6.0 TERMINAL REQUIREMENTS AND ALTERNATIVES

The projected activity levels at Sacramento International Airport as described in Chapter 3 are the basis for determining the terminal facilities that will be required to accommodate the passenger activity during the 20-year planning horizon. Currently, the Airport has two terminal buildings, Terminal A and Terminal B. Terminal A was completed in 1998, while the original portions of Terminal B were completed in 1967, with some modifications being completed over the years. There is also an interim international arrivals building located between the A and B terminal complexes that was completed in 2002. In 2003, Terminal A handled 67 percent of the total passengers and Terminal B handled 33 percent of the total passengers.

This chapter examines alternatives for modernizing the terminal facilities to insure that the necessary terminal capacity will be in place to accommodate projected growth. The terminal concept alternatives were developed using industry standards and specific criteria as defined by the Sacramento County Airport System. The purpose for developing terminal concept alternatives is to evaluate and select the best course of action, which will best meet future demands, expansion capability, financial responsibility and customer level of service. This Terminal Alternatives Chapter is organized into the four major sections:

- Terminal Requirements and Considerations
- Terminal Alternatives
- Refined Terminal Alternatives
- Preferred Terminal Alternative

6.1 TERMINAL REQUIREMENTS AND CONSIDERATIONS

The development of terminal concept alternatives began with the establishment of terminal requirements and considerations. These were created as a guide to determine future terminal development based on predetermined landside and airside constraints that

would allow passenger, vehicle and aircraft movements to occur in their optimal setting. These requirements and considerations centered on customer Level of Service issues; airline and other tenant requirements as well as the airport's vision of the future at Sacramento International. These requirements and considerations included the following components:

6.1.1 Terminal Facility Goals and Objectives

To establish the facility goals and objectives, information established in Chapter 1 was reviewed. In addition, key stakeholders were interviewed to gain an understanding of the needs and challenges facing the airport today as well as the expectations that this process should deliver. The various airport stakeholders included County leaders, airport administration, airline representatives and local, state and federal agencies. These goals are centered on growth needs, existing and potential capital expenditures on facilities, and the vision of the Airport, as it relates to the terminal facilities.

Develop projected passenger facilities needs:

Develop a benchmark methodology for establishing current and projected passenger enplanements for the near and long term planning years. Develop a projected flight schedule, which might operate in the planning years.

Determine existing facilities capabilities:

Assess the existing terminal facilities to determine the extent to which the facilities may or may not support current and future facility needs. Assess whether the existing facilities could be renovated, modified or expanded to meet the projected need in a fiscally responsive manner.

Maintain operational capability of existing facilities where possible:

Given the recent capital improvements constructed at the airport, the project should retain the service of the newer facilities, where practical.

Establish airfield constraints:

Establish airfield dimensional controls to judge each alternative equally. Determine the design aircraft size and taxilane separation requirements.

Develop and evaluate concept alternatives to meet the planning year forecasts:

To fully evaluate the best options for the airport, differing terminal concepts and/or layouts should be analyzed based on physical, operational and functional factors. Both traditional and non-traditional terminal concepts should be explored that positions the Airport to the *"leading edge"* of airport facilities and technology. The alternatives must be capable of meeting the 2010, 2020 and beyond planning years.

Maintain maximum operational flexibility:

In addition to accommodating the planning year requirements, allow for ease of future modification or expansion. Facilities must be capable of changing without major renovation or sunk cost.

Develop financially responsible concepts:

Insure that the alternatives can be developed within the financial capability of the airport and its tenants. Develop concepts that can enhance or promote progressive revenue generation opportunities for the airport.

Evaluate all concepts equally:

To truly determine the best terminal alternative for the airport, criteria must be developed to evaluate all concepts equally.

Creates a sense of place as an international gateway:

Convey "sense of arrival" to the State capitol and the region. Architecture embodies aspects of a "World Class" facility.

6.1.2 Planning Year

As established in Chapter 3, the projected growth and facility requirements are based upon planning year projections. To determine the terminal facility needs, two planning years have been established: near term - 2010 and long term - 2020. A forecasted flight schedule was developed to determine possible flight activity in each of the planning years to estimate passenger enplanements, establish design aircraft size, gate requirements, and develop a baseline for the terminal space program.

6.1.3 Gate Capacity Requirements

A forecasted flight schedule was prepared to determine the capacity of existing facilities as well as additional gates that may be needed to meet the projected demand based on the current and potential new entrant airline tenants.

Table 6.1-1 summarizes the results of the gate capacity requirements by airline and size of aircraft for both the near and long term planning years. The gate requirements show all the existing gates being utilized at the airport today, including the domestic gates in terminals A and B, as well as the single

international gate in the IIAB. The table indicates the projected need for a total of 37 gates in the year 2010 and 48 gates in the year 2020.

TABLE 6.1-1

Sacramento International Airport

GATE REQUIREMENTS BY SIZE

Development Phase	Operational Year	Southwest Airlines – Domestic Gates							
		RJ/ Prop	NB	757	WB	WW	Jumbo	NLA	Total
Current Operations	2005	0	11	1	1	0	0	0	13
Initial Opening	2010	0	12	0	0	0	0	0	12
Phase II	2020	0	15	0	0	0	0	0	15
Development Phase	**Operational Year**	**All Other Airlines – Domestic Gates**							
		RJ/ Prop	**NB**	**757**	**WB**	**WW**	**Jumbo**	**NLA**	**Total**
Current Operations	2005	5	8	2	0	0	0	0	15
Initial Opening	2010	5	14	4	1	0	0	0	24
Phase II	2020	7	16	6	2	0	0	0	31
Development Phase	**Operational Year**	**All Other Airlines – International Gates**							
		RJ/ Prop	**NB**	**757**	**WB**	**WW**	**Jumbo**	**NLA**	**Total**
Current Operations	2005	0	0	0	0	0	0	0	0
Initial Opening	2010	0	0	0	0	1	0	0	1
Phase II	2020	0	0	0	0	2	0	0	2
Planning Year 2010:									37
		Southwest Airlines							12
		All Other Airlines							25
Planning Year 2020									48
		Southwest Airlines							15
		All Other Airlines							33

Source: Corgan Associates
Notes: Terminal Requirements based on Conway Consulting Terminal Activity Demand Report 07.31.03

In order to provide the maximum flexibility for the Airport, a gate equivalency factor was developed for planning purposes based on the largest narrow body aircraft (Boeing 757) wingspan and length dimensions. This allows for a single aircraft type for planning purposes, but assures that a mix of aircraft can be accommodated without knowing specific aircraft fleet mix. This also

provides for additional ground space between aircraft for future changes that may occur to the aircraft fleet.

Table 6.1-2 summarizes the Narrow Body Equivalent gate requirements based on the planning aircraft size. This equivalency allows for swapping of aircraft size based on two narrow body aircraft positioned side by side. For example, three regional jets or one wide body aircraft can be accommodated in the same space. Based on the equivalency calculation, 35 gates are required for the 2010 and 47 required for 2020, for planning purposes only. It is intended that the final terminal *design* would be developed based on the agreed upon specific aircraft (agreed between SCAS and the airlines).

TABLE 6.1-2

Sacramento International Airport

NARROW BODY EQUIPMENT

Terminal A NB Requirements								Total
2010 Domestic	0	12	0	0	0	0	0	**12**
2020 Domestic	0	15	0	0	0	0	0	**15**
Terminal B NB Requirements								
2010 Domestic	3	12.6	4	1.5	0	0	0	21.1
2010 International	0	0	0	0	1.5	0	0	1.5
2010 Total								**22.6**
2020 Domestic	5	14.4	6	3	0	0	0	28.4
2020 International	0	0	0	0	3	0	0	3
2020 Total								**31.4**

Source: Corgan Associates

6.1.4 Terminal Program Requirements

The terminal facilities programming process validated the space requirements for both the near and long term planning years. The basis of the program compilation of information was a series of interviews with the existing airlines; the Airport Administration, and other stakeholders to determine facility and operational requirements based on airport, airline and other tenant needs. The public space requirements were developed using industry standards and other planning considerations to determine the total square feet of terminal space that is

required in the development of the terminal concept alternatives. These planning considerations are explained in greater detail later in this chapter. The terminal program details various different space requirements, which are categorized by public space; operational space and various support type spaces. **Table 6.1-3** summarizes the facility requirements for both 2010 and 2020.

TABLE 6.3-1
Sacramento International Airport
LEVEL 3 EVALUATION CRITERIA

Criteria Category	Alternative B	Alternative C	Alternative E2
Long Term Strategic Factors			
Gateway Image Potential	2	2	6
Incremental Gate Growth	4	2	6
Future Expansion Flexibility	2	4	6
LRT/BRT Integration To Equally Serve All PAX	2	2	6
Airport APM Integration To Equally Serve All PAX	2	4	6
APM Not Required Near-Term	6	6	2
Minimizes Improvements To Terminal A	2	2	6
Operational Factors			
Gate Flexibility for Aircraft Type (Larger Aircraft Accommodation)	2	4	6
Gate Flexibility For Airline Use	6	2	6
Maintains IAB Operation (Most Effectively)	2	2	6
Curbside Operation	6	6	6
Security Breach Control	2	6	2
Maintain Dual Taxilanes Between All Aircraft	2	6	6
Environmental Factors			
Air Quality Construction Impacts	4	2	6
Building Orientation	6	2	6
Ground Transportation/Traffic Impacts Thru Construction	2	2	6
Finance/Economic Factors			
2010 Building Cost	4	2	6
2020 Building Cost	4	6	2
Roadway Infrastructure Cost	6	4	2
Operational/Maintenance Cost	4	6	2
Potential Concession Revenue Generation-2010	6	2	6
Potential Concession Revenue Generation-2020	4	2	6

TABLE 6.3-1 (continued)
Sacramento International Airport
LEVEL 3 EVALUATION CRITERIA

Criteria Category	Alternative B	Alternative C	Alternative E2
Feasibility/Constructability Factors			
Construction To Maintain On-going Airport Operations	2	4	6
Length/Number of Construction Phases	4	2	6
Early Delivery of Complete Usable Facilities	6	2	6
Maximize Re-use of Existing Roadways	4	6	2
Minimize Customer Disruption/Maximize Safety	2	2	6
Customer Service Factors			
Maximize Usable Curbside Length	2	4	6
Walk Distance-Ticketing to SSCP	6	2	4
Walk Distance-SSCP to Furthest Gate	2	4	6
Assisted Walk Not Required (Less Than 900 Feet)	2	6	2
Overall Best Customer Experience Potential	4	2	6
Minimize Vertical Transitions 2010	6	6	2

Source: Corgan Associates

It should be noted that the space requirements allocated to terminals A and B are target estimates and may differ between the alternatives.

Once the total amount of terminal space required was determined, a comparison was made to the amount of existing terminal space. As the space program chart indicates, the existing Terminal A is basically sized appropriately to meet the 2010 requirements, although some modifications may be required to address some areas of constraint within the facility (i.e. security screening checkpoint, baggage screening, etc.). Terminal B, however, is very deficient and cannot cost effectively be modified to provide the required space. Therefore, it is recommended that Terminal B be replaced and that Terminal A be modified as required.

6.1.5 *Terminal Planning Considerations*

Numerous planning considerations were identified and developed to guide the terminal development process. These considerations include airside dimensional criteria, use of existing structures, and square foot parameters to determine the size of public spaces. The planning considerations included:

AIRFIELD

Existing cross field taxiway may be used as an apron edge taxilane
Replacement of existing cross field taxiway
Two new cross field taxiways constructed north of existing cross field taxiway
Existing B2 apron paving to remain as long as possibleAllow for dual taxiways for existing runways

FACILITY

Terminal A (airside structure) to remain as is (where practical)
Terminal A parking garage structure to remain as is (with minor modifications allowed)
Existing Administration Building need not remain during construction
Ticketing Hall depth shall be a minimum 90 feet times the required length (of the ticket counter)
Passenger security screening checkpoint and checked baggage screening shall meet Transportation Security Administration current standards
Gate hold lounges spaced at a minimum of two consecutively
Passenger baggage claim depth shall be a minimum 140 feet times the required width (of the number of claim devices)

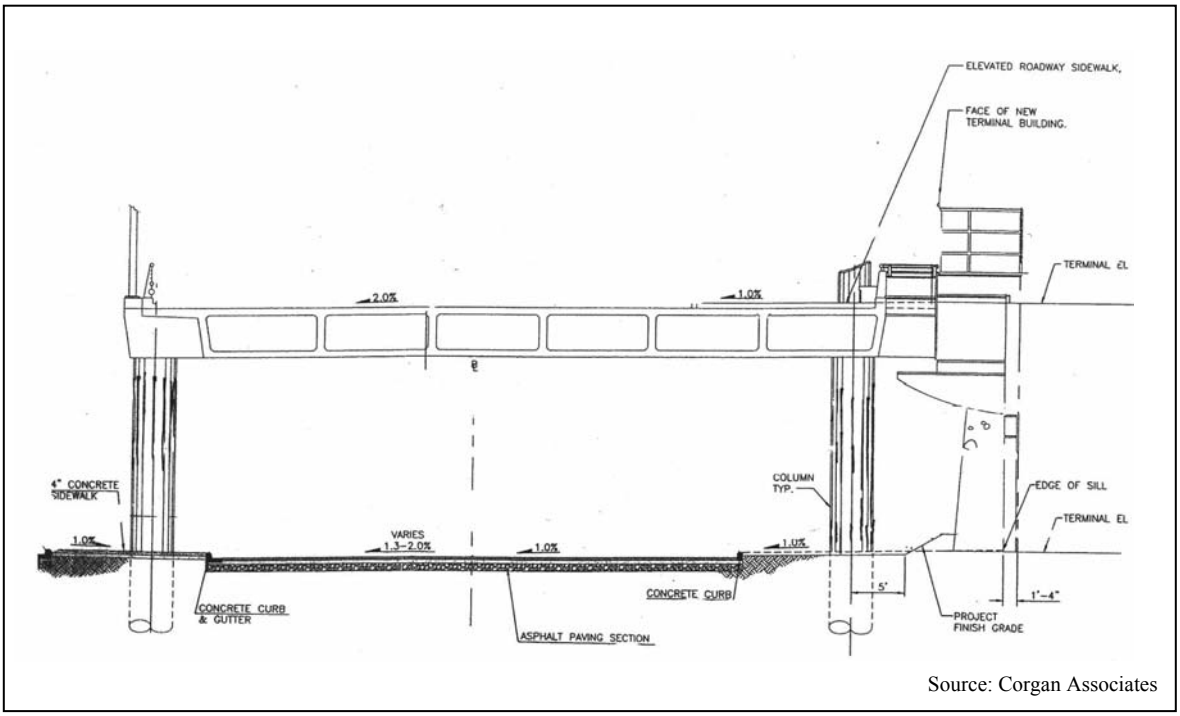
DIMENSIONAL

25 feet aircraft wingtip clearance
15 feet aircraft wingtip to service road clearance
Dual taxi lanes at aircraft parking apron for independent aircraft movement
Unassisted walk shall not exceed 900 feet
International Air Transport Association Standards – Level of Service "B"

6.1.6 Terminal Roadway and Curbside Requirements

To evaluate the current roadway system serving the terminal platform area, the volume of traffic that it can support must be determined. The existing system is composed of a single airport entry from Interstate 5, which splits in to two roadways, one serving Terminal A and the other serving Terminal B. This division of the roadway allows each terminal to be served independently without compounding all of the terminal traffic along one roadway. Past each terminal, the roadways merge together and return vehicles back to the airport exit. The roadway is typically constructed as a two-lane system that expands to four lanes at the terminal curbsides (not including the pick up and drop off lane adjacent to the curbside). Each terminal curbside also provides a dedicated commercial curb.

It is not anticipated that there will be a need for additional roadway capacity on any of the major roadway links within the terminal platform area. Capacity from the I-5 entry toward the terminal platform area will be evaluated in a subsequent environmental study. Redevelopment and /or realignment of the Terminal B roadway would be required with the development of a new Terminal B. To provide optimum flexibility and maximum growth for the airport, a two-level roadway should be developed to access Terminal B. This will allow the separation of the departures and arrivals functions, essentially doubling the amount of potential curbside. The length of the two-level structure will be determined by the preferred alternative that is selected. **Exhibit 6.1-1** illustrates a typical two-level roadway structure that would be developed.



Source: Corgan Associates

Exhibit 6.1-1 Typical Two-level Roadway Structure

Currently, each terminal has a single level curbside with both a passenger vehicle and commercial curb. It is assumed that all alternatives for Terminal B will incorporate the stated requirements based on the two-level roadway. The Terminal A curbside, however, is deficient today and will require some type of solution to provide adequate curbside length in the near future.

Table 6.1-4 summarizes the anticipated curbside requirements through the planning periods, which is based on the peak hour enplanements indicated in **Table 6.1-4A**. Currently, the existing Terminal A curbside becomes heavily congested during multiple peak hours. In order to validate these numbers, a traffic survey was performed in August 2003, and it was noted that this date does not necessarily reflect typical peak conditions.

TABLE 6.1-4

Sacramento International Airport

ESTIMATED CURBSIDE REQUIREMENTS TERMINAL MODERNIZATION PROGRAM

	Activity	Existing Supply (linear feet)	2003		2005		2010		2020	
			Volume (Vehicles per hour)	Required Length (linear feet)	Volume (Vehicles per hour)	Required Length (linear feet)	Volume (Vehicles per hour)	Required Length (linear feet)	Volume (Vehicles per hour)	Required Length (linear feet)
A	Enplaning Curbside – Private vehicles, rental cars, taxicabs, limousines, door-to-door vans	250	460	370	550	440	440	370	670	530
	Other commercial vehicles (b)	445	80	0 to 330	90	0 to 330	100	0 to 330	120	0 to 330
	TOTAL	695	540	370 to 700	640	440 to 770	540	370 to 730	790	530 to 920
	Deplaning Curbside – Private vehicles, rental cars,	240	430	430	520	510	420	430	630	620
	Taxicabs, limousines, door-to-door vans	(c)	35	300	40	330	35	300	55	480
	Other commercial vehicles	275	80	330	90	330	100	360	120	390
	TOTAL	515	545	1,060	650	1,170	555	1,090	805	1,490
B (d)	Enplaning Curbside – Private vehicles, rental cars, taxicabs, limousines, door-to-door vans	255	240	230	260	230	510	410	600	480
	Other commercial vehicles (b)	690	80	0 to 330	90	0 to 330	100	0 to 360	120	0 to 390
	TOTAL	945	320	230 to 560	350	230 to 560	610	410 to 770	720	480 to 870
	Deplaning Curbside – Private vehicles, rental cars	255	230	270	240	270	490	490	570	570
	Taxicabs, limousines, door-to-door vans	230	35	300	40	330	35	300	55	480
	Other commercial vehicles	(e)	80	330	90	330	100	360	120	390
	TOTAL	485	345	900	370	930	625	1,150	745	1,440

Source: Leigh Fisher Associates, February 2004, based on August 15, 2003 traffic survey.

Note: Existing dwell times and required curb length per vehicle are assumed constant through 2020. Passenger volume assumptions are provided in Table 6.1-4A.

(a) 2005, 2010, and 2020 volumes assume 2003 traffic volumes are escalated in proportion to annual enplanements, by terminal (2003 to 2005), and then in proportion to peak hour enplanements, by terminal (2010 and 2020)

(b) Includes parking, rental car, inter-terminal and hotel/motel shuttles, airporters, transit, and special event vehicles.

(c) These modes currently pick up passengers in a courtyard west of the terminal.

(d) Terminal B volume are estimated based on observations at Terminal A and peak hour passenger volumes at each terminal.

(e) Commercial vehicles using the outer curbside at Terminal B pick up and drop off passengers in the same location.

This table indicates a current deficiency in the required curbside today and by 2005, the curbside requirements at terminals A and B will exceed the available capacity. Based on these requirements, it is believed that Terminal A could warrant a two-level curbside between 2010 and 2013 or will require providing some other form additional curbside frontage elsewhere.

TABLE 6.1-4A

Sacramento International Airport

ESTIMATED ENPLANED PASSENGER VOLUMES (PEAK HOUR ENPLANEMENTS) TERMINAL MODERNIZATION PROGRAM

	2003	**2005 (a)**		**2010 (b)**		**2020 (b)**	
Terminal	Annual	Annual	Peak Hour Enplanements	Annual	Peak Hour Enplanements	Annual	Peak Hour Enplanements
A	2,878,122	3,424,000	1,600	3,110,000	1,300	4,025,000	1,950
B	1,509,685	1,612,000	600	2,933,000	1,200	4,358,000	1,400
TOTAL	4,387,807	5,036,000	2,200	6,043,000	2,500	8,383,000	3,350

(a) 2003 passenger volumes – SCAS February 2004.
(b) 2005,2010, and 2020 passenger volumes – SCAS July 2003.

6.1.7 Close-in Public Parking Capacity Requirements

The Airport provides three basic service levels of parking: Hourly, Daily, and Remote. Each of these product types must be incorporated into the planning, so it is necessary to determine the requirements of each. **Table 6.1-5** summarizes anticipated public parking requirements through the planning periods based on estimated enplaned passenger volumes.

The parking requirement estimates are higher than previously indicated because the current 2010 and 2020 airline passenger forecasts are higher than originally assumed. As a result of these estimates, the assumed annual growth rates shown for public parking have increased by 2 percentage points (i.e., 6 percent versus 4 percent) for the years 2003 through 2010.

TABLE 6.1-5

Sacramento International Airport

ESTIMATED PUBLIC PARKING REQUIREMENTS

Terminal	Parking Facilities	Existing Supply (a)	Required Parking Spaces			
			2003 (b)	2005 (c)	2010 (d)	2020 (d)
A	Hourly	5,400	900	1,100	1,100	1,500
	Daily	3,155	3,600	4,400	4,400	5,600
	TOTAL	**8,555**	**4,500**	**5,500**	**5,500**	**7,100**
B	Hourly	1,497	500	1,100	1,100	1,800
	Daily	2,944	1,900	2,300	4,600	6,800
	TOTAL	**4,441**	**2,400**	**3,400**	**5,700**	**8,600**
A & B	Remote	5,045	6,700	8,100	10,900	15,100
GRAND TOTAL		**18,041**	**13,600**	**17,000**	**22,100**	**30,800**

Source: Leigh Fisher Associates, February 2004, based on data provided by SCAS.

Notes: Requirements for all facilities include a 10% circulation factor.

Passenger volume assumptions are provided in Table 6.1-5A below.

(a) Includes facilities under construction and operational by July 2004 These numbers are subject to revision upon receipt of updated parking inventory data from SCAS.

(b) 2003 requiremetns are based on overnight occupancies provided by SCAS (daily and remote parking requirements) and 2003 parking model (hourly requirements).

(c) 2005 requirements assume 2003 requirements escalated in proportion to annual enplanements, by terminal

(d) 2010 and 2020 requirements assume 2005 requirements escalated in proportion to peak month, average day enplanemetns, by terminal (hourly requirements) and peak month enplanements, by terminal (daily and remote requirements)

TABLE 6.1-5A

Sacramento International Airport

ESTIMATED ENPLANED PASSENGER VOLUMES (PEAK MONTH) TERMINAL MODERNIZATION PROGRAM

	2003 (a)	2005 (b)			2010 (b)			2020 (b)		
Terminal	Annual	Annual	Peak Month	Peak Month Average Day	Annual	Peak Month	Peak Month Average Day	Annual	Peak Month	Peak Month Average Day
A	2,878,122	3,424,000	310,780	10,800	3,110,000	279,850	9,790	4,025,000	358,100	13,500
B	1,509,685	1,612,000	162,880	5,640	2,933,000	296,420	10,250	4,358,000	440,490	16,470
TOTAL	4,387,807	5,036,000	473,660	16,440	6,043,000	576,270	20,040	8,383,000	798,590	29,970

(a) 2003 passenger volumes – SCAS February 2004.

(b) 2005,2010, and 2020 passenger volumes – SCAS July 2003.

6.2 TERMINAL ALTERNATIVES

The analysis of terminal concept alternatives commenced with a "proto-typing" process, in which more than 30 vignette sketches were developed to explore potential options for development of the terminal concept alternatives. A high level evaluation was performed of these proto-typing alternatives (Level 1) using comparative data based on industry standard level of customer service and the market being accommodated (origin and destination versus connecting hub). This Level 1 screening determines which, if any, of the alternatives meet the basic customer level of service and therefore should be considered for further evaluation. The alternatives were also evaluated as to whether they meet the projected facilities demand.

Six of the alternatives were identified through the Level 1 process for further development. The six alternatives were then subjected to Level 2 analysis (detailed and quantitative evaluation designed to identify which three alternatives best meet the Airport's future facility needs). Those three alternatives were then refined and subjected to a Level 3 final analysis that includes further refinement of the concept, evaluation factors and additional examination. Based on the results of the Level 3 analysis, a Preferred Alternative was selected as the terminal facility recommendation.

6.2.1 Identification of Preliminary Concept Alternatives

In the proto-typing process of the terminal concept alternatives, it is important to review all potential "origination and destination "(O & D)" type concept. At this level of detail, all options should be considered regardless of whether existing facilities are preserved. The primary objective is to investigate as many differing options as possible to insure that all potential scenarios are reviewed. Using this process, over 30 potential concepts were developed and weighed against the comparative data to determine which alternative concepts had merit to proceed to the Level 2 evaluation. This comparative data included the following criteria:

Overall terminal layout

Airside/aircraft operation

Potential curbside

Passenger walk distance

Capital cost

Incremental and long term growth

Use of existing facilities

Maintenance of ongoing operations during construction

Of the more than 30+ preliminary concepts, six concept alternatives were identified as a result of the Level 1 evaluation process providing possibilities by maximizing existing facilities, providing long term growth and meeting the targeted level of service. Each of the concept alternatives selected allowed for the redevelopment of Terminal B and the potential to maximize the Terminal A facilities. As well, each terminal concept alternative responded to the possible airfield alternatives that were under consideration.

6.2.2 Development of Level 1 Alternatives

Each concept alternative was developed based on the planning requirements and considerations identified in this chapter. The common considerations of the alternatives were the development of a two-level terminal curbside roadway, a parking structure and a multi-level, multiple unit or central terminal concept. In addition, a "no-build" option was considered to determine the impacts on the airport and the customer level of service if renovation of Terminal B was considered. The following concept alternatives were developed:

6.2.2.1 No Build Alternative

This alternative evaluated the possibility of maintaining the existing terminals A and B as the airport terminal facilities. Terminal A, being the most recent facility, was designed to sufficiently accommodate

additional passenger traffic in the concourse, the hold lounges and the passenger bag claim. The program requirements, however, validated that the ticketing hall and passenger security checkpoint are currently unable to accommodate current demands. In other words, the single level terminal roadway and curbside (especially for Terminal A) are deficient as well. Providing additional capacity to Terminal A would create a domino effect by creating congestion at the security checkpoint, then backing up into ticketing hall, and then out to the curbside. This would translate into major traffic delays with increased waiting time for vehicles approaching the curbside to deliver passengers.

Based on the projected 2010 space requirements, Terminal B is currently 500,000 square feet undersized to handle the required operation. This will equate to similar congestion issues as described for Terminal A, with the ticketing, bag claim, security and concourses all breaking down. In addition, the terminal would be burdened with increased capacity and additional flight activity. Since the concourses are at capacity, additional flights would have to be accommodated via hardstand operations with a bussing system to transfer passengers to the aircraft. Air quality issues will continue to degrade due to the bussing operation, aircraft idling at the hardstand positions and increased vehicle traffic congestion. With these issues facing both terminals, the level of customer service for the entire airport will degrade to unacceptable levels.

6.2.2.2 Alternative A

Alternative A (see **Exhibit 6.2-1**) is a multi-unit terminal concept. It retains Terminal A as a single unit terminal and assumes a new Terminal B as a second unit terminal. Alternative A would develop Terminal B as a three level, "U" shape single unit terminal with two concourse finger piers to be constructed for the planning year 2010. One additional pier would be added for the planning year 2020. The landside terminal would be constructed to support all three concourses in the initial phase requiring increased costs to support this alternative. A two level roadway provides passenger vehicle access to the arrivals and to the departures levels. This alternative envisions the requirement to reconstruct Terminal A with a two-level landside facility and a double level roadway system to separate the arrivals and departures process due to constraints with the existing single level terminal and roadway.

6.2.2.3 Alternative B

Alternative B (see **Exhibit 6.2-2**) is a multi-unit terminal concept. It retains Terminal A as a single unit terminal and assumes a new

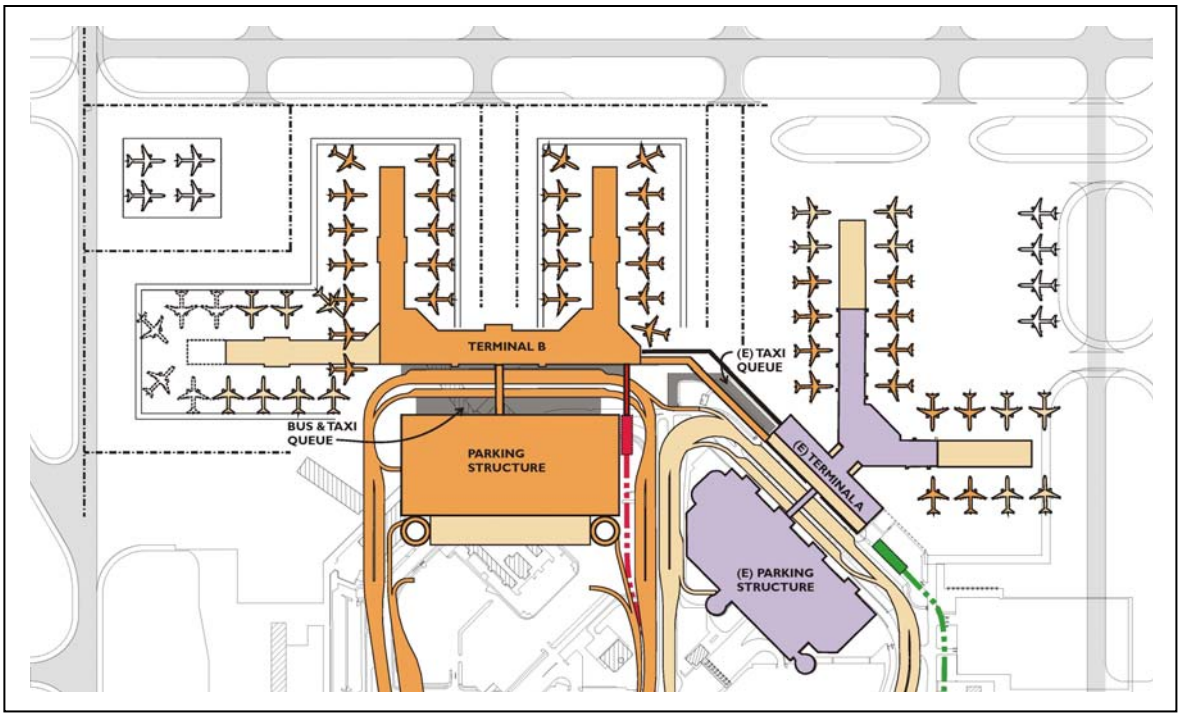


Exhibit 6.2-1 Terminal Alternative A

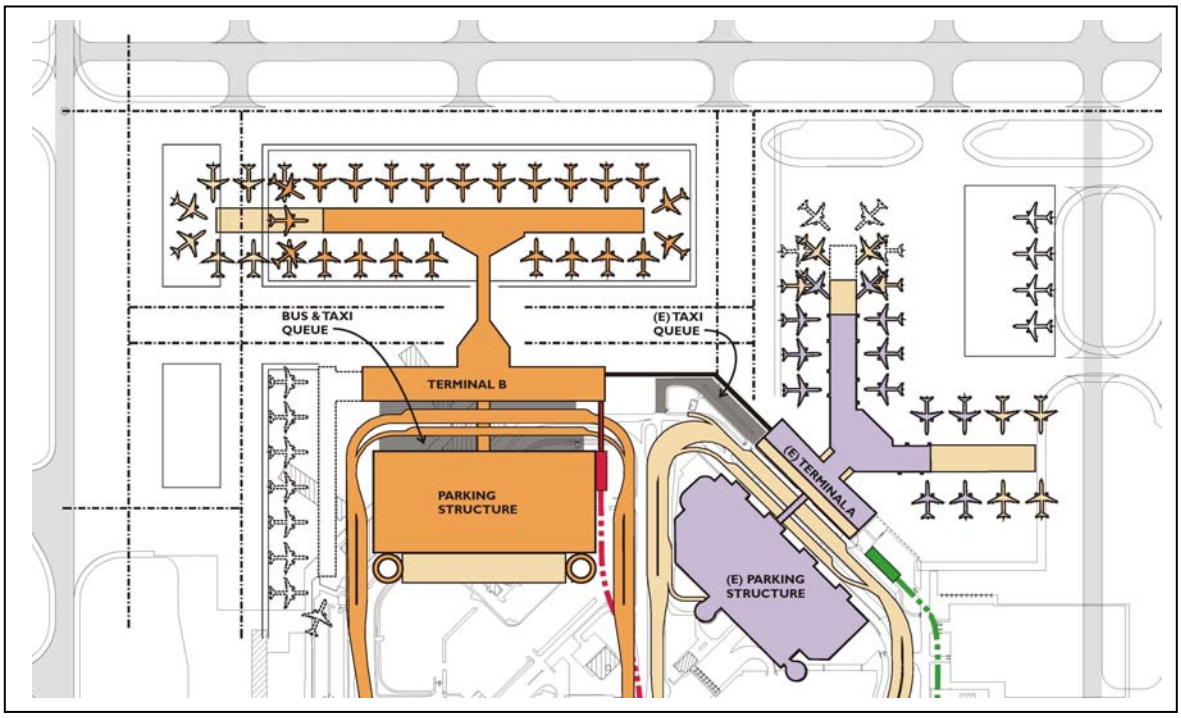


Exhibit 6.2-2 Terminal Alternative B

Terminal B as a second unit terminal. Alternative B would develop Terminal B as a three level, single unit terminal with a separate remote concourse for the year 2010 with an addition to the concourse extending to the west for the year 2020. This alternative provides a separation of landside and airside functions as well as increased concession revenue potential (compared to Alternative A). The roadway system to Terminal B and the modifications required to Terminal A would be similar as described in Alternative A.

6.2.2.4 Alternative C

Alternative C (see **Exhibit 6.2-3**) is a multi-unit terminal concept. It retains Terminal A as a single unit terminal and assumes a new Terminal B as a second unit terminal. Alternative C would develop Terminal B as a three level single-unit terminal in a finger configuration with two concourse finger piers to be constructed for planning year 2010. Additional ticketing and bag claim along with one additional finger pier would be constructed for the planning year 2020. This alternative allows for the minimum construction required to support the 2010 program. The terminal curves in plan parallel to the existing roadway configuration, providing curbside length along the landside perimeter of the terminal. The roadway system to Terminal B and the modifications required to Terminal A would be similar as described in Alternative A.

6.2.2.4 Alternative D

Alternative D (see **Exhibit 6.2-4**) is a multi-unit terminal concept. It retains Terminal A as a single unit terminal and assumes a new Terminal B as a second unit terminal. Alternative D would develop Terminal B as a two level single unit terminal that is modeled after the design of the existing Terminal A. It would have two concourse piers developed in an "L" shape configuration with an additional single pier built to the east of the main terminal building. All three piers would be constructed for planning year 2010 and the main landside terminal sized for future ticketing and bag claim. One additional pier would be constructed for the planning year 2020. The terminal would be developed in plan parallel to the existing roadway configuration, providing curbside length along the landside perimeter of the terminal. To maintain existing

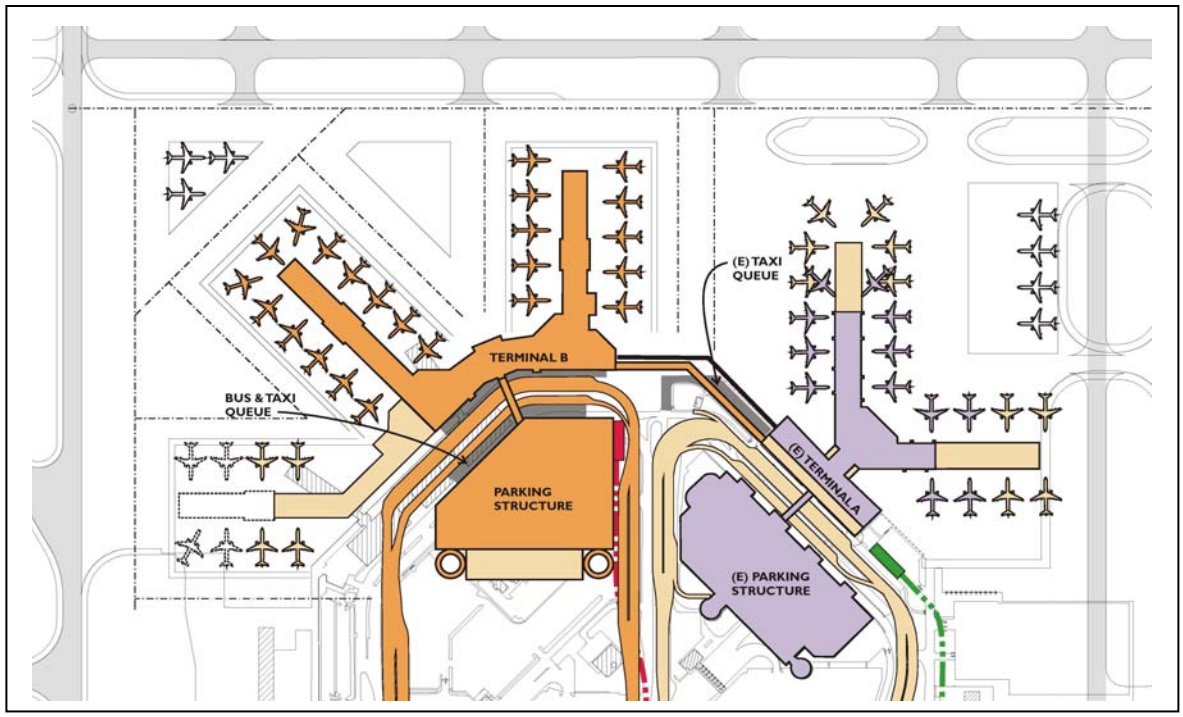


Exhibit 6.2-3 Terminal Alternative C

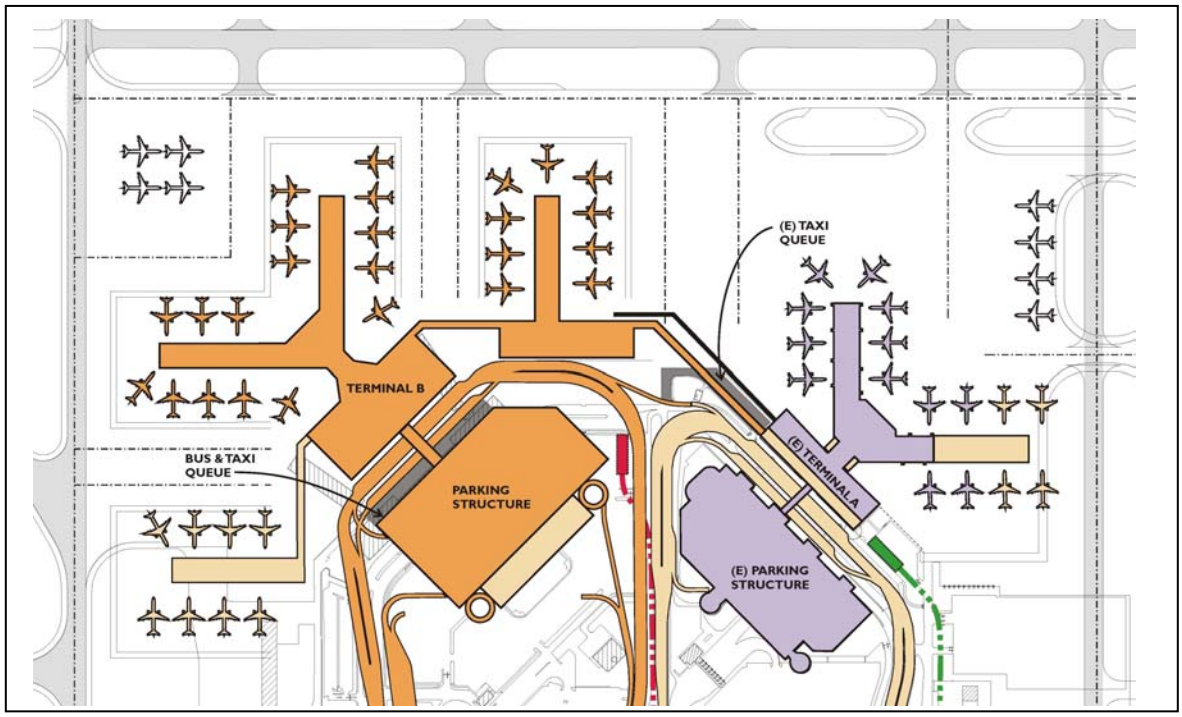


Exhibit 6.2-4 Terminal Alternative D

operations, the terminal would be constructed airside of the existing terminal, minimizing future growth and flexibility. The roadway system to Terminal B and the modifications required to Terminal A would be similar as described in Alternative A.

6.2.2.5 Alternative E

Alternative E (see **Exhibit 6.2-5**) would initially be developed as a multi-unit terminal concept with the ability to become a central terminal concept at some future date. It retains Terminal A as a single unit terminal and assumes a new Terminal B as a second unit terminal for the near term planning year with the functions of Terminal A relocating to the Terminal B building in the long term planning year. At that time, Terminal A would then be utilized as an airside concourse. Alternative E would develop Terminal B as a three level infield terminal with airside concourses to be constructed for planning year 2010 with the ability to add an additional pier for the planning year 2020. The terminal is served by a west side dual level roadway for planning year 2010, with an additional east side dual level roadway to be added for planning year 2020.

6.2.2.6 Alternative G

Alternate G (see **Exhibit 6.2-6**) is a multi-unit terminal concept, which responds to the inboard airfield alternative 3. It retains Terminal A as a single unit terminal and assumes a reconstructed Terminal B as a second unit terminal. Alternative G would develop Terminal B as a three-level landside terminal building with two remote satellite concourses connected by an underground people mover system for the 2010 planning year and one additional satellite concourse for the planning year 2020. A two level roadway provides passenger vehicle access to the arrivals and to the departures levels. This alternative envisions the requirement to reconstruct Terminal A with a two-level landside facility and a dual level roadway system to separate the arrivals and departures process due to constraints with the existing single level terminal and roadway.

6.2.3 Construction Phasing

With the recommendation that the existing Terminal B facility be replaced, any new facility must be constructible while the existing facilities remain operational. This may require development of a multi-phased construction program in order to maintain airport operations. All gates currently utilized in Terminal B must remain in service either in current locations or be replaced

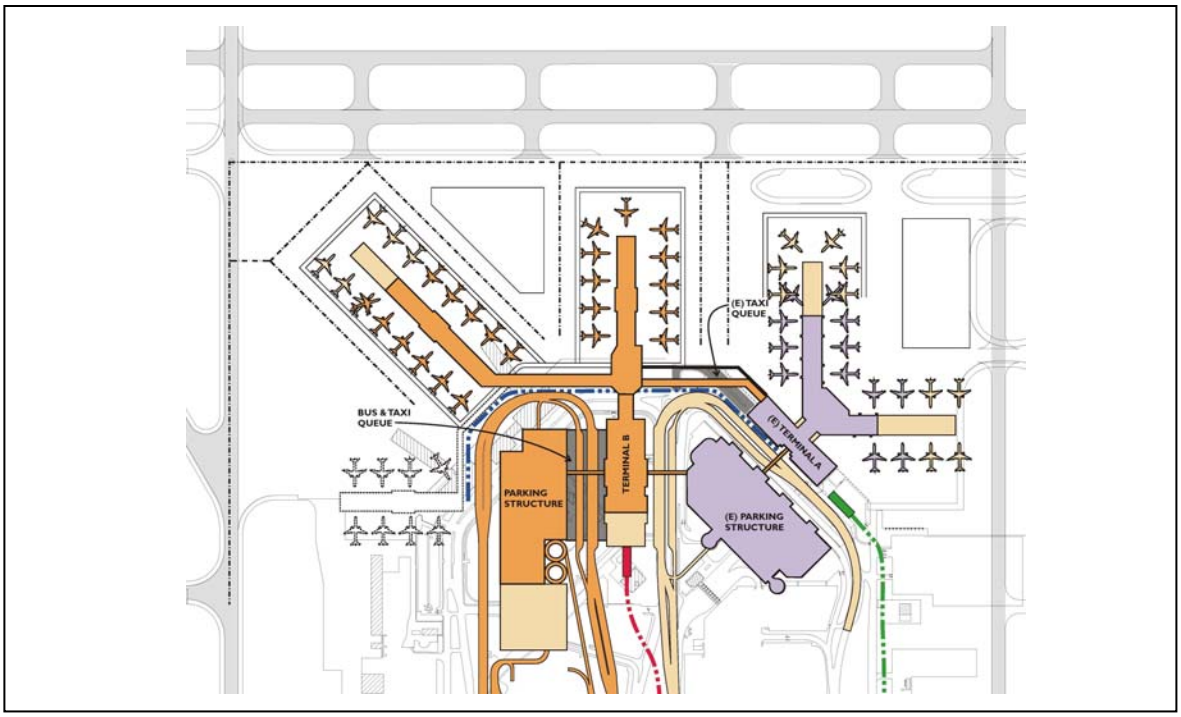


Exhibit 6.2-5 Terminal Alternative E

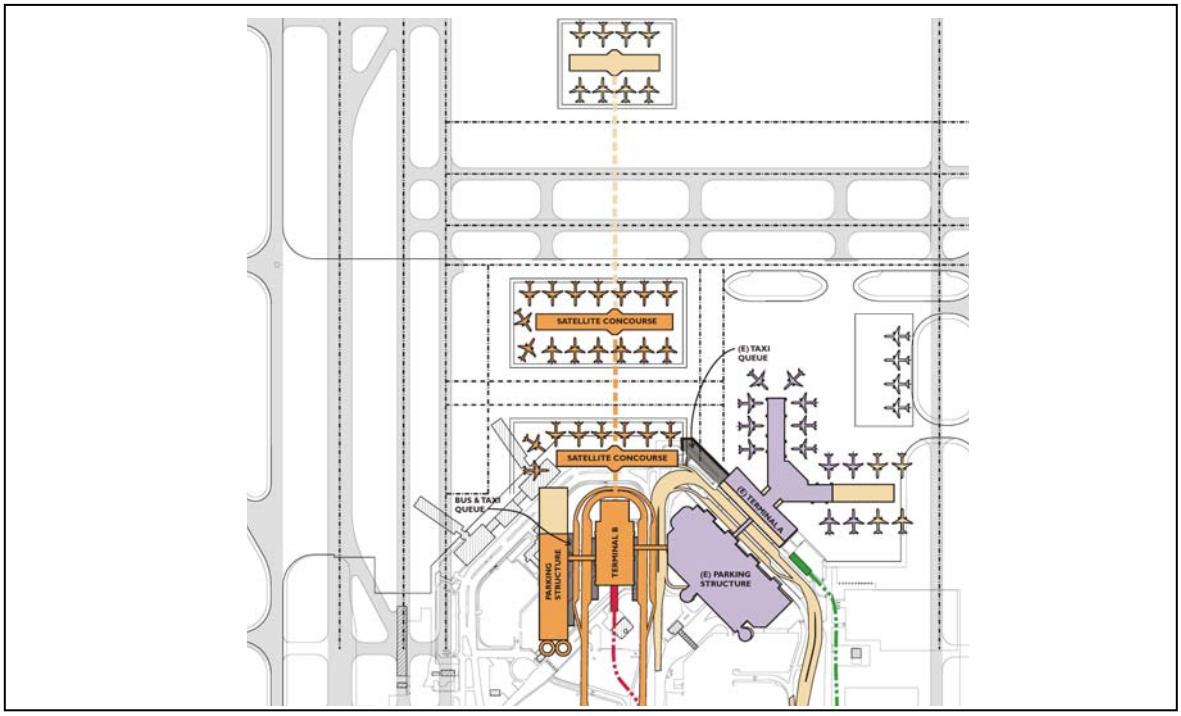


Exhibit 6.2-6 Terminal Alternative G

elsewhere. Access to the terminal and curbside must also be maintained throughout construction.

6.2.4 *Evaluation of Terminal Alternatives (Level 2)*

Based on the goals for the Terminal Modernization Program, a comprehensive set of evaluation criteria were developed. The intent of the goals was to ensure a thorough evaluation of each alternative, resulting in the best alternatives for a final review. The criteria were developed within the following factors:

Long Term Strategic Issues
Operational
Environmental
Finance /Economic
Feasibility/Constructability
Customer Level of Service

The following **Table 6.2-1** Level 2 Ranking Summary, summarizes the ranking of each of the terminal alternatives with the Level 2 criteria. Based on the cumulative total of each criteria category, Alternatives B, C and E are recommended for further refinement.

TABLE 6.2-1
Sacramento International Airport
LEVEL 2 EVALUATION RANKING

Criteria Category	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative G
Long Term Strategic Plan	30	38	44	32	48	10
Operational Factors	50	44	52	34	58	22
Environmental Factors	14	34	20	14	34	28
Finance/Economic Factors	46	46	54	44	48	16
Feasibility/Constructability Factors	32	34	38	28	52	12
Customer Service Factors	102	92	96	92	58	20
Total Score	**274**	**288**	**304**	**244**	**298**	**108**

Source: Corgan Associates

6.3 REFINED TERMINAL ALTERNATIVES

The three highest-ranking alternatives were refined to support the Level 3 evaluation. The terminal refinements for alternatives B, C, and E consisted of:

Site plan landside and airside refinements
Passenger flow and level-of-service development
Block plan refinements
Architectural sectional studies
Construction phasing development and schedule

Common elements to all three alternatives include:

The terminal roadway would be redeveloped based on the terminal location and configuration as a two-level structure to provide maximum curbside access.
A new parking structure with an elevated walkway connection would be developed in close proximity to the terminal.
Replacement of the hotel and airport administration within the terminal facility.

There is a difference between the three alternatives to meet the long-term growth in 2020. Alternatives B and C, as multi-unit terminal concepts, will be limited to the amount of future gate expansion that is possible. To meet the future growth, these alternatives will require expansion in Terminal A (Airside and Landside). The existing concourse can be easily expanded, but the terminal roadway and curbside cannot support additional gates without reconstruction as a two-level structure. This would also require reconstruction of the terminal as a two-level facility as well. Alternative E, however, can initially be constructed as a unit terminal to support an airside concourse in 2010 and then be expanded in 2020 to become a central terminal to support Terminal A airline tenants. This would allow the gate (airside) expansion of Terminal A without the reconstruction of the terminal or the terminal roadway (landside).

6.3.1 *Refined Alternative B*

From Level 2 evaluation to Level 3 evaluation, the basic configuration of Alternative B (see **Exhibit 6.3-1**) has remained. Alternative B is a traditional multi-unit terminal concept that is capable of supporting up to 23 equivalent aircraft gates (2010 planning year). The most notable refinement is the reduction of the dual taxilane in the "throat", between the terminal and concourse, due to the limited distance between the roadway and the cross-field taxiway. This allows the operations of the Interim International Arrivals Building (IIAB) to be maintained while the new facilities are constructed, but requires a bussing operation to a remote hardstand parking location. The concept involves a new Terminal B with a terminal (landside components with ticketing and baggage claim lobbies, hotel, administrative offices) connected to a pier concourse via a pedestrian connector. The concept provides for a single security screening checkpoint (SSCP) and aircraft gate contiguity. The terminal would be a multi-level facility with arrivals functions at the lower level (including the international arrivals facilities), departures functions at the second level and the possibility of the airport administration and a hotel located at the upper levels. The length of the pedestrian connector would provide for a minimal slope to account for the 5-foot (plus) height differential between the terminal and the concourse.

Due to the location and configuration of the new terminal building with the existing Terminal B, multiple phases are required to accomplish the program. It is estimated that the program will take five phases and over six years to complete. The 2010 terminal program would be constructed in two major projects and would require passengers accessing the terminal through a construction zone for multiple years. Half of the terminal (landside components) and the entire concourse can be constructed in the first phase with the remaining ticketing following in the second phase. The dual level roadway would not be usable until the end of the construction period and would require departing

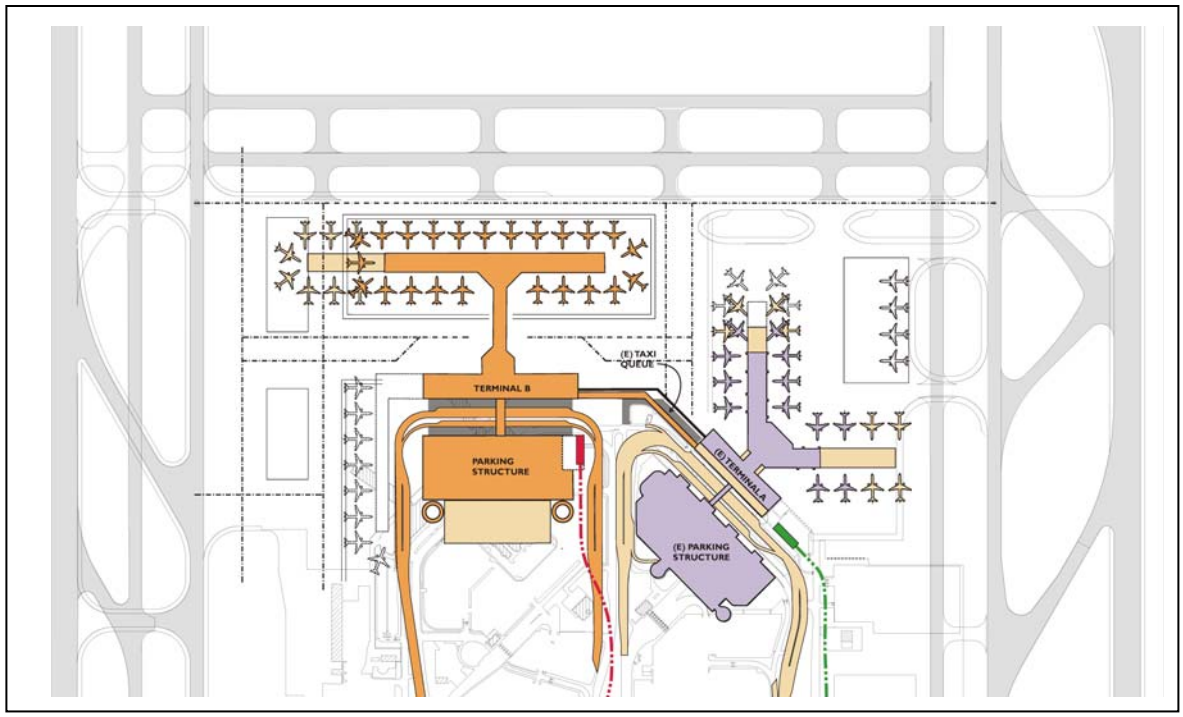


Exhibit 6.3-1 Refined Terminal Alternative B

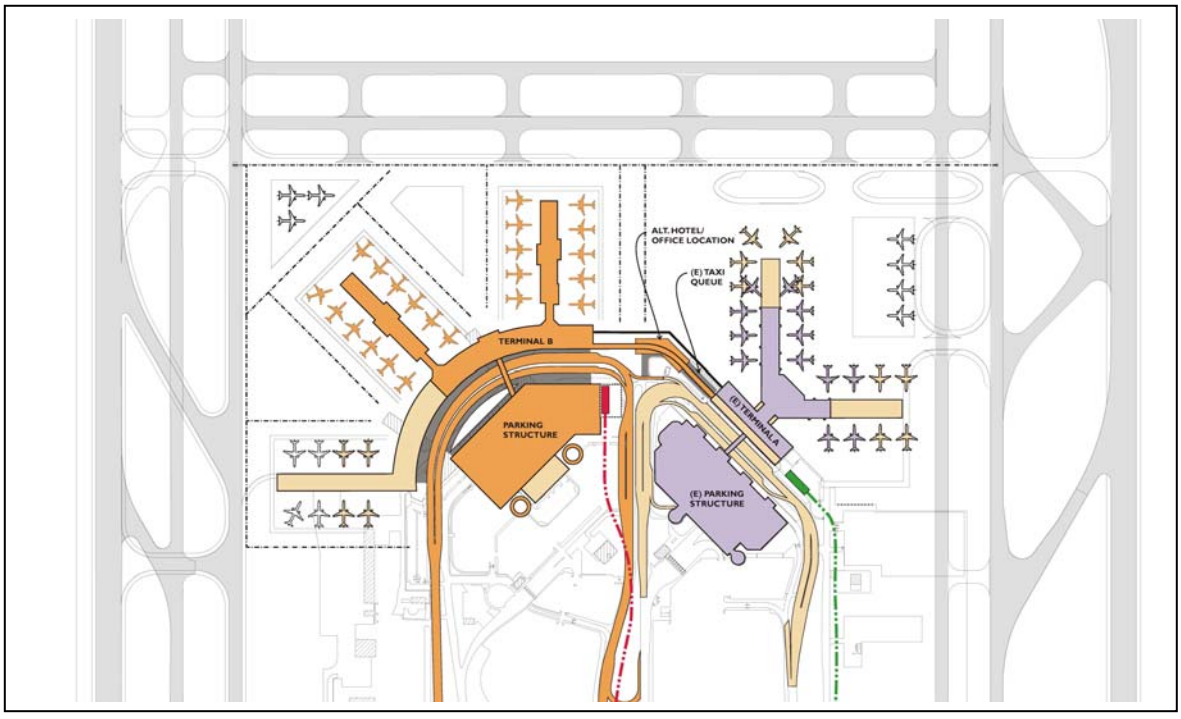


Exhibit 6.3-2 Refined Terminal Alternative C

passengers to access the terminal at the arrivals level during construction. Short-term parking would be displaced during construction and the terminal would not have direct access parking until year six.

6.3.2 *Refined Alternative C*

From Level 2 evaluation to Level 3 evaluation, the basic configuration of Alternative C (see **Exhibit 6.3-2**) has evolved to a radial form. Similar to Alternative B, C is also a traditional multi-unit terminal concept, capable of supporting the same number of gates. This concept alternative would develop the terminal facilities in direct proportion to the concourse, essentially creating contiguous multi-terminals. Multiple concourses would be constructed in this alternative. The Interim International Arrivals Building (IIAB) also remains operational through construction, but requires a bussing operation to a remote hardstand parking location. The multi-level structure of the building would be similar to Alternative B. For the 2010 planning year, this alternative allows the ticketing and baggage claim facilities to expand in proportion to the aircraft parking gate count, unlike Alternative B. For the 2010 planning year, this alternative separates the gates into two concourses and each concourse with its associated security-screening checkpoint (SSCP). Because of the close proximity of the terminal to the concourse, the five foot (plus) height differential requires the apron paving level to be raised two to three feet and the remaining differential be accomplished in ramps from the landside terminal down to the concourse.

Due to the location of the new terminal building to the existing Terminal B, multiple phases are also required to accomplish the program. It will take five major phases and over six years to complete. The terminal (landside components) would be constructed in two major projects and would also require passengers to access the terminal through a construction zone for approximately three years. Half of the terminal and one concourse can be constructed in the first phase and

the remaining portion of the terminal and second concourse in the second phase. The dual level roadway would also not be usable until the end of the construction period and would require departing passengers to access the terminal at the arrivals level during construction. Short-term parking would be displaced during construction and the terminal would not have direct access parking until year six.

6.3.3 *Refined Alternative E2*

From Level 2 evaluation to Level 3 evaluation, the basic configuration of Alternative E (see **Exhibit 6.3-3**) has evolved most significantly to a true landside/airside facility. After several iterations, the original Alternative E concept as presented could not satisfy customer level of service requirements. It was determined that an automated people mover system (APM) would be required to reduce walk distances to the west pier in the original Alternative E. The Alternative E2 version is a centralized terminal concept with separated landside and airside facilities, which are connected by a must-ride APM. This allows greater operational and security flexibility for the airport as well as full independent aircraft movement around the concourse. The landside terminal and roadways can be constructed in the existing Terminal B public parking lot while the airside concourse can be constructed beyond the existing apron edge. This allows the Interim International Arrivals Building (IIAB) to remain operational and gated throughout construction as well as allowing existing Terminal B to remain operational. Similar to the other two alternatives, this would be a multi-level facility, however the third level would be a transition level where passengers would access the APM and have access to retail and a possible hotel above. The height differential between the landside and airside facilities would be accommodated in the APM guideway.

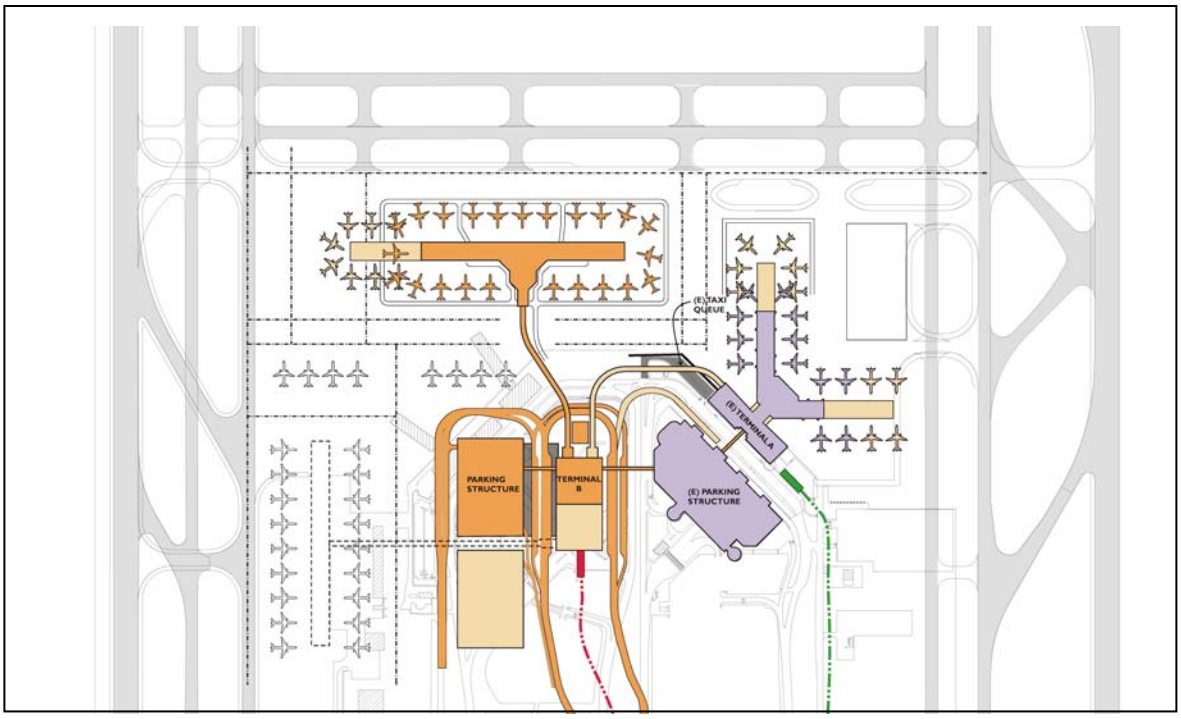


Exhibit 6.3-3 Refined Terminal Alternative E2

The phasing in this alternative is shorter in duration and more simplistic than alternatives B and C. The entire landside terminal, airside concourse, APM and roadways can be constructed in a single phase while the other existing facilities remain operational. This would allow the Airport to have beneficial occupancy in less than two and a half years. Passengers would not have to access the terminal through construction zones so this alternative would not decrease customer level of service.

6.3.4 *Level 3 Evaluation of the Refined Terminal Alternatives*

A detailed Level 3 analysis was conducted for Alternative B, Alternative C and Alternative E2 using criteria in the following categories: Long Term Strategic Factors, Operational Factors, Environmental Factors, Economic Factors, Construction Feasibility and Customer Service Factors. **Table 6.3-1** shows the Level 3 evaluations for the criteria in these categories:

Long Term Strategic Factors - The Long Term Strategic Factors analysis considered the long-term vision, goals and opportunities for the airport. Expansion, future growth, alternative access and re-use of existing facilities to the extent possible are all key elements in this category. Each of the alternatives can meet the projected long-range gate growth that will be required at the airport. The potential to develop a central terminal complex allows the airport the opportunity for developing a "sense of place" or gateway image, which is important as the State Capitol. As the area continues to grow, public transportation will be expanded to the airport. Each of the alternative concepts provide for a center or eastern alignment right of way for the Light Rail Transportation/Bus Rapid Transit system. The development of a central terminal would allow for a central depository of all transit passengers to a single location.

TABLE 6.3-1

Sacramento International Airport

LEVEL 3 EVALUATION CRITERIA

Criteria Category	Alternative B	Alternative C	Alternative E2
Long Term Strategic Factors			
Gateway Image Potential	2	2	6
Incremental Gate Growth	4	2	6
Future Expansion Flexibility	2	4	6
LRT/BRT Integration To Equally Serve All PAX	2	2	6
Airport APM Integration To Equally Serve All PAX	2	4	6
APM Not Required Near-Term	6	6	2
Minimizes Improvements To Terminal A	2	2	6
Operational Factors			
Gate Flexibility for Aircraft Type (Larger Aircraft Accommodation)	2	4	6
Gate Flexibility For Airline Use	6	2	6
Maintains IAB Operation (Most Effectively)	2	2	6
Curbside Operation	6	6	6
Security Breach Control	2	6	2
Maintain Dual Taxilanes Between All Aircraft	2	6	6
Environmental Factors			
Air Quality Construction Impacts	4	2	6
Building Orientation	6	2	6
Ground Transportation/Traffic Impacts Thru Construction	2	2	6
Finance/Economic Factors			
2010 Building Cost	4	2	6
2020 Building Cost	4	6	2
Roadway Infrastructure Cost	6	4	2
Operational/Maintenance Cost	4	6	2
Potential Concession Revenue Generation-2010	6	2	6
Potential Concession Revenue Generation-2020	4	2	6
Feasibility/Constructability Factors			
Construction To Maintain On-going Airport Operations	2	4	6
Length/Number of Construction Phases	4	2	6
Early Delivery of Complete Usable Facilities	6	2	6
Maximize Re-use of Existing Roadways	4	6	2
Minimize Customer Disruption/Maximize Safety	2	2	6
Customer Service Factors			
Maximize Usable Curbside Length	2	4	6
Walk Distance-Ticketing to SSCP	6	2	4

TABLE 6.3-1 (continued)
Sacramento International Airport
LEVEL 3 EVALUATION CRITERIA

Criteria Category	Alternative B	Alternative C	Alternative E2
Walk Distance-SSCP to Furthest Gate	2	4	6
Assisted Walk Not Required (Less Than 900 Feet)	2	6	2
Overall Best Customer Experience Potential	4	2	6
Minimize Vertical Transitions 2010	6	6	2

Source: Corgan Associates

Operational Factors – These factors centered on the operational aspects of the aircraft, the terminal facilities, curbsides and roadways. It is important to insure maximum flexibility for the aircraft around the terminal building. This includes the ability to accommodate differing aircraft sizes as well as independent movement of the aircraft to the gates. By providing dual taxilanes at all aircraft gates, where possible, maintains the independent movement and access of the aircraft. The existing Interim International Arrivals Building can be maintained until replacement facilities are complete in all three alternatives. Alternatives B and C will require a hardstand operation with bussing. Alternative E2 is the only alternative where the aircraft can be gated during the construction.

Environmental Factors – The major issues related to the environmental factors are during the construction of new facilities. The possible locations for the new terminal are previously developed sites, so there are minimum environmental impacts with constructing in the existing terminal platform area. Air quality due to construction activities and emissions caused by vehicle delays through the construction are of greatest concern. The number of construction phases varies between the alternatives and influences the length of impact to the environment. Alternative E2 minimizes the construction duration.

Finance/Economic Factors – The economic factors analyzed both near-term and long-term costs for the project as well as potential non-airline

revenue generation. The terminal construction and roadway infrastructure costs are based on the block plans that were developed for each alternative and are based on the cost per square foot to construct. Current dollar costs, phasing, and escalation are included in the overall construction costs. Additionally, the cost to operate and maintain the facilities for each alternative was analyzed. The ranking of this criterion was quantitative based on size as well as being subjective based on complexity of the facility.

Concessions revenue generation was also considered. Higher revenue potential is possible with the greater concentration of passengers passing a single point. In a multi-unit terminal concept, the passenger traffic is dispersed to multiple locations, thus decreasing the revenue potential. Alternative C disperses passengers to three locations; B to two locations and only Alternative E2 has the potential to accommodate all passengers in a single location.

Feasibility/Constructability Factors – The ability to construct the new facilities was evaluated under this category. It is important to maintain operations of the airport throughout any construction program, but this must be measured in the amount of time required to construct and the impact to the customer level of service. Alternatives B and C require the most construction phases and consequently, have the most customer level of service impacts through construction. Alternative E2 can be constructed in a single phase outside the existing operations area and can allow for beneficial occupancy of the facility the least amount of time.

Customer Service Factors – This category analyzed quantitative customer level of service issues based on acceptable industry standards. Each of these respond to the customer experience of navigating the airport from the curbside to the gate. Ample curbside, short walk distances and minimizing vertical transitions are key factors. Walk distances are defined between several major passenger-processing functions and require assisted movement if the

targeted distance is exceeded. The use of an automated people mover (APM) allows greater distance between the ticketing and gates because it eliminates the entire walk distance between stations.

All three alternatives provide for minimal distance between the curbside and the ticketing hall. While the physical distance between the ticketing and the gates is the greatest in Alternative E2, the actual customer walk distance is the shortest due to the use of the APM. Both alternatives B and C are based on traditional terminal concepts, whereas E2 is a non-traditional terminal concept that can allow for a greater overall passenger experience. Other components of consideration are passenger ease of wayfinding, access to amenities and concessions potential and offerings. Alternative E2 also provides for redundant curbsides served by two separate roadways.

6.3.5 *Ranking of Refined Terminal Alternatives (Level 3)*

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. Similarly, the scoring is based on a 2 point spread between the three alternatives. To ensure that the difference between alternatives was appropriately quantified, the following rankings were applied to each criterion:

Least favorable – 2
Next least favorable – 4
Most favorable – 6

Table 6.3-2 shows the results of the ranking analysis.

Long Term Strategic Factors - Alternative E2 ranked the highest in all but one of the criteria in this category. This alternative provides the opportunity for a central terminal complex, allows for incremental gate growth and most

flexible expansion options as well as minimizing improvements to Terminal A. Alternatives B and C are comparable as unit terminals, but provide the most challenges for this category.

TABLE 6.3-2
Sacramento International Airport
LEVEL 3 EVALUATION RANKING

Criteria Category	Alternative B	Alternative C	Alternative E2
Long Term Strategic Plan	20	22	38
Operational Factors	20	26	32
Environmental Factors	12	6	18
Finance/Economic Factors	28	22	24
Feasibility/Constructability Factors	18	16	26
Customer Service Factors	22	24	26
Total Score	**120**	**116**	**164**

Source: Corgan Associates

Operational Factors - Alternative B is constrained between the terminal road and the cross-field taxiways, which limits both the gating flexibility and movement of aircraft. Because of the narrowed throat between the terminal and concourse, four gates become dependent in this alternative. While the concourses are configured similarly between Alternative B and E2, the aircraft size is limited along the north face of B. Alternative C provides good access around the piers but has some limitations at the end of the alleyway. E2 provides the greatest parking depth and dual taxilanes around the concourse, therefore offering the greatest flexibility for aircraft movement and gating.

Environmental Factors - Alternative E2 ranked most favorable from an environmental standpoint. The alternative can be constructed in fewer phases; thus it has the shortest construction duration. Also, the roadway construction can occur with minimal impacts to the existing terminal operation, therefore having little to no impact on the vehicle emissions.

Finance/Economic Factors – Based on current dollars, alternatives B and C can be constructed for the least costs. However, each of these alternatives require more construction phases and longer to construct increasing the project complexity and escalation costs. Considering these costs, Alternative E2 has the lowest capital costs to construct.

Alternative C had the most favorable cost from a maintenance and operations standpoint, but was least favorable from non-airline revenue generation potential. Overall, Alternative B had the highest ranking in this category with E2 marginally behind due to the requirement of the automated people mover system.

Feasibility/Constructability Factors - Alternative E2 ranks the most favorable in the feasibility/constructability category because it requires the least amount of construction phases. E2 also has the least complexity from a construction standpoint as well as minimum impacts to the existing operation. The terminal and roadway can be constructed in a single phase, allowing passengers to access the completed facilities on opening day. Both alternatives B and C require multiple phases, phased opening of the facilities and disruption to the passengers during the construction process.

Customer Service Factors – Alternative E2 also ranked the highest in this category. The APM mitigates the distance between the terminal and the concourse and as a result, provides the shortest average walk distance of all the alternatives. Overall customer walk distances are the least in E2 because the vertical transition allows for a more compact floor plan. The curbside potential is greater because of access to both sides of the terminal building being served by two loop roads as well as the future expansion capabilities. Both alternatives B and C function with a high level of customer service, but are limited to the actual number of gates each can support and since each terminal will be served by a single loop road.

Alternative E2 can also provide the greatest overall customer experience. Starting from the roadway approach to the facility, the terminal has the potential of creating a "gateway image" for the airport. The facility would be positioned between the terminals A and B garages allowing parking and access from either structure. Light Rail /Bus Rapid Transit can terminate in a central location with easy access for all passengers to the gates via the APM. Concession and amenity offerings can be greater based on all passengers accessing a single point and the compact floor plan allows for ease of passenger wayfinding.

6.4 SELECTION OF PREFERRED TERMINAL ALTERNATIVE

Based on the Level 3 evaluation and ranking, it was determined that Terminal Alternative E2, was the best overall terminal concept for the Airport. Alternative E2 ranked most favorable based on the analysis of 33 criteria in the above-mentioned categories. Although Alternative E2 did not score the highest possible points in each category, it did score highest in five of the six, thus advancing it to the highest-ranking selection. Alternative E2 provides both the near-term and long-term growth that will be required at the Airport but also provides the greatest possibility to maximize the number of aircraft gates beyond the planning years. Because it is the least complex development program, it can be constructed in the least amount of time, for the lowest overall costs, and with the least disruption to the current airport operations.