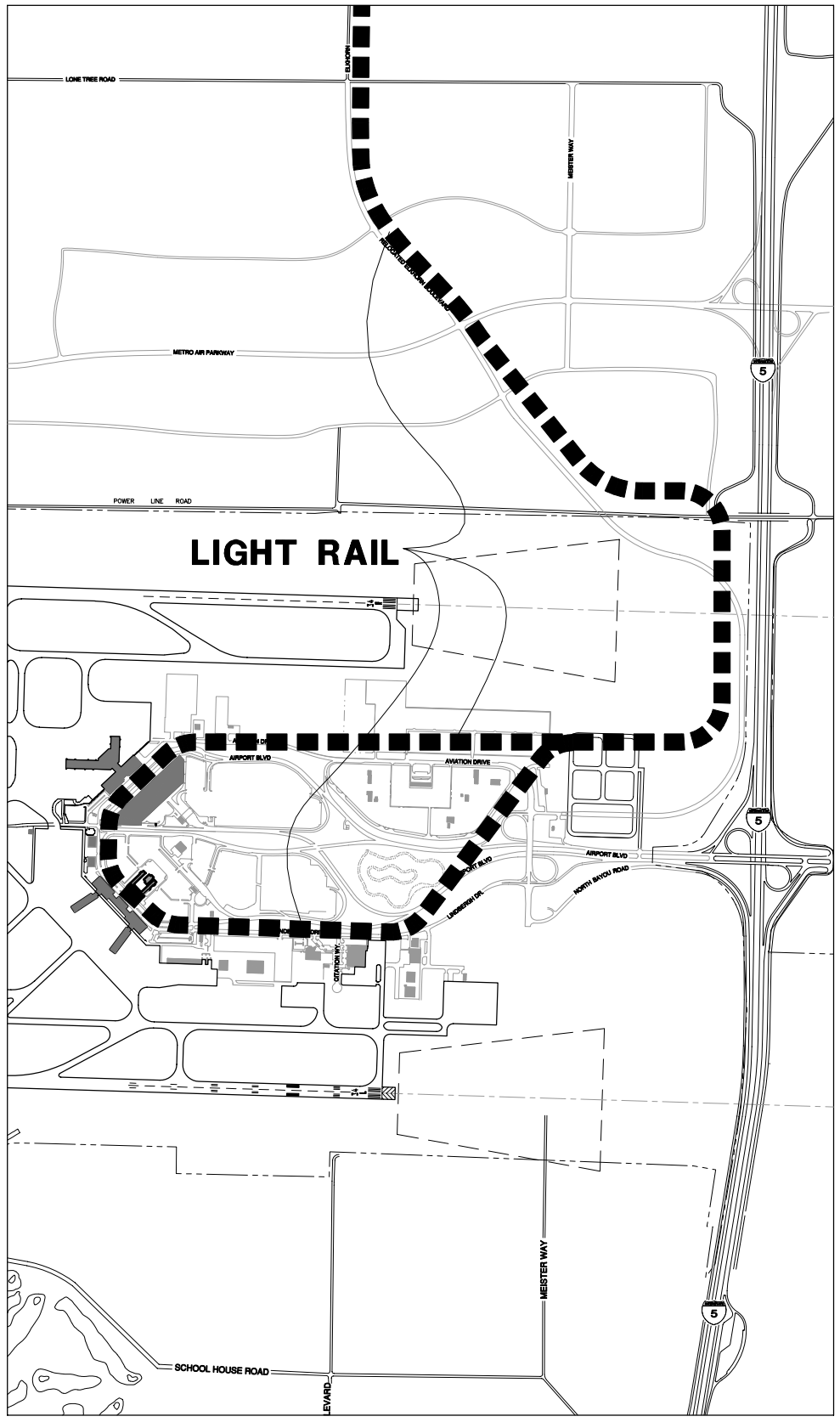
Alternative 3, the terminal loop, enters the airport and would be on the same alignment as Alternative 1 until it reaches Terminal A. At this point Alternative 3 continues around the terminal, generally following the terminal curb alignment. For this alternative stations are envisioned at Terminal A and Terminal B, after which the alignments turns south and meets the inbound rail alignment.




Light Rail Alternative 1
Multi-modal Station




Light Rail Alternative 2
LRT Central Spine Alignment




Light Rail Alternative 3
LRT Loop Alignment

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# PRELIMINARY LIGHT RAIL ALTERNATIVES

NORTH

EXHIBIT 5.4-2

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## 5.4.2 Screening of Preliminary Access Alternatives (Level 1)

Like the airfield alternatives analysis, the access alternatives are evaluated at three levels of detail. The intent is to determine the best alternatives that meet the vision for the airport and identify those alternatives that are less favorable.

### 5.4.2.1 Road Access Alternatives

As previously shown on Exhibit 5.4-1 Preliminary Access Alternatives, Access Alternative 1, ground transportation routes into the Airport from the north are shown. Specifically, an additional entrance into the Airport would be provided from Power Line Road. This route would allow vehicles traveling from north of the Airport to enter the terminal area without having to use I-5. Access into the north part of the airport from Elverta Road also is maintained in this alternative, although it should be noted that this route would not access the passenger terminal complex. Elverta Road would continue to serve the land uses in the north part of the Airport, but for security, cost and traffic flow reasons would not connect to the passenger terminal facilities. Access Alternative 2 shows additional access options from the south, including the potential future Del Paso Road and additional access along North Bayou Way.

One of the goals of the SCAS is to provide high-quality, multi-modal, congestion free access to the Airport. Since these access alternatives are not mutually exclusive, Access Alternatives 1 and 2 were combined into a single ground access option plan for further evaluation with the light rail options.

### 5.4.2.2 Light Rail Access Alternatives

In discussions with SCAS and RT Staff, it was determined that Light Rail Alternative 3 Terminal Loop was substantially less favorable than the other two alternatives. In the cost category, Alternative 3 requires significantly more on-Airport light rail track. In addition, constructing a light rail system adjacent to the terminal curb would be substantially more difficult than the other two alternatives and this would manifest as higher development cost. Operationally, the alignment provides for a stop at each terminal and perhaps a stop at the rental car terminal, but this would not be an effective on-airport transportation system due to the relatively long headways for light rail as compared with the need for "on-demand" circulation between the airport functional land uses. Even with this alternative, the Airport would still need to provide on-airport transportation between land uses (such as parking areas and the terminals)

with a bus system or APM. Given these factors, it was determined that light rail Alternatives 1 and 2 were more favorable and should be continued for further analysis while Alternative 3 should be eliminated from further consideration.

## 5.4.3 Refinements and Re-screening of Access Alternatives

Refinements were made to both preliminary road access alternatives and preliminary light rail alternatives. Both access alternatives and two of the light rail alternatives were refined and evaluated for Level 2.

### 5.4.3.1 Refinement of Road Access Alternatives (Level 2)

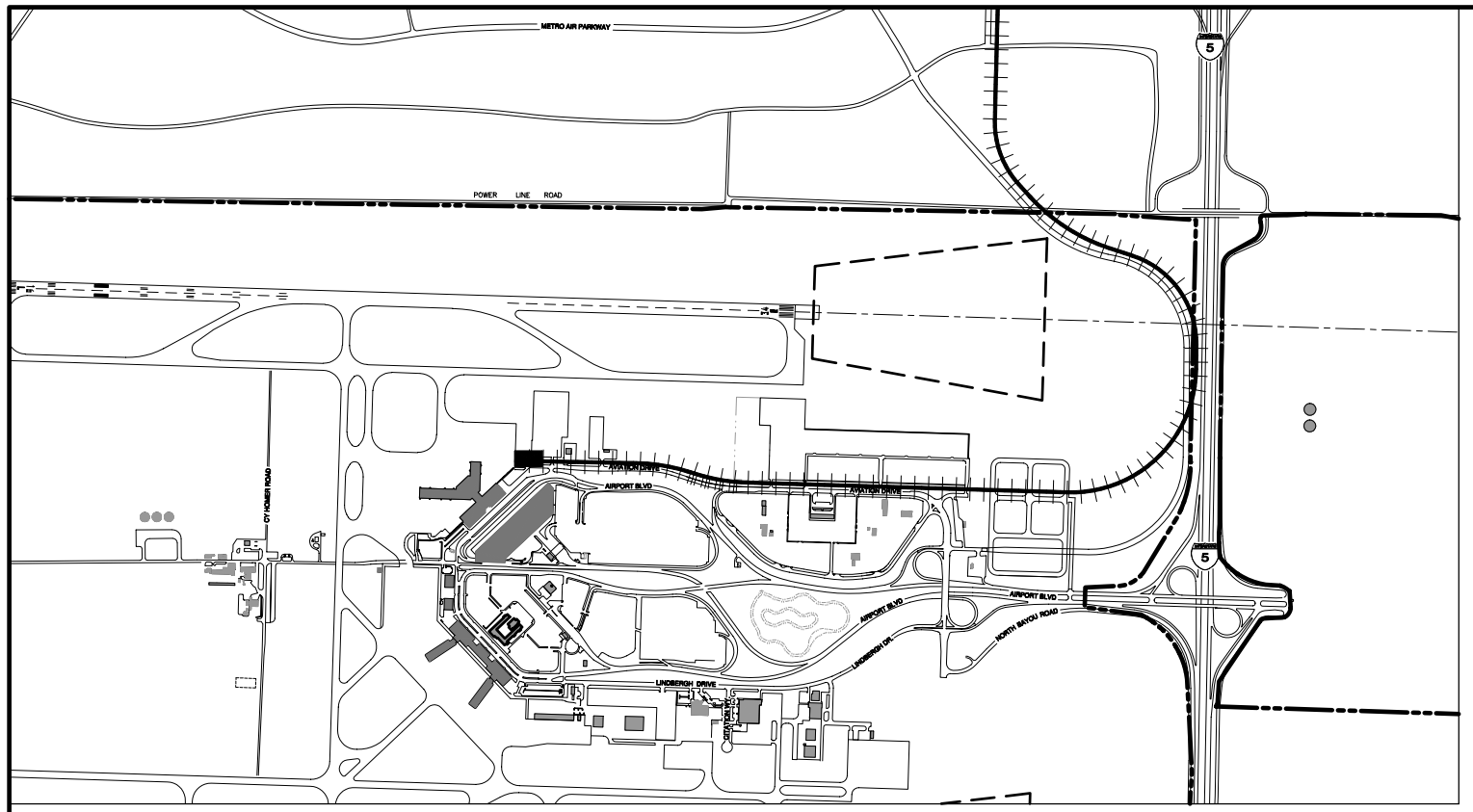
The North Access Alternative in Level 1 screening shows two entrances into the terminal area off Power Line Road, one at I-5, and the other entrance further north. It was determined that the entrance point further north should be eliminated. This entrance point becomes complicated with the addition of the light rail alternatives, as they would be require either an at-grade or grade separated crossway. Additionally, the southern access option aligns favorably with the extension of Elkhorn Boulevard from Metro Air Park. The South Access options remain the same from the Level 1 analysis.

### 5.4.3.2 Refinement of Light Rail Alternatives (Level 2)

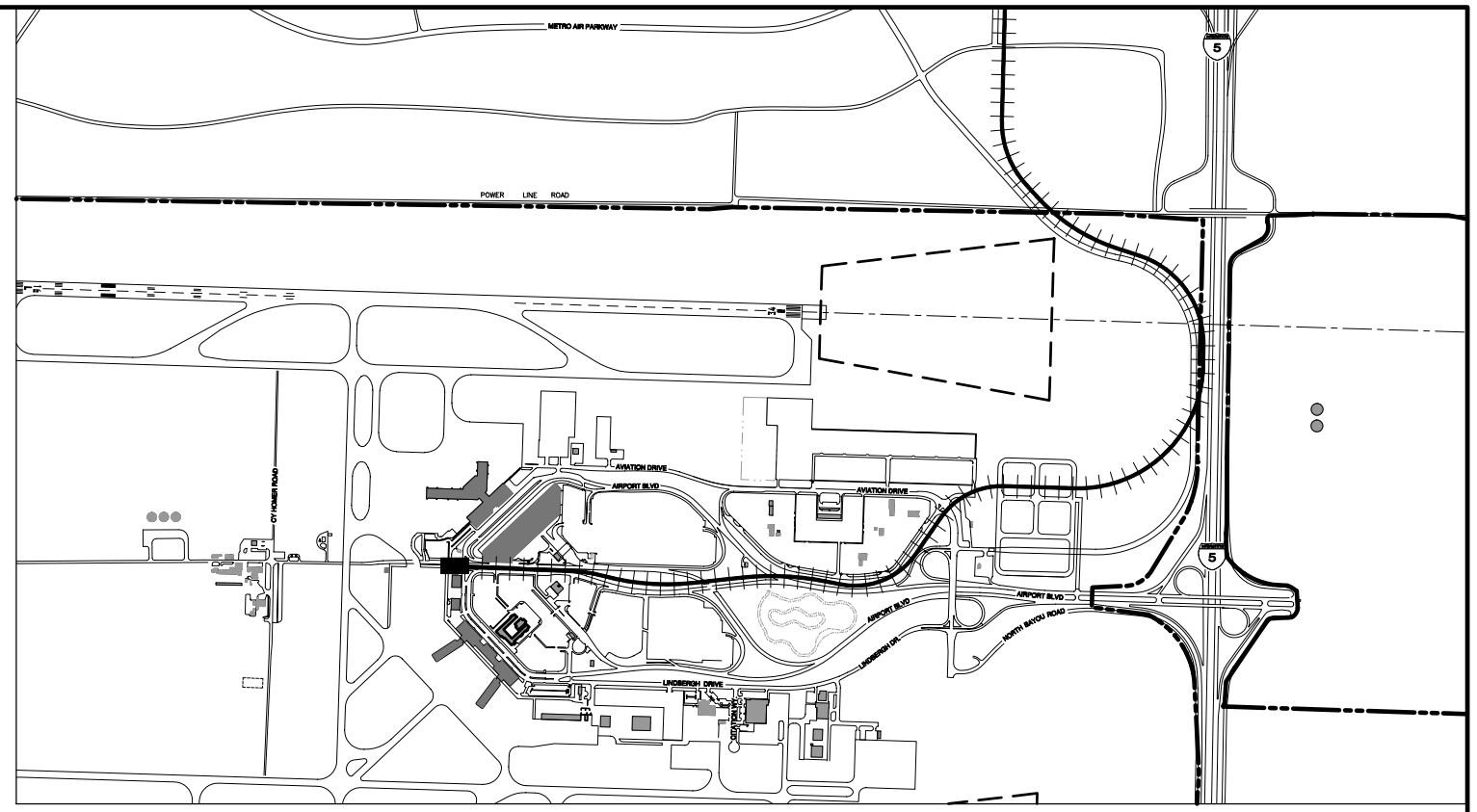
The two retained light rail access alternatives were developed and refined in conjunction with the D-N-A corridor study. The light rail alternatives assume that the rail alignment will enter the Airport to the east of the terminal area. Both airport rail alternatives would initially be via a single track; however, sufficient width (50 feet) should be reserved for future dual-track service.

As shown in **Exhibit 5.4-3**, the light rail East Alignment can either terminate at Terminal A or into a multi-modal station on the Airport. At the multi-modal station, an APM would provide access to the passenger terminals.

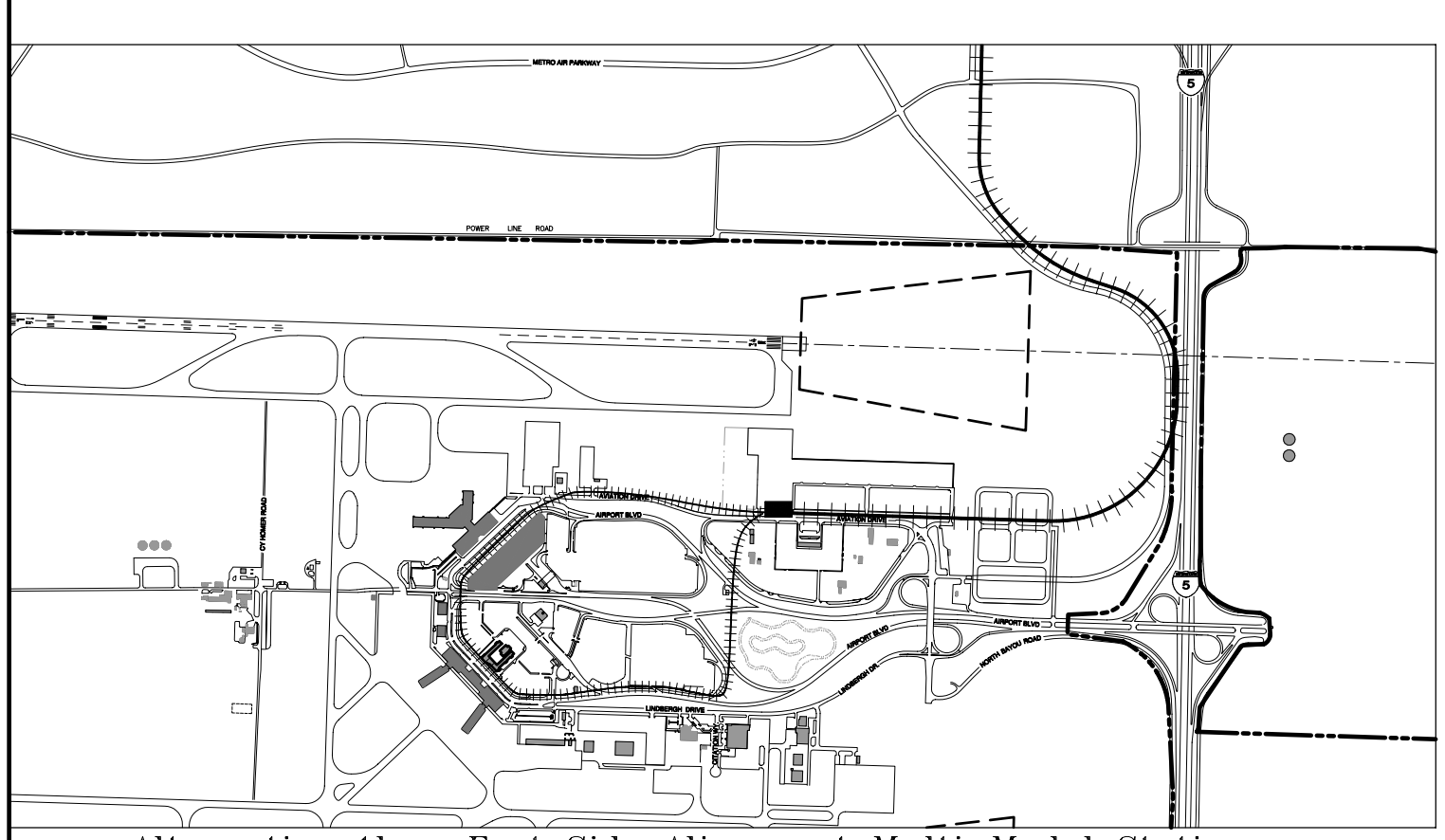
Exhibit 5.4-3 shows a representative station location. However, the actual location of the light rail station could be located further to the north or further to the south depending on the final configuration. With the location of the station further to the north, customers using the Airport are closer to the terminals allowing for a shorter distance to travel via an



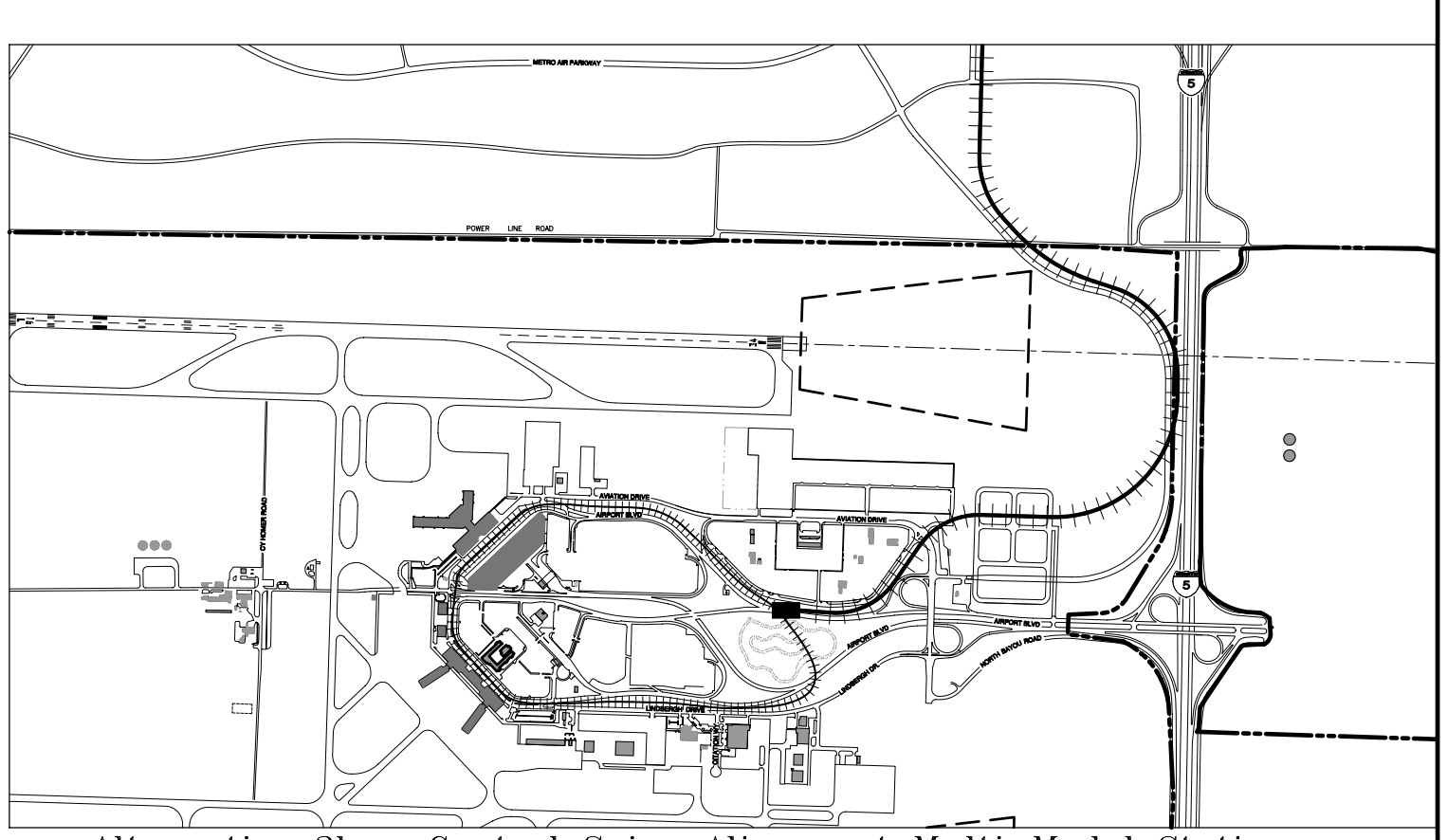

Alternative 1a – East Side Alignment Terminal Station




Alternative 2a – Central Spine Alignment Terminal Station




Alternative 1b – East Side Alignment Multi-Modal Station




Alternative 2b – Central Spine Alignment Multi-Modal Station

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# LIGHT RAIL ALTERNATIVES

NORTH

EXHIBIT 5.4-3

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APM. A more southerly station location could allow the rail to serve ancillary development such as office buildings, hotels and restaurants. This alternative offers substantial flexibility in tailoring the final rail configuration to the development at the Airport.

Light rail Alternative 2, shown in Exhibit 5.4-3, includes a light rail alignment along the central spine parking area, terminating in a station near the passenger terminals. At the station, a people mover such as a moving sidewalk would provide convenient access to the terminals. As shown on Exhibit 5.4-3, the location of the light rail line offers some challenges given the existing airport access road and parking infrastructure. It would be necessary to use an elevated rail line in the vicinity of airport parking as the delays associated with at-grade crossings could cause passengers to miss time-certain flight departures.

## 5.4.4 EVALUATION OF ALTERNATIVES (LEVEL 3)

### 5.4.4.1 Road Access Alternatives (Level 3)

The improvement of Del Paso Road as an alternate access route into the terminal area presents potential problems in terms of environmental and community impacts. This road would be improved in an area known to be habitat for the Swainson's Hawk and potentially could disturb foraging area as well as nesting habitat. In addition the upgraded road would pass through an established residential community areas and a school which raises the question of appropriateness for a major thoroughfare/access route. Based on these factors, the Del Paso extension was eliminated from further consideration as South Bayou Road can meet the needs with less impact.

Following minor improvements from their preliminary stage, the access alternative recommendations are:

- Elkhorn Boulevard should be extended through the Metro Air Park and into the terminal area.
- Bayou Way should have better signage and should be widened if needed.
- Elverta Road should continue to serve the north airfield area for commercial and industrial activity.

### *5.4.4.1 Light Rail Access Alternatives (Level 3)*

Evaluation of the light rail alternatives is based on the number of mode changes for the Airport user. The two light rail alternatives, East Alignment and Central Spine Alignment both offer a terminal station and a multi-modal station. With each of these station locations, the number of mode changes an Airport user would be subjected to becomes an issue.

As shown on **Table 5.4-1**, the number of mode changes required when Airport users travel using a private auto increases. It is assumed that the location of the multi-modal station would still require a bussing system for private auto users to reach the light rail station. This increase of mode changes may become a bothersome to travelers that have timely departures, however, this location of the light rail station also has a larger distribution of riders. Should the multi-modal station be located with the East Alignment, a future land use plan for the Airport shows the station in close proximity to potential future development, such as hotels and commercial development, collecting an even larger distribution of riders.

***TABLE 5.4-1***

***Sacramento International Airport***

***MODE CHANGES***

| | **East Alignment Terminal Station** | **East Alignment Multi-Modal Station** | **Central Spine Terminal Station** | **Central Spine Multi-Modal Station** |
|---|---|---|---|---|
| Passengers using LRT | 0<br>LRT to Terminal | 1<br>LRT to APM to Terminal | 0<br>LRT to Terminal | 1<br>LRT to APM to Terminal |
| Passengers using private auto | 1<br>Public parking to bus<br>bus to Terminal | 2<br>Public parking to bus<br>bus to APM<br>APM to Terminal | 1<br>Public parking to bus<br>bus to Terminal | 2<br>Public parking to bus<br>bus to APM<br>APM to Terminal |

Source: PB Aviation

## 5.4.5 Selection of Preferred Alternatives

### 5.4.5.1 Road Access Preferred Alternatives

The three access alternatives, Elkhorn Extension, improvements to Bayou Road, and Elverta Road into the north airfield are all recommended as viable alternatives for the Master Plan (see **Exhibit 5.4-4**). Following the elimination of the Del Paso Road alternative, the remaining access alternatives, the remaining access routes all provide adequate alternatives to I-5 for unforeseen events cause traffic and congestion using the Bayou Road Alternative, access to and from Metro Air Park using the Elkhorn Extension Alterative, and additional access for users of the north airfield with Elverta Road Alternative.

### 5.4.5.2 Light Rail Access Preferred Alternative

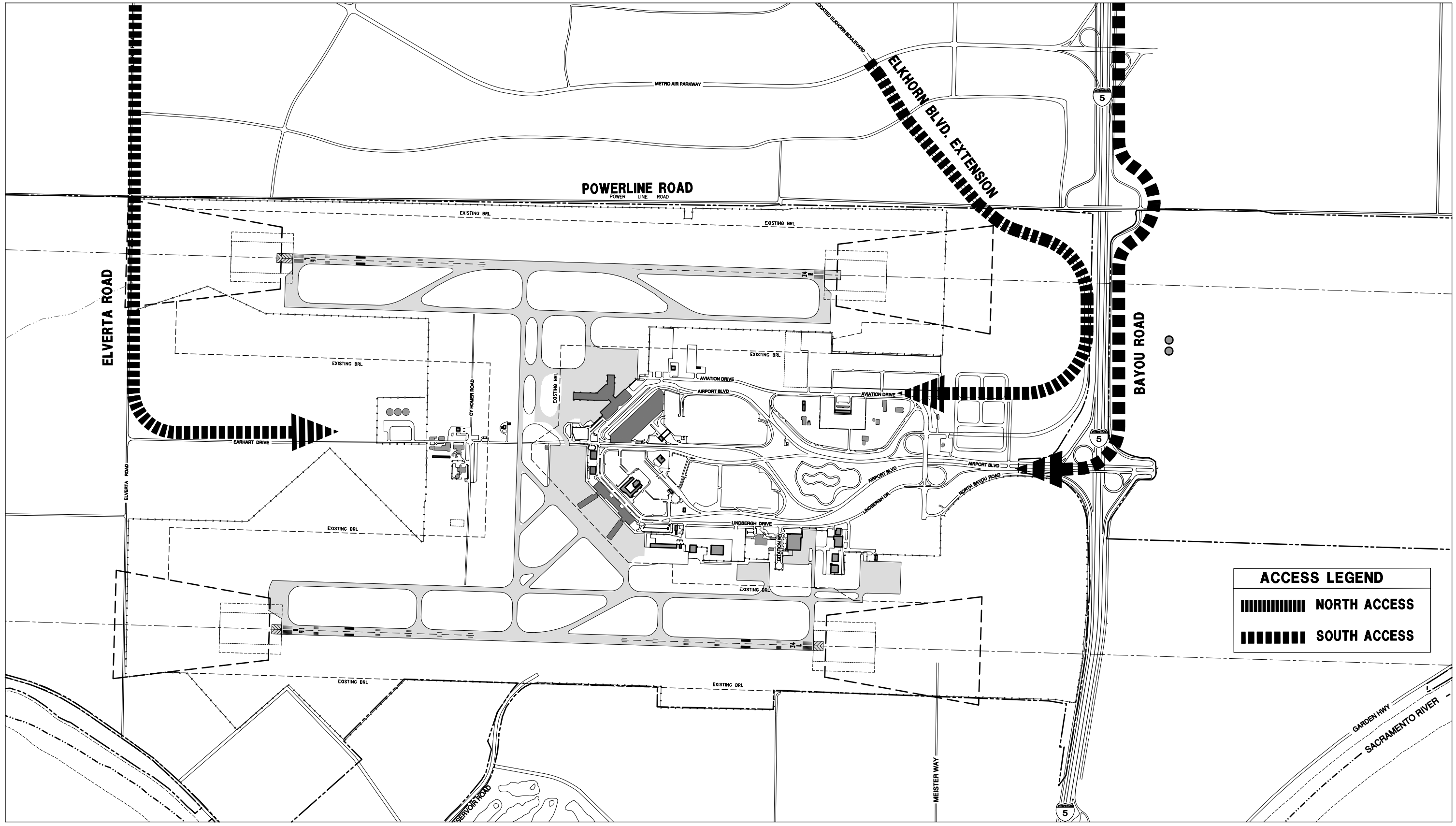
The Master Plan will recommend the preservation of a corridor for the future development of light rail. Selection of this corridor is strongly linked to the terminal development and will be selected based on a selected terminal development concept to ensure that transit passengers have appropriate terminal facility access.

## 5.5 Transportation Demand Management

The Sacramento County Airport System believes that it is important to encourage ride-sharing and other measures that can reduce the number of single-occupant vehicle trips to the Airport. There is a wide range of options that can be used to enhance Transportation Demand Management (TDM) as activity continues to grow at Sacramento International Airport. Recommendations were made for near term implementation and for long-term implementation. The following TDM recommendations are recommended for implementation at the appropriate time.

### 5.5.1 Order of Magnitude Valuation

**Table 5.5-1** presents the evaluation matrix for the TDM recommendations and shows a ranking for each of them in their order of




SACRAMENTO COUNTY AIRPORT SYSTEM
6900 AIRPORT BLVD.
SACRAMENTO, CA 95837

**Sacramento International Airport Master Plan Study**

# PREFERRED ACCESS ALTERNATIVES

NORTH

EXHIBIT 5.4-4

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PB AVIATION, INC.

magnitude for ridership. The rankings are based on benefits of use and are between a very low value and a very high upper value.

The near term recommendations identify TDM measures that have the ability to be implemented in the near term, have reasonable passenger ridership opportunities and can be controlled and/or managed by the Airport. The long-term recommendations include viable TDM measures that provide high potential passenger ridership opportunities but may take many years to implement. Some TDM measures are a good idea, but the airport does not have the authority to implement them. Measures not recommended are not viable TDM options for airport passengers due to potential legal constrain.

***TABLE 5.5-1***

***Sacramento International Airport***

***PASSENGER TDM OPTIONS***

| | **ORDER OF MAGNITUDE FOR RIDERSHIP/USE** | | | | |
|---|---|---|---|---|---|
| **AIRPORT PASSENGER TDM OPTIONS** | **Very Low** | **Low** | **Medium** | **High** | **Very High** |
| Fixed Guideway Transit | | | | | X |
| Transit Transfer Agreements/Subsidies for all transit connections | | | X | | |
| Enhanced local bus services | | | | X | |
| Land Dedication for Transit Facilities | | | X | | |
| Transit Passenger Shelter/Bus Stop | | | X | | |
| Super Shuttle discounts for families and groups | | | | X | |
| Preferential Passenger Loading Zones | | | | | X |
| Parking Elements | | | X | | |
| HOV lanes directly to the airport and preferential parking | | | X | | |
| Toll charges for drop off and pick up | | X | | | |
| Pedestrian Elements | | | X | | |
| Multi-modal services | | X | | | |
| Airport Transportation Information | | | | X | |
| Participation in Regional TMA | | X | | | |
| Collaboration with tourism and travel agencies, municipal/State agencies, 1-(800) RIDES seamless transportation assistance via SACOG | | | X | | |
| Marketing campaign via TV, print, and radio | | | X | | |

Source: The Hoyt Company

### *5.5.2 Near Term Recommendations*

- **Enhanced local bus services (augment local and new regional services, and service to impacted communities via contract)** Enhanced local bus service would provide an immediate benefit for transit users. This measure would not require significant capital cost and could operate within the existing infrastructure. Implementing local transit service via Sacramento Regional Transit (RT) would augment existing Yolo Bus service. Enhanced RT service from the downtown area (and other strategic locations) would increase airport transit frequency to one half hour service when combined with current hourly Yolo Bus service. This would also include improvements to scheduling and transfers between transit systems.

Airport bus service could also be expanded to include direct routes provided by other regional transit agencies such as Yuba-Sutter Transit, Amador Regional Transit System, Auburn Foothill Flyer, Placer Transit and Roseville Transit. Impacted communities with high levels of airport passenger usage may be targeted for future special airport routes.

- **Land Dedication for Transit Facilities.** This measure is a synergistic measure needed for future fixed guideway transit services (a long-term recommendation) or enhanced local bus services. Land would be dedicated, on or off the Airport, by the County for future light rail or BRT and key bus stops or access points for airport passengers and employees.

- **Transit Passenger Shelters/Bus Stops**. Transit shelters or transit stops are a synergistic measure that could enhance the benefits from fixed Guideway transit services or enhanced local bus services. This measure includes the addition of transit stops and covered passenger shelters at the airport in key terminals and airport service or hotel locations. On and off airport improvements to transit shelters and services such as luggage carts and airport park and ride areas would improve the potential for seamless transit transfers to the airport and provide greater continuity for operations and services on airport grounds.

- **Preferential Passenger Loading Zones**. Conveniently located and well-signed passenger loading zones can provide affordable, safe and easy user access to the Airport. It could also reduce the demand for on-airport parking. On Airport passenger loading zones would provide greater convenience and time savings and can be used to encourage high occupancy vehicle (HOV) and transit options by providing priority locations.

- **Parking Elements (preferential HOV/EV parking and/or rates, restrict supply, increase passenger rates, frequent flyer AVI system, group/tour handling area)**. Parking elements, such as preferential HOV/EV parking and/or rates, restriction of supply, increase passenger rates, frequent flyer AVI system, and a group/tour handling areas can be immediately implemented providing easy access for users. These elements can accommodate regional passenger needs while reducing vehicle trips and congestion. Encouraging greater HOV use provides a positive benefit for airport users.

Preferential parking for carpool, vanpool and electric vehicles would be designed in all on-airport parking facilities and future garages. These parking spaces would be strategically located close to terminal entrances. Reduced parking rates for HOV airport travelers or an increase in parking rates for single occupancy vehicles (SOV) would encourage carpooling or vanpooling modes. State employee travelers would also be encouraged to utilize HOV airport ridematching resources.

Restriction supply is limiting the general amount of overall airport parking with the intension that it would encourage greater use of other alternatives such as transit options or carpooling. This same rational is with lower parking fees at off-airport parking lots to encourage the use of Airport, County, or private shuttle services thereby reducing parking demand at the airport.

Parking rates are often less expensive for Department of Airport employees (City or County employees) than they are for tenant employees (airlines, food vendors, etc.). Passenger parking rates would need to be studied further to determine the affect of pricing and the availability of acceptable transit options. A priced parking strategy could raise additional revenues through increased pricing on SOV users. A priced parking program would need to be balanced to ensure that additional drop-off trips (and future automobile emissions) are not generated in an effort to avoid paying parking charges.

- **Pedestrian Elements (minimize distances, improve connections) remote terminals and other multi-modal sites**. Pedestrian elements can improve opportunities for transit and HOV users. Convenient pedestrian access from transit stops, passenger loading areas and garages could minimize transfer and connecting distances for travelers. These elements (direct, designated, automated walkways, seating, lighting, and signage) would be designed to provide the shortest walking distances from transit drop-off points and HOV parking areas to the terminal areas.

- **Airport Transportation Information (electronic kiosks, visitor booths and computerized ground transportation access system)**. Transportation information systems could be immediately implemented and provide easy user access for regional needs. Airport ground transportation options, Super Shuttle and hotel shuttle scheduling information would be integrated into both the 1-800-COMMUTE Web site and telephone service and the Airport Web site. Electronic kiosks could provide reservation abilities and real time messaging for various transit options. Visitor booths staffed with airport volunteers can help direct travelers to appropriate transit services.

- **Multi-modal services - airport shuttle coordination at off-site and on-airport.** Multi-modal service may provide service to regional passengers and could reduce the need for parking. Regional transit sites, such as the Sacramento Depot facility (accommodating Amtrak, Capitol Corridor, and Sacramento Regional Transit), future high speed train stations, light rail and bus transfer centers would coordinate ticketing, baggage, and hotel shuttle services for airport bound travelers. Remote access ticketing or remote terminals via airlines or car rental agencies, similar to the remote ticketing and baggage operations at Delta in Atlanta at the end of the MARTA rail line, would provide additional support for transit use by airport travelers.

- **Participation in regional Transportation Management Associations (TMA)**. Memberships in the regional TMAs could provide airport employers and employees ridesharing resources and opportunities. Airport passengers might benefit from future resources generated by the TMA such as various rideshare program grants, transportation kiosks and/or advocacy components. Membership in the local North Natomas TMA would be established in coordination with other North Natomas employers and landlords. The Department of Airports (DOA) would also have a seat on the Board of Directors and strongly encourage (or require through leases) tenants to be active TMA members to support alternative mode uses by employees.

- **Collaboration with tourism and travel agencies, municipal/State agencies, 1(800)Commute.org (future 511) seamless transportation assistance via SACOG**. A collaboration with tourism and travel agencies could provide a consistent theme to highlight alternative transportation options to airport passengers. This partnership between the airport, airlines, tourism organizations and travel agencies could provide a united and common theme that would support the identified TDM measures for the Airport. Because the State of California employees are the single biggest user of the airport, representing 10 percent or more of the total trips, State travel policy has a tremendous

opportunity to influence and reduce SOV use. Sacramento International Airport would work with State and regional travel agencies, and other Transportation Management Associations (TMAs) to promote alternative ground transportation options to the airport for State workers.

- **Marketing campaign via TV, print, radio and airport Public Service Announcements**. A marketing campaign directed at regional passengers could provide direct encouragement and information about the available travel options to the airport. This measure would require funding and is ranked to provide a medium level of ridership. The Airport currently participates in various marketing campaigns and it is recommended that this practice continue.

### *5.5.3 Long Term Recommendation*

- **Fixed Guideway Transit (future BRT or LRT)**. Fixed Guideway Transit service to the airport would provide safe, affordable, and easy access for users. This measure also reduces the demand for on-airport parking, reduces vehicle trips and congestion and ranks very high for potential ridership use in the order of magnitude.

Fixed Guideway Transit options, for the purposes of this Master Plan, are systems that would be separated from the general traffic flow and use its own right of way for the majority of travel. Bus Rapid Transit (BRT) and light rail would provide a fixed guideway transit option to the Airport. BRT is an exclusive (or mixed flow) guideway for rubber tired buses that would have the ability to leave the guideway to provide other localized service. Light rail would be a fixed rail system with planned stops along the route to the airport as an extension of the current light rail system.

### *5.5.4 Recommended but Not Within Airport Control*

- **Super Shuttle discounts for families and groups**. Currently, Super Shuttle provides an excellent example of alternative transportation to the Airport. Services are not marketed, managed or controlled by the airport as it is a private enterprise. Providing a discount subsidy program via Super Shuttle would be provided for passengers to the Airport and also for employees. Routes through van shuttle operations would run not only to and from the downtown Sacramento area but to and from Placer, Yuba, Sutter, Yolo, and El Dorado Counties. Shuttle service to Downtown Sacramento would connect to the rail and transit lines. Some shuttle discounts for passengers include reduced fare first-time rider, reduced fare for the second rider going to the same address

as the first rider, State employee trip consolidations, and reduced fares for children.

- **HOV lanes directly to the airport and preferential parking (I-5/I-80 HOV lanes)**. HOV lanes will meet the needs of passengers from around the region and could provide a synergistic supporting element for the on-airport carpool parking elements. The implementation of HOV lanes along I-80 is currently underway. The scheduled timing for HOV facilities to the airport along I-5 is at least 2014 and is not a function within the airport's control.

### *5.5.5 Not Recommended due to Airport Limitations*

- **Transit Transfer Agreements/Subsidies for all transit connections (free transit access via airline tickets)**. Transfer agreements or subsidies for airport passenger from airplanes to transit options may be illegal for the airport to provide due to Federal funding restrictions. It may be an opportunity for airlines to provide as an independent program. These programs would encourage and promote transit services for airport related trips. Transit transfer passes would provide airline passengers with a free or discounted ride on local connecting transit buses and light rail via their airline ticket.

- **Toll charges for drop off and pick up**. On-Airport toll charges may be an illegal function for the Airport to implement due to the need for a Federally-funded transportation facility to provide equal access to the public. Toll charges require airport travelers to pay a fee for entrance to the Airport grounds. Toll charge research indicates a potential for time increases in the exiting process which creates public frustration, and requires extra staffing and materials to manage.