Salt Lake City International Airport

Airport Layout Plan Update

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Submitted by:
HNTB Corporation

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Chapter One
Introduction and Airport Inventory

INTRODUCTION

The purpose of this report is to document the revisions presented in the 2005 Salt Lake City International Airport (SLC) Layout Plan (ALP) Update. This is the first formal revision to the Plan since 1997.

The Airport has experienced many changes since the last ALP Update, including revisions to the passenger terminal, landside, and general aviation (GA) development plans.

The Salt Lake City Department of Airports (SLCDA) has several goals for this Update, including updating the ALP to include recent specialized plans; updating airfield requirements and development plans based on recent forecasts; addressing the current state of the aviation industry; tailoring the Airport development plan to meet the plans of dominant air carriers; addressing changes in aircraft operations; considering the potential for international operations; and addressing the changes in GA traffic. Each of these goals will be explored further in the following text.

1.1 CURRENT STATE OF THE AVIATION INDUSTRY

The tragic events of September 11, 2001 were felt worldwide on a personal as well as professional level, though many would agree that no industry felt the impacts as great as the aviation industry. In the past three years, airlines and airports have struggled to remain profitable as traffic initially decreased, then slowly rebounded, and tighter security regulations were implemented by a new Transportation Security Administration (TSA).

In its 2004 Annual Report, the International Air Transport Association (IATA) details several concerns that continue to plague the aviation industry, including the war in Iraq, terrorism, and a poor economy.

In addition, high oil prices in 2004 and 2005 have further reduced the narrow profit margin for US airlines.

However, the overall climate of the IATA report is a positive one, noting that most of the industry is back to its pre-9/11 traffic numbers and is expected to continue its positive growth over the next several years.

1.2 PLANS OF DOMINANT AIR CARRIERS

On September 8, 2004, Delta Air Lines outlined a new business plan, streamlining the carrier's operations to increase profitability. Despite recent setbacks resulting from high fuel prices and Delta's Chapter 11 proceedings, this business plan should have a positive impact on Delta's Salt Lake City operations. Details from the report will be considered in the preparation of the Airport development plan.

In summary, the plan calls for growing the Salt Lake City hub by re-deploying aircraft that are currently used at Dallas-Fort Worth International Airport. Delta operations at SLC increased from 318 daily flights to 376 daily flights by February 2005, at an average of 81 seats per departure (up from 79 seats per departure).

Delta entered Chapter 11 bankruptcy proceedings in September 2005. As part of their reorganization, they introduced new non-stop service to some markets such as Bellingham, Washington, but reduced to frequency of service to many existing markets. As a result of their schedule changes, by February 2006 Delta operations at SLC had decreased to 308 daily flights, but seats per departure had increased to 83.

1.3 CHANGES IN AIRCRAFT OPERATIONS

In discussions with SLCDA, it is noted that there has been an increase in total operations since the last ALP Update as Delta Air Lines focuses on the Salt Lake City hub. Between 1998 and 2005, total operations increased nearly 25 percent. As Delta's third largest hub, SLC has experienced increases in Delta connection flights with regional jets.

Additionally, there are many new trends in aviation forecasting that have surfaced since 9/11, and an optimistic approach to operations will be used. Forecasts of aviation demand will be updated to verify this information, and facility requirements and development plans will be based upon these forecasts.

1.4 POTENTIAL FOR INTERNATIONAL OPERATIONS

According to SLCDA, airlines such as Virgin Atlantic Airways, Air France, Delta Air Lines, and Lufthansa have discussed adding service to several European destinations utilizing aircraft such as the Airbus A340, Boeing B767, and Boeing B747.

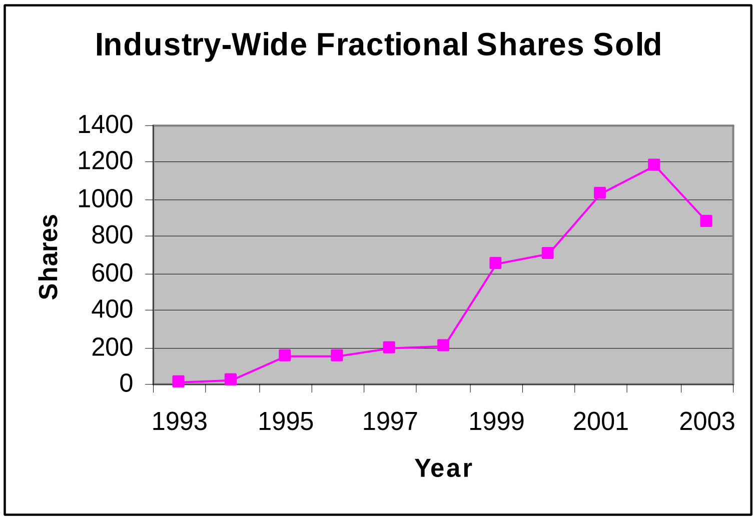
1.5 CHANGES IN THE GENERAL AVIATION TRAFFIC

The nature of GA and business aviation has changed considerably since the 1997 ALP Update. Business jets have increased in their size and sophistication, as noted in new aircraft such as the Boeing Business Jet (B737 airframe) and the Airbus Corporate Jetliner (A319 airframe). These aircraft require a review of the current GA plans to ensure that the proper FAA design standards are achieved for GA areas. Additionally, users of these sophisticated aircraft may require a more refined fixed base operation than the facilities typically offered to recreational fliers.

Another change to the GA arena includes the increased popularity in business jet fractional ownership. Companies such as Flexjet, Netjets, Flight Options, and Citation Shares are making corporate aviation more affordable. In sharp contrast to commercial aviation operations, many airports have seen an increase in business aviation traffic since 9/11. Industry-wide fractional shares sold have increased from 10 in 1993 to 880 in

2003 (see **Figure 1-1**). These increases can be attributed to greater reliability, flexibility, and time savings associated with business aviation.

Figure 1-1



Source: Citation Shares

Recognizing the growth in GA nationwide, and the changes to the nature of GA traffic, the SLCDA has created a General Aviation Strategic Plan. This GA Strategic Plan, which was finalized in March 2004, outlines a strategy to accommodate the aviation demand of the Salt Lake City area. To that end, the Plan identifies a role for each of the three airports owned and operated by the Department of Airports. These airports are Salt Lake City International Airport, Salt Lake City Airport II, and Tooele Valley Airport. SLC is designated as the area's commercial service airport with supporting general aviation facilities. Airport II is a GA facility designed to accommodate GA traffic and also functions as a reliever airport to SLCIA. And finally, Tooele Valley Airport is designed to attract flight training operations and act as a GA reliever airport for both SLC and Airport II.

Understanding these designations, the GA Strategic Plan outlines a business plan for SLC, including the following points:

- Redevelopment of several existing T-hangar units into lots appropriate for condo-type hangars.
- Support expansion of corporate/ business aviation and FBO development.
- Develop hangars as demand presents itself.

1.6 SUMMARY OF GOALS AND OBJECTIVES

In summary, this ALP Update has been initiated to address the many changes in the aviation industry and at SLC since the 1997 ALP Update. This Report will review the state of the commercial and GA industry, as well as the plans of the dominant air carriers at SLC and the historical and forecast operations for the Airport. This review will allow planners to design development plans This ALP narrative report will continue with an overview of the existing Airport conditions, a summary of the forecasts of aviation demand, a demand/capacity analysis and facility requirements, an updated capital improvement program (CIP), and the updated ALP.

1.7 SUMMARY OF EXISTING CONDITIONS

The following is a brief summary of the major facilities of the Airport:

- 7,678 acres of land
- Four runways: Runway 14-32—4,892 feet by 150 feet; Runway 16L-34R—12,003 feet by 150 feet; Runway 16R-34L—12,000 feet by 150 feet; Runway 17-35—9,596 feet by 150 feet
- Three 60-foot by 60-foot helipads
- A 328-foot tall Federal Aviation Administration (FAA) Air Traffic Control Tower (ATCT) and a Terminal Radar Approach Control (TRACON) Facility
- Over million square feet of passenger terminal facilities in two terminals and five concourses
- 90 aircraft gates—36 mainline gates with jet bridges, 14 mainline/regional jet gates with jet bridges, five regional jet gates with jet bridges, and 35 regional jet gates without jet bridges
- 10,654 public parking spaces

that meet the specific needs of this unique airport facility.

- Two Fixed Base Operation (FBO) facilities totalling nearly 50,000 square feet
- 186 GA T-hangars and 54 shade hangars
- 28 conventional GA hangars and nearly 140,000 square yards of GA apron area
- Over 22 acres of airfield maintenance facilities
- Jet-A fuel storage capacity of 6.7 million gallons for commercial aircraft
- Nearly 100,000 square feet of aircraft maintenance facilities
- Approximately 250,000 square feet of cargo facilities and over 250,000 square yards of cargo apron area
- Over 60,000 square feet of Flight Kitchen facilities
- Two Aircraft Rescue and Fire Fighting (ARFF) facilities totalling nearly 40,000 square feet

There have been several modifications to the Airport since the 1997 Master Plan and ALP Update which are detailed in the following text.

1.7.1 Commercial Airline Areas

Apron Replacement/Addition

The Airport has an on-going project involving the replacement of the apron adjacent to all terminals. This project is being completed in phases and is scheduled for completion in the five year planning period. Additional pavement was added west of Concourse D.

Deicing Pads

New deicing pads were recently constructed south of Concourse A. These pads are north of the Delta Air Lines cargo area.

New Cargo Area

United Parcel Service (UPS) relocated their operations to the north side of the airfield. Their new operation includes a sort building of nearly 25,000 square feet and approximately 4,800 square yards of apron area. DHL, who recently announced plans to create a regional hub in Salt Lake City, also plans to relocate their cargo operations to new facilities adjacent to UPS.

Hangar Expansion

Sky West expanded their maintenance hangar at SLC located north of the terminal area.

New Commercial Passenger Pickup Lane

A new lane was added in front of the terminal for passenger pickup.

Rental Car Storage Lot

An on-airport rental car storage lot was added.

New Employee Parking Lot

A new employee parking lot was constructed adjacent to the FedEx Cargo Facility.

Public Observation Area

Due to security concerns, the Public Observation area adjacent to the approach end of Runway 34R was closed immediately following the events of September 11, 2001. This area will not reopen.

Electrical Vault and Storage Building

A new electrical vault, as well as a new storage facility for the storage of airfield deicing materials, including sand and urea, was recently constructed between the south ends of Runway 34R and Runway 35.

1.7.2 General Aviation

In addition the changes to the commercial aviation areas, there are several changes to the GA areas.

New Conventional Hangars

Eight new conventional (corporate) hangars have been constructed in the GA support area and two additional hangars are under construction.

New Fire Station

A new fire station (Station 12) was constructed in the GA area since the previous ALP update.

GA Access Points

There are now nine drive-through code access security gates in the GA area.

Southwest Airlines Reservation Center Closed

The Southwest Airlines Reservation Center, located north of the Boeing Facility on 2200 West Street, has closed. This facility could be used for future commercial development, and has the potential for airfield access.

1.8 AVIATION ACTIVITY FORECASTS

This section summarizes the annual activity forecasts (2005-2025) for SLC.[1] The initial forecasts were prepared in 2004, before Delta announced their plans to de-hub their operations at DFW and significantly expand operations at SLC. The forecasts of passenger activity were updated in December 2005. Two alternative scenarios, a Conservative Scenario and an Optimistic Scenario, were prepared because of the uncertainty surrounding the post-9/11 aviation industry. The optimistic forecast was used to project facility requirements for this ALP Update. In general, it is prudent to plan for the optimistic case, and then adjust the phasing of improvements to meet realized demand.

1.8.1 Socioeconomic Background

Passenger demand is ultimately determined by the strength of the economy and the cost of available service (fares). Consequently, the development of an aviation activity forecast requires a clear understanding of local economic forces and trends. All of the economic projections used to develop the activity forecasts were obtained from Woods & Poole Economics, Inc. and are consistent with local economic projections.

In general, the key drivers of passenger growth at SLC, such as income, employment, and population in the Salt Lake metropolitan area, are projected to grow more slowly over the forecast period than they have over the last 20 years, but the region is expected to continue to grow more quickly than the nation as a whole.

1.8.2 Passenger Forecasts

The passenger forecasts were initially prepared in early 2003, and were then updated in early 2004 to reflect the latest changes in Delta's schedules. There was an additional update in late 2005 that incorporated new schedule changes resulting from Delta's bankruptcy proceedings. Regression analysis—a statistical method that is used to generate an equation that best explains the historical relationship among variables—was used to project originations at SLC.

1.8.3 Conservative Scenario Assumptions

Under the Conservative Scenario, it is assumed that high jet fuel costs, and the higher fares required for the airlines to recover those costs, would continue through the forecast period. Furthermore, it is assumed that the high cost of oil would reduce economic growth. The Conservative

[1] Salt Lake City International Airport Aviation Activity Forecast, May 2004, HNTB Corporation and Salt Lake City International Airport Passenger Aviation Activity Forecasts, December 2005.

Scenario is also based on the following key assumptions:

- Connections, as a percent of total passengers will drop through 2010 and will then remain constant for the duration of the forecast period.

- Peak hour activity, as percent of daily activity, is assumed to gradually decline as annual activity increases.

- Yields (proxy for fares) will increase more than the FAA-projected rate for the nation because of anticipated high fuel costs.

1.8.4 Optimistic Scenario Assumptions

In contrast to the Conservative Scenario, the Optimistic Scenario assumes that fuel prices will decline to long term levels and that fares would change at the rate projected by the FAA. There would also be no adverse impact on the economy since fuel costs would not remain at their current high levels. Additionally, connections, as a percent of total passengers, are assumed to remain constant at existing levels (46.2 percent). Otherwise, the assumptions under the both scenarios are the same.

1.8.5 Results

As shown in **Figure 1-2**, enplanements under the Conservative Scenario are expected to increase from 11.1 million in 2005 to 15.7 million by 2025, an annual average annual increase of about 1.7 percent over the forecast period. Under the Optimistic Scenario, enplanements are projected to increase from 11.1 million in 2005 to 20.5 million by 2025, an increase of about 3.1 percent per year over the forecast period. By comparison, enplanements grew at an average rate of about 6.8 percent between 1980 and 2005.

1.8.6 Aircraft Operations Forecast

The aircraft operations forecasts were prepared in late 2003 and early 2004. As shown in **Figure 1-3**, total aircraft operations under the Conservative Scenario are projected to increase from 455,472 in 2005 to 576,283 in 2025, an average annual increase of 1.2 percent. Under the Optimistic Scenario, total operations are projected to increase at an average annual rate of 2.0 percent from 455,472 in 2005 to 679,681 operations in 2025.

Figure 1-3 also shows the breakout of aircraft operations by category (passenger, cargo, GA and air taxi, and military). The projected average annual growth rate (2005-2025) for each of these categories as well as total operations is as follows:

Category	Conservative Scenario	Optimistic Scenario
Passenger	0.8%	1.8%
All-cargo	1.1%	2.2%
GA and Air Taxi	2.5%	2.9%
Military (2004-2025)	2.2%	2.2%
TOTAL	1.2%	2.0%

Figure 1-2 Yield, Income, and Originations

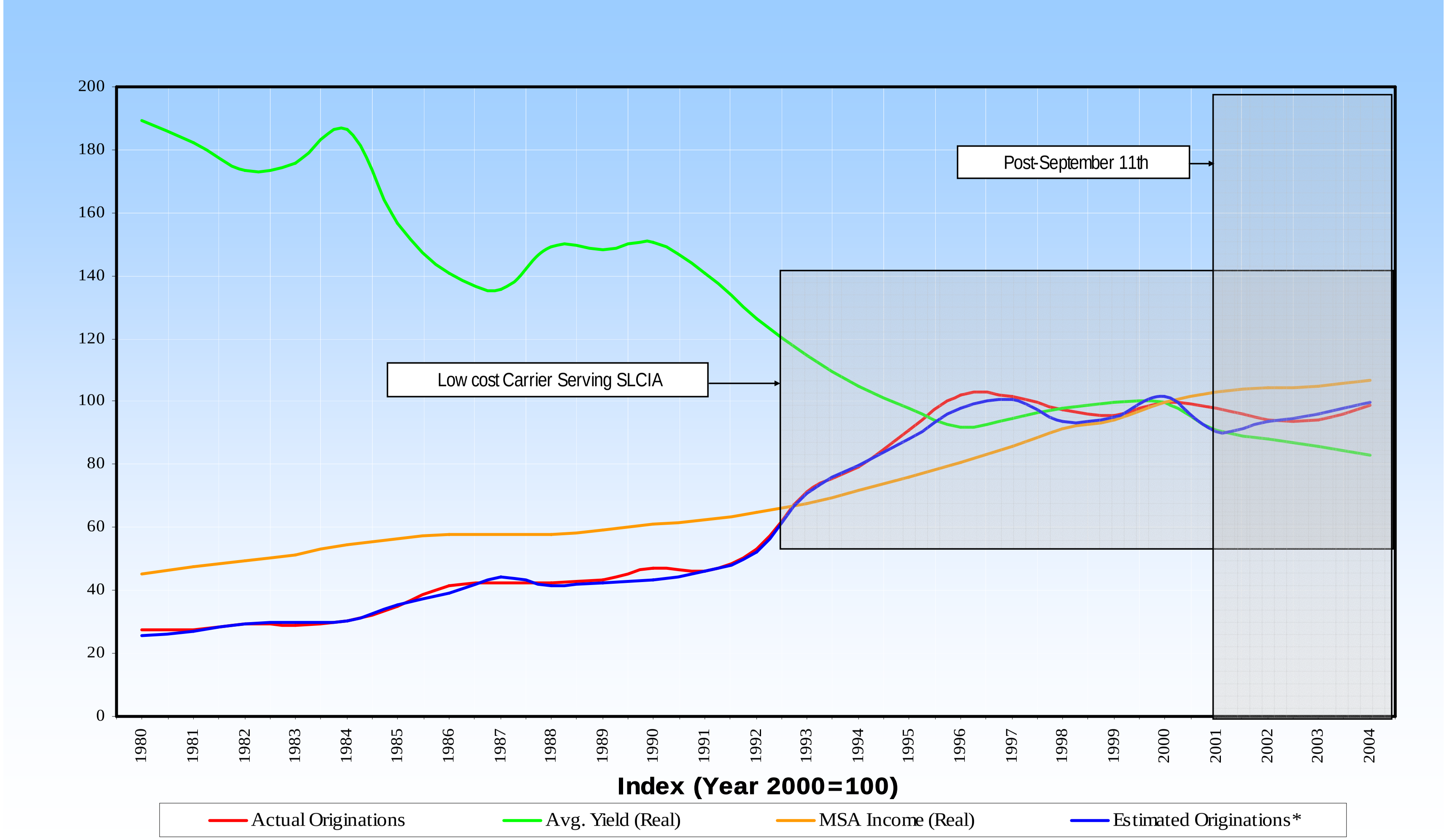
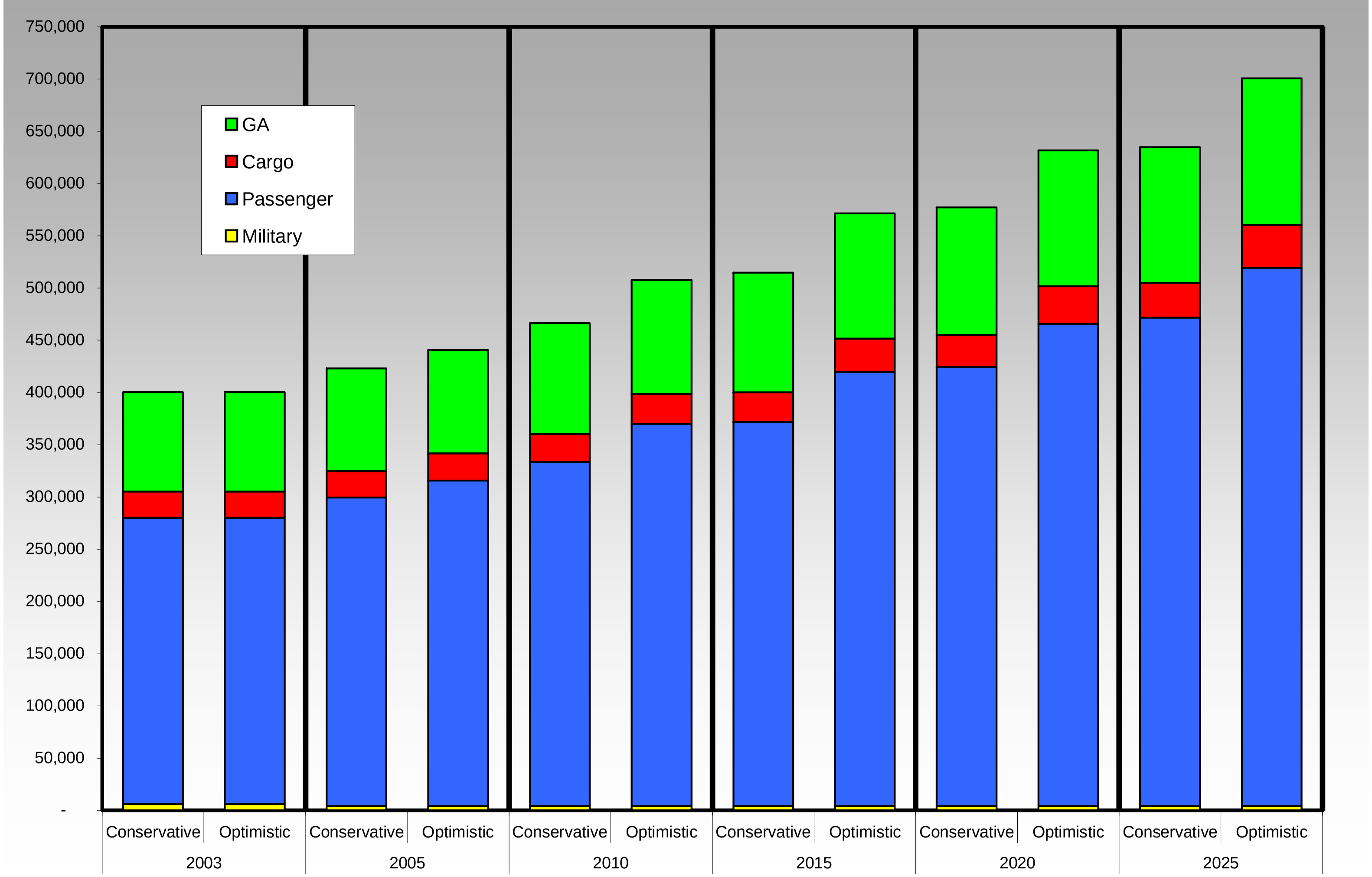


Figure 1-3 Forecast of Aircraft Operations



1.8.7 Fleet Mix Forecast

Under both scenarios, the older model B737s (such as the B737-300 and B737-500) are expected to gradually disappear from the passenger fleet mix at SLC while next generation B737s (such as the B737-800) are expected to account for an increasing percentage of aircraft operations. Both scenarios project the number of large regional jets (70+ seats) to increase and the number of smaller 50-seat regional jets to decrease. The fleet mix of cargo, GA, and military aircraft is projected to be the same under both scenarios. Among mainline all-cargo jets, the MD-11s and A300s are expected to account for an increasing share of the cargo fleet mix while the percentage of B727s and DC9s is expected to decrease. The proportion of all-cargo B757s, B767s, and DC-10s is expected to remain fairly constant. The GA fleet mix forecast reflects a large increase in the proportion of jets and a diminishing percentage of all other types of GA aircraft.

1.8.8 Derivative Forecast

As part of this forecast effort, some additional detailed analyses were conducted to determine parking requirements and peaking characteristics for projected levels of cargo, GA, and military activity. For example, it is estimated that between 39 (conservative) and 48 (optimistic) cargo positions will be required by 2025, up from a need of 31 positions in 2003. The biggest increase in parking demand will be for positions that can accommodate medium wide-body jets, such as A300s, B767s, MD-11s, and DC-10s.

Overall, the number of GA based aircraft at SLC is expected to decline slightly under both scenarios; however, the number of based GA jet aircraft is expected to increase from 41 in 2003 to between 90 and 98 in 2025. Based on GA activity data for 2000, 2002, and 2003, the peak month for GA operations tends to fall in the summer months and account for approximately 9.8 percent of annual GA operations. Based on a weeks worth of data from June 2003, the peak hour for GA operations is between 5 PM and 6 PM, with approximately 9.2 percent of daily operations occurring during this hour.

Chapter Two
Airport Demand/Capacity Analysis and Facility Requirements

This chapter summarizes the facilities required to accommodate the demand at SLC over the course of the 20-year planning period from 2005 to 2025. Facility requirements were developed by utilizing the aviation projections presented in the forecast and performing demand/capacity analyses on the various functional Airport areas.

Requirements analyses were performed for the following functional areas: Airfield Capacity and Delay; Airfield; Air Cargo; GA; and Support Facilities. Descriptions of terminal facilities, surface transportation and auto parking requirements developed as part of other studies, are also included. Significant changes to the Utah Air National Guard complex are not anticipated during the planning period, and as such, were not included in this analysis.

The facility requirements in this chapter were developed at a level of detail appropriate for an ALP, not the level of detail suitable for an architectural or engineering design study. Required facility improvements are identified and quantified, and in subsequent chapters specific alternative methods of meeting these facility requirements will be identified and evaluated.

2.1 AIRFIELD CAPACITY AND DELAY

The calculation of airfield capacity and delay is essential in evaluating the capability of the existing runway system to effectively serve existing and future airport activity levels. The purpose of this section is to determine the capacity of the existing airfield to determine if future demand can be sustained without excessive levels of delay. Potential capacity improvements will be evaluated to compare their delay savings against existing conditions.

2.1.1 Airfield Capacity

Typically, the capacity of the existing runway system depends on a number of factors including aircraft separation, wind and weather, aircraft fleet mix, runway operational configurations and airfield equipment and technology. Capacity of SLC's existing airfield is influenced by surrounding terrain, the airspace structure and air traffic control procedures.

Airfield capacity is defined as the maximum number of aircraft that an airfield configuration can accommodate when there is a continuous demand for service (i.e., an aircraft is always waiting to depart or land). Capacity is typically measured in one-hour time periods, which are defined as hourly capacity. Based on discussions with Air

Traffic Control and review of the FAA Capacity Report, capacities at SLC can range from approximately 90 to 110 operations per hour in instrument meteorological conditions (IMC) and 120 to 130 operations in visual meteorological conditions (VMC). The capacities differ depending on whether the airport is in a north flow, south flow, peak arrival, peak departure or mixed operations.

2.1.2 Aircraft Delay

Average annual aircraft delay, expressed in minutes per aircraft operation, is a good measure of an airport's ability to accommodate projected aircraft demand on a day-in, day-out basis. Average annual delay is based on frequency of occurrence of visual meteorological conditions (VMC) and instrument meteorological conditions (IMC), demand variations, and runway capacity. The FAA Annual Delay Model was used to estimate runway delays at SLC.

The relationship between demand, capacity, and delay is such that average aircraft delays tend to increase at growth rates similar to the growth in aircraft operations until the airfield becomes saturated, at which point delays begin to increase exponentially. It is recommended that an airport provide additional airfield capacity just ahead of this exponential growth in delay. A survey of airports that are considered highly congested utilizing a similar methodology have an average annual delay of 10 to 12 minutes per operation which corresponds to peak hour delays of between of 30 to 40 minutes per operation. Two of these airports, Chicago O'Hare International Airport and Hartsfield-Jackson Atlanta International Airport, are adding capacity or are planning to add capacity to meet increased demand. For the purposes of this analysis, therefore, a delay range of 10 to 12 minutes per operation was used as the benchmark to determine when additional capacity should be added to meet future demand levels.

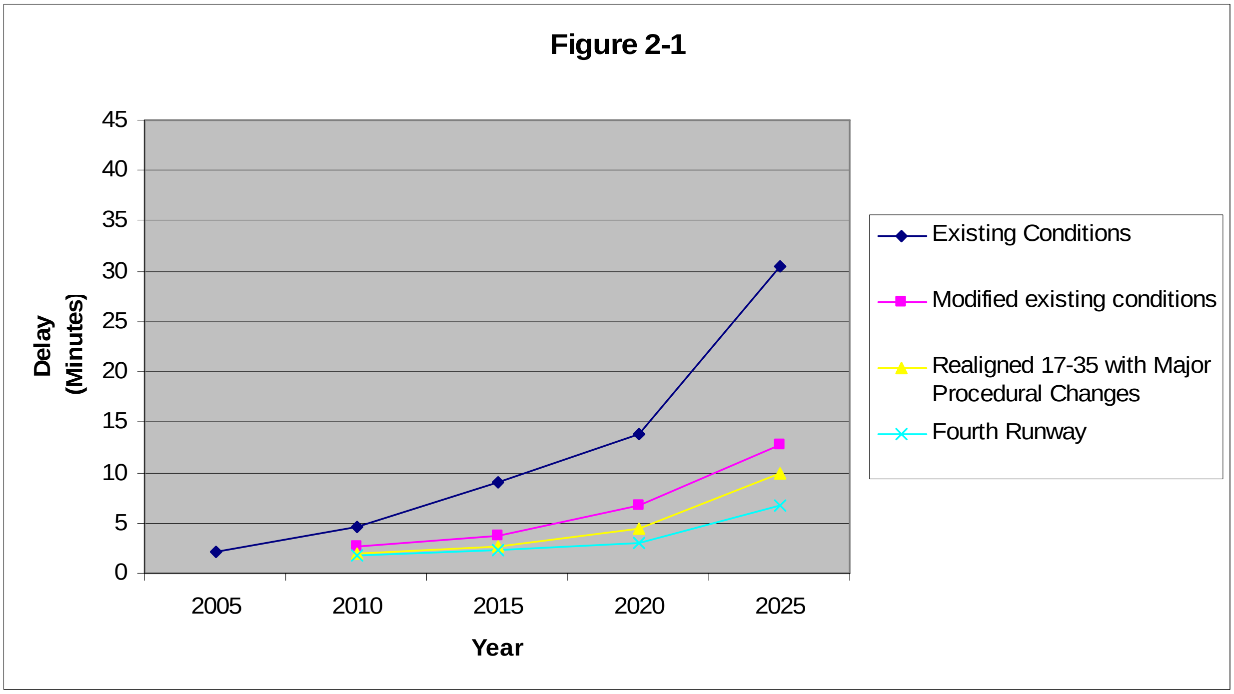
The average aircraft delay for the existing airfield at SLC in 2005 was estimated to be approximately two minutes per operation. By the year 2025, the average delay per operation for the existing airfield is projected to increase to over 30 minutes per operation. The existing runway system operates efficiently at today's levels of activity; however, as demand and corresponding delay increase, the airspace structure and ATC procedures will need to be modified to increase the capacity of the existing airfield. The greatest limiting factor on the existing runway system is departure capacity in both VMC and IMC conditions. **Figure 2-1** depicts average aircraft delay for the existing airfield. Based on the delay benchmark for this analysis, additional capacity should be added by 2015.

2.1.3 Potential Improvements

A number of capacity enhancement alternatives were evaluated to determine potential delay saving benefits. These enhancements included: modification of existing conditions and procedures, realigning Runway 17-35, and a fourth parallel runway. The realignment of Runway 17-35 and a fourth parallel runway are depicted in **Figure 2-2**.

12,000'
2,500'
15,100'
3,100'
3,200'
10,000'
Scale 1" = 1600'
AIRPORT
Salt Lake City International Airport
DRAWING NAME
AIRPORT LAYOUT PLAN
FOUR-RUNWAY CONFIGURATION
FIGURE 2-2
PROJECT NO.:
37111
DATE:
5/22/06
DRAWN BY:
WR
CHECKED BY:
JSM

Figure 2-1 Average Annual Airfield Delay



Modify Existing Conditions

The existing airspace can be redesigned to provide additional departure capacity. An analysis of the airspace concluded that RNAV departure guidance would allow triple independent departures in both north flow and south flow. This would provide a significant increase in capacity over the existing airfield configuration. With these improvements, hourly capacities would range from 140 to 160 operations per hour in IMC and 140 to 170 operations in VMC. The ranges represent peak arrivals, peak departures and mixed operations. Figure 2-1 depicts the average aircraft delay incorporating these changes. With these changes incorporated the airfield will experience nearly 13 minutes of delay by 2025. Based on the delay benchmark, even with these improvements additional airfield capacity will be required around 2020.

Realigned Runway 17-35

The first capacity enhancement project considered was realignment of Runway 17-35. The realigned Runway 17-35 included two options with runway separations that would allow for semi-dependent operations and independent operations. The semi-independent option provides separation between the realigned runway and Runway 16L-34R of 2,500 ft to 4,300 ft. This separation would provide simultaneous independent IFR arrival to one runway and departures on the adjacent runway and simultaneous independent IFR departures on adjacent runways. Triple independent IFR approaches would not be capable in this scenario. The option that provides independent operations would have a runway-to-runway separation of at least 5,000 feet. This separation would provide the same benefit as the semi-independent option but would also allow triple independent IFR approaches to the three runways.

Given the terrain in the vicinity of the Airport, an airspace analysis was conducted to determine the operational feasibility of both a semi-dependant and independent realigned Runway 17-35. This analysis, which is included in **Appendix A**, concluded that due to the mountains in the Salt Lake City area, certain requirements for terminal approach procedures could not be met, and full, triple independent arrival could not be achieved, even with the 5,000 separation between the runways. Therefore, a realigned runway with a separation to provide independent arrivals does not offer any additional operational benefits over a runway with a separation that provides semi-dependent operations. In addition, a runway with a 5,000-foot separation would require the demolition and relocation of multiple airport facilities, significantly increasing the cost of this option over the semi-dependent option. Therefore, it is recommended that the Airport construct the realigned runway be between 2,500 and 4,300 feet from the existing Runway 16L-34R.

The realigned runway assumes that the procedures described above would be implemented. It is important to note that if these improvements cannot be implemented, the hourly capacities of the realigned runway would be similar to the modified existing conditions so there would be little benefit in realigning the runway. The benefit of realigning the runway would be an increase in hourly capacity for arrivals to the north and departures to the south in VMC. Figure 2-1 depicts the delay curve for the realigned Runway 17-35. As shown, the airfield will experience close to 10 minutes of delay by 2025, even with a realigned Runway 17-35; therefore, additional capacity would be required long-term at the Airport.

Fourth Parallel Runway

Two options were analyzed for adding a fourth parallel runway. The first option considered a fourth runway between the realigned Runway 17-35 and existing Runway 16L-34R. This option was eliminated because the resulting spacing between these runways would not provide sufficient departure capacity in IMC and the separation would be subject to wake turbulence penalties. Based on the airfield configuration the only other opportunity for additional airfield capacity would be a fourth parallel runway west of the existing airfield. This runway would be parallel to existing Runway 16R-34L and separated between 2,500 feet and 5,000 feet. An airspace analysis was conducted for a runway separated by 2,500 feet. The analysis indicated that IFR approaches and departures could be conducted from this runway, and the four-runway configuration would operate similarly to the three-runway configuration. The benefit of the fourth runway separated by 2,500 feet would be the ability to provide dedicated arrival and departure runways. Likewise, an airspace analysis was conducted for a runway separated by 5,000 feet. Absent terrain issues, this separation would provide the independent arrival and departure streams. However, with terrain issues considered, the results indicate that the independent arrival or the independent departure streams in IFR cannot be achieved using today's technology. Since a runway separated by 5,000 feet would not provide any additional capacity, the 2,500-foot separation option is recommended for long-term planning purposes. The results of the delay analysis, depicted in Figure 2-1, indicated that the delay would be reduced to less than 10 minutes with both the realigned Runway 17-35 and a new west parallel runway.

2.1.4 Conclusion

It is recommended that both a realigned Runway 17-35 and a fourth runway be preserved for long term development. The following bullets summarize proposed actions based on the runway capacity and delay analysis.

- Update the ALP to reflect the realignment of Runway 17-35 and the future fourth runway;
- Conduct a detailed benefit/cost analysis for the proposed improvements;
- Work with the FAA to implement airspace redesign and procedural changes to maximize the capacity of the existing airfield. This should be completed by 2015;
- The realigned runway should be operational between 2020 and 2025, although a detailed benefit-cost analysis may show this project being justifiable at an earlier date; and,
- The fourth runway should be operational by 2025 and 2030.

It is important to note that results of a benefit/cost analysis may shift the proposed timing of these capacity improvements. Provided both runways can be implemented without major acquisition and environmental mitigation costs, and the way delay benefits accrue at major hub airports, like SLC, the timing would likely be sooner rather than later.

A new west runway will require major facilities work, including:

- Relocation or bridging of the surplus canal
- Relocation of major power lines
- Relocation of major electrical power substation
- Rerouting of two major natural gas pipelines (Kern River)
- Wetland mitigation/construction
- Purchase of required buildings in the international center for runway safety clearances; Part 77
- Possible reconstruction of interchange on I-80

- Relocate and construct road systems

2.2 AIRFIELD REQUIREMENTS

Runway and taxiway requirements are planned according to the recommendations in the FAA AC 150/5300-13, *Airport Design*. The controlling Airplane Design Group is Group V (although not all Airport surfaces are built to these specifications), which includes all aircraft with wingspans up to, but not including, 214 feet (B-747 and smaller). Provisions for operations by larger aircraft (i.e., Group VI) would require substantial changes in the runway/taxiway system. These changes are not justified since Group VI operations are not anticipated within the planning period.

2.2.1 Runways

Capacity

Per the recommendations summarized in Section 2.1, additional airfield capacity will be required to meet forecast demand. The ALP report recommends working with FAA to redesign surrounding airspace to a four corner post system, realigning Runway 17-35, and ultimately adding a fourth parallel runway at required minimize Airport delay.

As noted previously, the realigned Runway 17-35 should be separated from Runway 16L-34R by a distance of between 2,500 feet and 4,300 feet, since a greater separation (i.e., 5,000 feet) would not improve capacity and would have a significant impact on existing Airport facilities. The planned 3,100-foot extension of Runway 16L-34R would create a threshold stagger of approximately 3,800 feet. The FAA requires that runway separation be increased by 100 feet for every 500 feet of threshold stagger when arrivals are made to the far threshold. In south flow, a likely operational scenario would be arrivals to realigned Runway 17 and departures on existing Runway 16L. Runway 17 would represent the “far” threshold. The 3,800-foot stagger would therefore require an additional 700 feet of separation (for a total of 3,200 feet) to achieve the same benefits as runways separated by 2,500 feet with no staggered thresholds. The 3,200-foot separation can be achieved without impacting existing facilities on the east side of the Airport. An added potential future benefit of this separation may be ability to have dual simultaneous instrument approaches to the east runways. The airspace analysis determined, from an obstruction standpoint, that this could be achieved. This would give air traffic increased flexibility during events when the west parallel runway is closed.

Wind Coverage

Graphical depictions of the all-weather wind coverage for the existing runway system configuration for 10.5-knot and 20-knot crosswind components are provided in **Figures 2-3 and 2-4**. The new 10-year analysis (1994-2003) using airport observations obtained from the National Atmospheric and Oceanographic Administration indicates the existing runway system exceeds FAA’s guideline of at least 95 percent wind coverage.

Figure 2-3 All Weather Wind Rose 10.5-kt.

All-Weather Windrose: 10.5 kt Crosswind

Runways 16-34, 17-35, 14-32

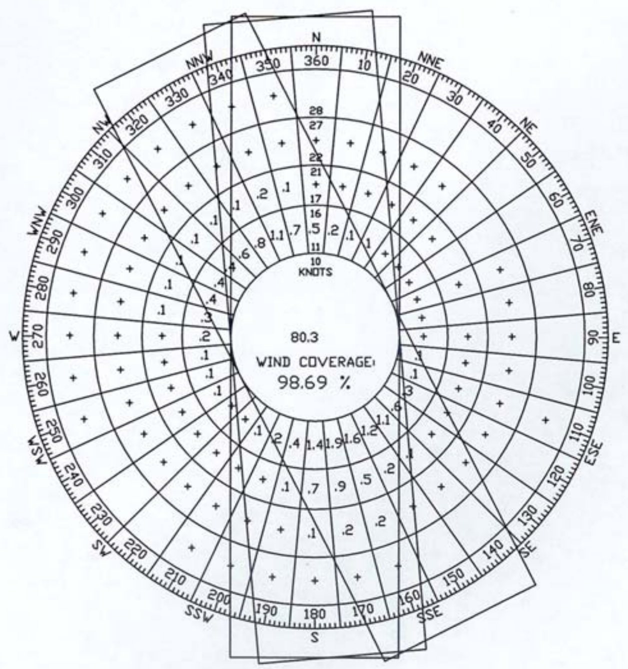
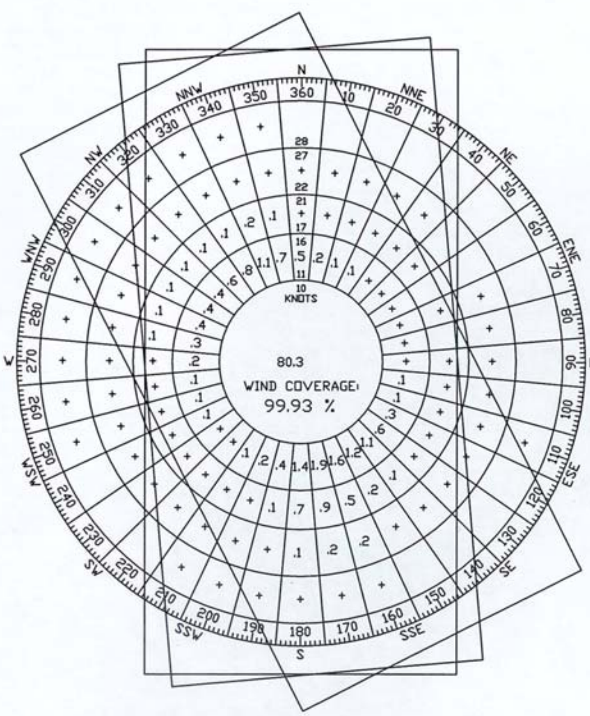


Figure 2-4 All Weather Wind Rose 20-kt.

All-Weather Windrose: 20 kt Crosswind

Runways 16-34, 17-35, 14-32



There was virtually no change in percentage wind coverage when results were compared to the previous study. No additional runways are needed at SLC for wind coverage purposes.

Runway Length Requirements

The runway length analysis consisted of three components, including runway length requirements, a payload versus range analysis, and identification of any improvements that would increase payload capabilities. This analysis is being conducted as part of the SLCDA on-going efforts to actively market non-stop service to both European and Asian markets.

Runway Length Analysis

Due to the Airport's high elevation, high mean maximum temperature, and surrounding obstructions, actual aircraft performance data was utilized to determine runway length requirements. Flight Engineering, Inc. was contracted to perform calculations to determine maximum runway length requirements for the B767-300, B747-400, A340-300, A340-600, and the B777-200 on Runway 16L-34R. The runway length requirement was determined by increasing the existing runway length of 12,003 feet until the allowable takeoff weight was limited by something other than field length (such as an obstruction or aircraft performance limitations). It was assumed that the runway extension would be to the north, consistent with the existing Airport Layout Plan. Calculations were conducted for each aircraft based on the following assumptions:

- Temperature of 95.6° F.
- Airport elevation = 4,227 feet MSL.
- 16L Runway end elevation = 4,226 feet MSL.
- 34R runway end elevation = 4,221 feet MSL.
- Source of obstacles was SLC NOAA Airport Obstruction Chart (AOC 365, 10th Ed. Surveyed October, 1996).
- Typical engine failure departure procedures are straight-out. For 16L departures, the Jeppesen-published engine-failure departure procedures were utilized to increase allowable takeoff weights over a straight-out departure.
- Typical values were used for Maximum Certified (structural) Takeoff Gross Weight. These values can vary from one operator to another based on contracts with the airplane manufacturer.

Table 2.1 depicts the runway length required for each aircraft at maximum allowable takeoff weight.

Table 2.1
Salt Lake City International Airport
Runway Length Requirement

A340-300	15,600 feet
A340-600	15,100 feet
B747-400	15,100 feet
B777-200	13,700 feet
B767-300	11,850 feet

Source: Flight Engineering, Inc.

A number of observations can be made from these results.

- The A340-300 only benefits from the 15,600-foot runway length in a south flow. The transmission line in its existing location limits the takeoff weight and corresponding runway length in a north flow.
- The B767-300 is second-segment-climb limited (independent of runway length and obstacles) for the existing 12,003-foot runway; therefore, there is no benefit in additional runway length for this aircraft.
- Even with a longer runway, all aircraft are weight-limited due to factors other than field length. These factors include obstacles, break energy (weight is break energy limited for an aborted takeoff), and tire speed (excessive tire speed causes the weight limitation).
- The Airbus aircraft have greater weight restrictions with departures to the north on 34R than to the south on 16L due to close-in obstructions. The critical close-in obstruction to 34R is the electrical transmission lines north of the airfield.
- Greater takeoff weights can be achieved in cooler temperatures.

Payload versus Range Analysis

A number of factors, including elevation, temperature, and obstructions, can prohibit aircraft from departing the Airport at Maximum Gross Takeoff Weight (MGTOW). The inability for the aircraft to depart at MGTOW will impact the aircraft's payload, range, or both. Without addressing airline economic issues, this section addresses the resulting increase in takeoff weight that may be achieved with a longer runway. The increased weight is then used to determine the maximum payload that could be achieved to selected cities.

Table 2.2 depicts the increased takeoff weight and payload with the existing runway for each aircraft in both north and south flow (i.e., departing 16L and 34R) and weight-limiting factors. Two obstructions have been identified that contribute to the weight limitations for Runway 34R departures. These obstructions are depicted on **Figure 2-5.**

Based on the maximum takeoff weights that are achieved on the extended runway, an analysis was performed to determine payload to selected cities. The cities include the largest European and Asian hubs of London and Tokyo, respectively, and the primary SkyTeam European and Asian hubs (Paris and Seoul, respectively). **Table 2.3** depicts the percent passenger and cargo payload that is achieved to each city for each runway. The B747-400 achieves the greatest passenger and cargo payloads. The B777-200 achieves the least passenger and cargo payloads. Due to obstructions, the Airbus aircraft experience greater weight restrictions on Runway 34R than on Runway 16L.

Table 2.2

Salt Lake City International Airport

Increased Takeoff Weight and Payload (lbs.)

	Max TOW	16L			34R		
Aircraft	Existing RW	Max TOW	Payload Gain	Limiting Factor	Max TOW	Payload Gain	Limiting Factor
A340-300	495,600	521,800	**26,200**	**BE**	502,900	**7,300**	**OBS1**
A340-600	659,700	729,200	**69,500**	**TS/BE**	708,000	**48,300**	**OBS1/BE**
B747-400	724,900	816,100	**91,200**	**BE**	816,100	**91,200**	**BE**
B767-300	329,300	329,300	-	**CLB**	329,300	-	**CLB**
B777-200	537,400	537,400	-	**CLB**	526,000	-	**OBS2**

Notes:

OBS1 - Transmission line on the north side of the airfield

OBS2 - Antenna on obstruction lighted tower approximately 21 nautical miles north of the Airport

BE - Break Energy

CLB - Second Segment climb

TS – Tire Speed

Source: Flight Engineering, Inc. and HNTB analysis.

Figure 2-5 Departure Obstructions

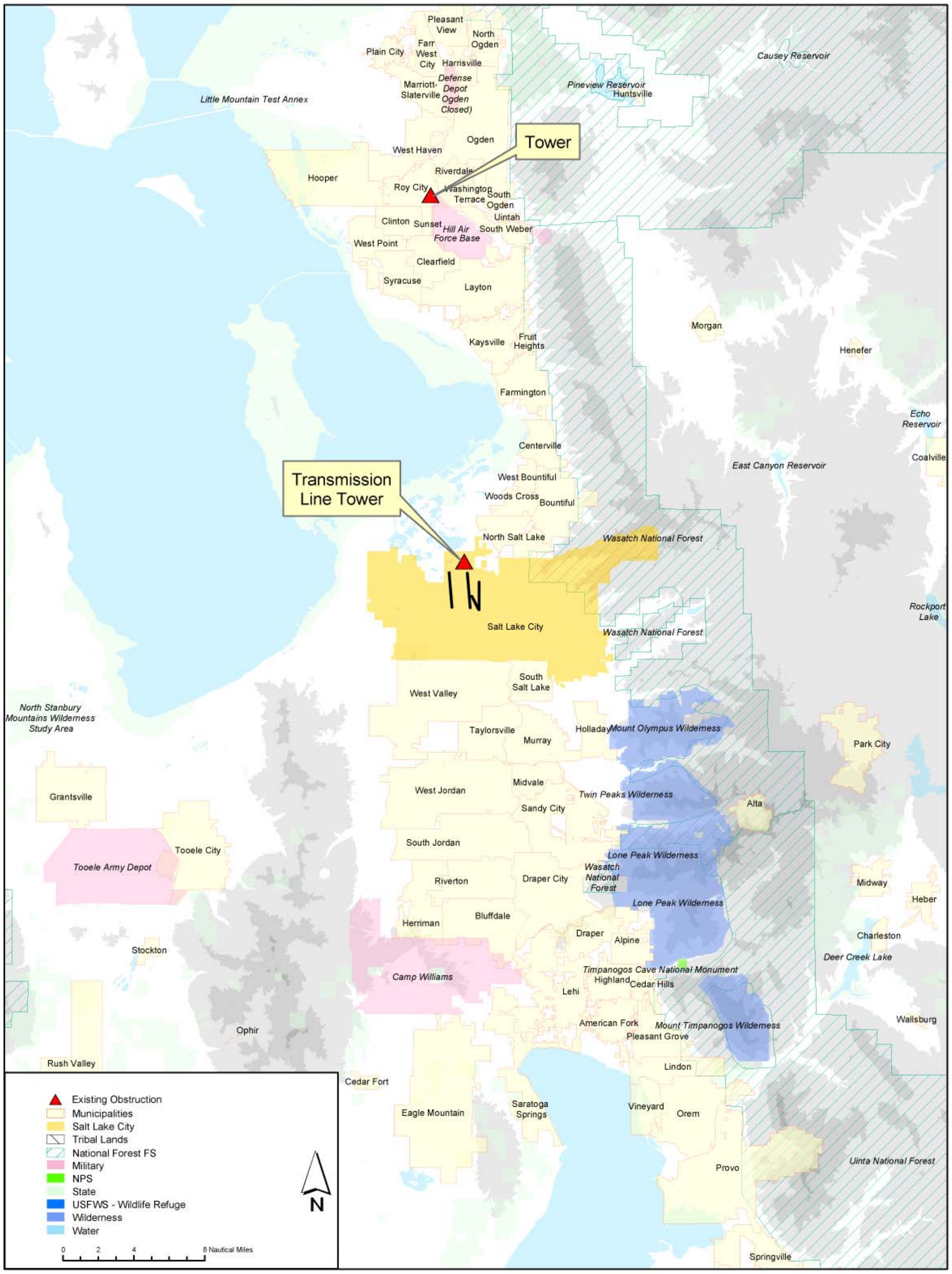


Table 2.3

Salt Lake City International Airport

Aircraft Payload to Selected Cities

Runway 16L

	B747-400		A340-300		A340-600		B777-200	
	Passenger	Cargo	Passenger	Cargo	Passenger	Cargo	Passenger	Cargo
Paris	100%	100%	100%	43%	100%	100%	100%	9%
London	100%	100%	100%	74%	100%	100%	100%	3%
Seoul	100%	100%	91%	0%	100%	44%	82%	0%
Tokyo	100%	100%	100%	22%	100%	84%	97%	0%

Runway 34R

	B747-400		A340-300		A340-600		B777-200	
	Passenger	Cargo	Passenger	Cargo	Passenger	Cargo	Passenger	Cargo
Paris	100%	100%	93%	0%	100%	56%	91%	0%
London	100%	100%	100%	18%	100%	87%	100%	5%
Seoul	100%	100%	60%	0%	97%	0%	67%	0%
Tokyo	100%	100%	82%	0%	100%	34%	83%	0%

Source: HNTB analysis.

These weight restrictions are reflected in the passenger and cargo payloads that can be achieved by each aircraft to each city.

For departures on 16L, all four aircraft would have good payload capability to all markets. For departures on 34R, the B747-400 and A340-600 would have good payload capability to all markets. The A340-300 and B777-200 would have good payload capability to European markets, but the allowable passenger payloads to Asian markets might not be economical for the airlines.

Potential Improvements

One potential improvement to increase payload for Runway 34R departures would be to relocate the electrical transmission lines north of the Airport. **Figure 2.6** depicts a proposed relocation of the transmission line. The proposed alignment was developed to minimize impacts to existing wetlands. The maximum takeoff weight was then recalculated for each aircraft assuming that the power lines were removed to compare against the previous scenario. **Table 2.4** depicts the increase in takeoff weight and payload for these aircraft with the power line obstruction removed. The only aircraft that benefit from removing the obstruction are the A340-300 and A340-600. (As indicated earlier, the B767-300 has a second segment climb limitation.) The limiting obstruction for the B777-200 is the obstruction that is further out as depicted in Figure 1.

A similar payload analysis was conducted based on the revised takeoff weights (as shown in **Table 2.5**.) The removal of the obstruction only provides a benefit to the Airbus aircraft.

By removing the obstruction, all of the aircraft, except for the B777-200, have identical passenger payloads to that of Runway 16L. The B777-200 is weight-limited by the distant obstacle.

As shown in the table, a significant benefit is realized by the Airbus aircraft to the Asian markets.

Before a decision is made to relocate the transmission lines, a benefit/cost analysis would need to be conducted. The analysis would consider the frequency of operation and time of day to determine the benefit versus the cost of mitigating the obstruction.

One important consideration is that departures to the Asian markets typically occur during the late morning to early afternoon when the temperatures are generally cooler. For this reason, additional analysis was conducted to determine how the cooler temperatures would benefit the aircraft takeoff weight assuming the transmission lines remained in their existing location. Based on a review of other western gateway airports, including Denver, Los Angeles, and San Francisco, it was determined that Asian departures typically occur between 11 am and 1 pm.

Figure 2-6 Transmission Line Relocation

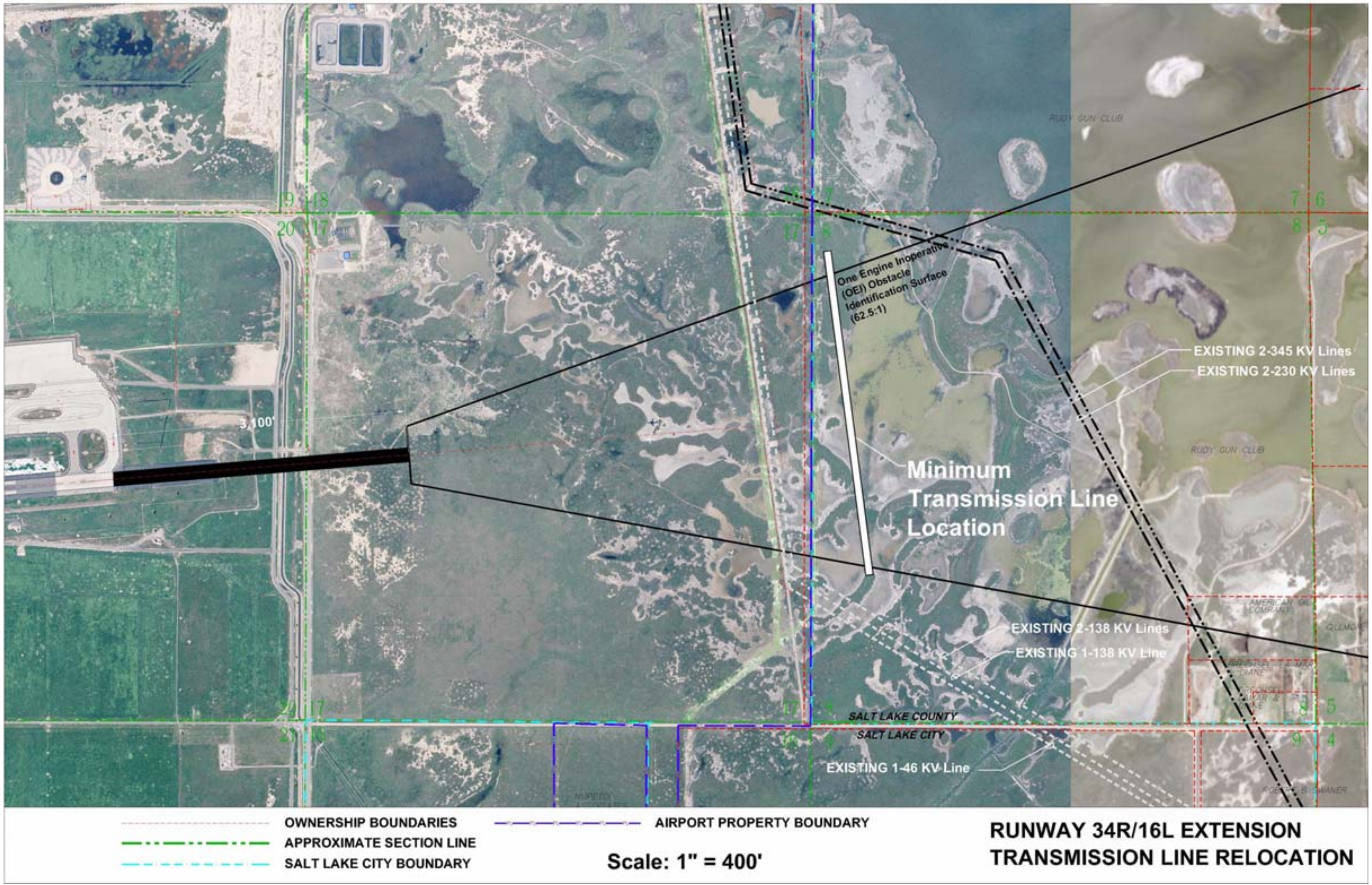


Table 2.4

Salt Lake City International Airport

Increased Takeoff Weight and Payload without Obstruction –Runway 34R

	Takeoff Weight (lbs.)		Payload (lbs.)		
Aircraft	With OBS	Without OBS	With OBS	Without OBS	Gain
A340-300	502,900	521,800	7,300	18,900	**11,600**
A340-600	708,000	729,200	48,300	69,500	**21,200**

Source: HNTB analysis.

Table 2.5

Salt Lake City International Airport

Aircraft Payload to Selected Cities without Obstruction – Runway 34R

A340-300		A340-600	
Passenger	Cargo	Passenger	Cargo
100%	43%	100%	100%
100%	74%	100%	100%
91%	0%	100%	44%
100%	22%	100%	84%

Source: HNTB analysis.

It was determined to select the 90th percentile mean maximum temperature during the midday time period. Based on 54 years of weather data, 83 degrees was selected for recalculating the takeoff weights. As would be expected, assuming the lower temperature value significantly improves both maximum weight limits for a given runway length and reduces runway length for a given takeoff weight. **Table 2.6** depicts the increase in takeoff weight and payload for these aircraft at the lower temperature.

All three aircraft have greater takeoff weights at the revised temperature with the obstruction than at the higher temperature without the obstruction. A similar payload analysis, depicted in **Table 2.7**, was conducted based on the revised takeoff weights. As depicted, all aircraft can provide one hundred percent passenger payloads to the selected cities.

The results of this analysis raised an additional issue on runway length requirements. If the transmission lines were not relocated, a 15,600-foot runway would only benefit the A340-300 to a single market during south operations. In addition, the carrier likely to serve this market also has options in terms of the aircraft used to service the market. An additional model run was conducted to determine the weight benefit of the 15,600-foot runway versus the 15,100-foot runway, the next longest runway required for the aircraft analyzed. The reduction of 500 feet of runway length results in a 1,700-pound decrease in takeoff weight at 95.6° F. A 100 percent passenger payload to every city except Seoul is maintained. The passenger payload to Seoul would be reduced from 91 percent at 15,600 feet to 88 percent at 15,100 feet. At cooler temperatures, however, a 100 percent payload to Seoul would be achieved on the 15,100-foot runway.

Table 2.6

Salt Lake City International Airport

Increased Takeoff Weight and Payload – Revised Temperature

	Takeoff Weight (lbs.)		**Payload (lbs.)**		
Aircraft	95.6° F	83° F	95.6° F	83° F	Gain
A340-300	502,900	533,500	7,300	37,900	**30,600**
A340-600	708,000	733,600	48,300	73,900	**26,600**
B747-400	816,100	824,000	47,700	78,000	**34,500**

Source: HNTB analysis.

Table 2.7

Salt Lake City International Airport

Aircraft Payload to Selected Cities – Revised Temperature

	B747-400		A340-300		A340-600	
	Passenger	Cargo	Passenger	Cargo	Passenger	Cargo
Paris	100%	100%	100%	77%	100%	100%
London	100%	100%	100%	100%	100%	100%
Seoul	100%	100%	100%	17%	100%	54%
Tokyo	100%	100%	100%	56%	100%	94%

Source: HNTB analysis.

Runway Length Analysis Conclusions

Based on the analyses described above, a runway length of 15,100 feet is recommended. Although the model determined that the A340-300 requires a runway length of 15,600 feet to achieve its greatest takeoff weight, the additional 500 feet provides only a marginal benefit as described above.

The following action should be initiated based on the recommendation of a 15,100-foot runway:

- Finalize the Airport Layout,
- Revise the Master Plan to incorporate these recommendations, and
- Conduct a benefit/cost analysis and environmental clearances for the runway extension which could include the relocation of the transmission lines.

To determine the recommended runway length for Runway 17-35, a runway usability study was performed. For this analysis, the aircraft fleet mix projected in the forecasts of aviation demand was analyzed to determine approximate takeoff distances. These distances were calculated through the use of manufacturer's airport planning manuals, and the results are depicted in **Figure 2-7**. The primary objective is to have both secondary runways to Runway 16L-34R have a fleet usability of at least 90 percent. As shown, for fleet usability of 90 percent, the optimal runway length for Runway 17-35 is approximately 10,000 feet.

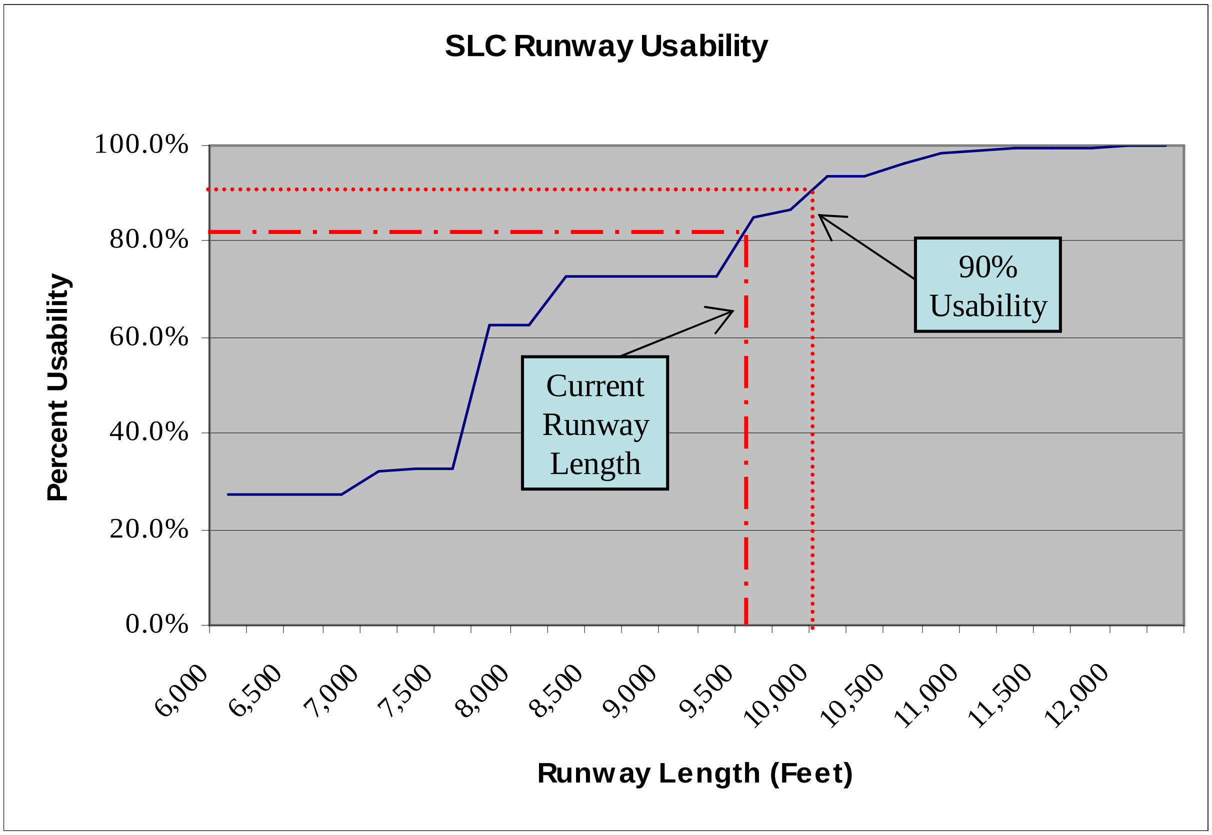
Runway Width

All runways at SLC are 150 feet wide. This dimension meets the existing and future requirements for Airplane Design Group V aircraft, the critical aircraft for the 20-year planning period.

Runway Clearances

Runway clearances include runway safety areas and runway obstacle free areas. These areas provide clearances from the potential

Figure 2-7


SLC Runway Usability
100.0%
80.0%
60.0%
40.0%
20.0%
0.0%
Percent Usability
6,000
6,500
7,000
7,500
8,000
8,500
9,000
9,500
10,000
10,500
11,000
11,500
12,000
Runway Length (Feet)
Current Runway Length
90% Usability

hazards for routine operations for aircraft operating on the airfield. All runways at SLC have standard runway safety areas and object free areas. These RSAs and OFAs are expected to meet requirements throughout the planning period.

2.2.2 Taxiway Requirements

Taxiway separation requirements at SLC for runway-to-taxiway, taxiway-to-taxiway, and taxiway-to-fixed or movable object are based on Aircraft Design Group V as defined in FAA Advisory Circular AC 150/5300-13, *Airport Design*. Existing runway-to-taxiway separation for parallel Runways 16R-34L and 16L-34R is at the Design Group VI standard of 600 feet (which is 200 feet greater than the 400-foot Design Group V standards); high speed taxiway exit requirements for Design Group V. The parallel taxiway for Runway 17-35 is separated by 570 feet except for the first 2,000 feet at the south end, where the separation is reduced to 400 feet (which is the standard for Design Group V aircraft). However, a runway-to-taxiway separation of 600 feet will be provided when Runway 17-35 is realigned.

There are three sets of parallel taxiways at the Airport. They are east-west Taxiways E and F on the north side of the terminal, Taxiways A and B associated with Runway 16R-34L, and Taxiways G and H along the northern half of Runway 16L-34R. The separations between Taxiways A and B, Taxiways G and H, and Taxiways E and F are all 267 feet, the distance required to meet Design Group V criteria.

In addition, there are parallel taxilanes in the terminal area and GA area. The taxilane in the GA area east of Taxiway K runs from the Air National Guard facility on the north to the FBO on the south. The minimum separation is 213 feet which exceeds Design Group IV but not Design Group V. The separation of the taxilane in the terminal area, parallel to Taxiway E, ranges from approximately 558 feet to 698 feet.

Existing taxiway- and taxilane-to-fixed or movable object distances vary considerably around the Airport. The only taxiways that provide Group VI separation are portions of Taxiway B and H and Taxiway F (except where vehicles enter/leave tunnel). The Group VI taxipath identified in the previous master plan (Taxiway H to Taxiway F) is still valid; however adjacent ramp area traffic might restrict Group VI aircraft movement or conversely, require operational restrictions of other Airport traffic. Taxiway K fixed-to-movable object ranges from 160 feet on the north to approximately 90 feet on the south. The taxilane in the GA area has a fixed-to-movable object separation of approximately 50 feet. The apron edge taxilane around the terminal area meets Group IV standards.

2.2.3 Navigational Aids

The Airport's existing complement of navigational and visual landing aids described in the inventory provides excellent capabilities to all users. There are Category III approaches to Runways 16L, 16R, 34L, and 34R. The development phase of the study will determine the need and timing of additional approach capability upgrades. In addition, all runway ends have PAPIs. The Airport can also operate in low visibility conditions, to 300-foot RVR (runway visual range), since SLC has an ASDE-3.

2.3 PASSENGER TERMINAL BUILDINGS

The following text summarizes the current passenger terminal improvement program, which was developed under a separate planning effort. These concepts are graphically depicted in **Figures 2-8 and 2-9**. This plan was designed to meet a projected demand of 34 million annual enplanements.

The new *Landside Terminal* (Figure 2-8) will consolidate air carrier passenger-processing operations into a single terminal building, consisting of three levels plus a basement level. The structure will be built west of the existing terminal complex, along with a new three-level terminal roadway system. It will provide ticketing, passenger security and screening, and baggage claim for all domestic and international flights.

The *North Concourse—East* (Figure 2-9) is a satellite concourse that will be constructed north of the existing Terminal 2 and will be connected to the Landside Terminal by an automated people mover (APM) system. The east portion of the North Concourse includes the APM station and a two-level building serving approximately 19 large jet aircraft parking positions.

The North Concourse—West (Figure 2-9) is a satellite concourse that will be connected to the Landside Terminal by an APM system. The west portion of the North Concourse includes a two-level building planned to serve up to 60 regional jet aircraft parking positions.

The *South Concourse* (Figure 2-9) will be constructed, for the most part, west of the existing Terminal 2 and will join to the stem of the Landside Terminal at the APM station. The South Concourse will support 31 large jet gates, 30 of which will serve the Airport's major hub carrier (Delta Air Lines) and one of which will be the Airport's international arrivals gate.

The APM system will move passengers between the Terminal/South Concourse and the North Concourse. This APM system will consist of two trains operating on a two-guideway shuttle system. The APM system resides entirely below the apron in a tunnel. Passengers will board trains at either the Terminal/South Concourse or the North Concourse and travel to the other station. The system utilizes a single center platform for boarding and detraining.

Other supporting development projects include a new Mechanical Plant; an apron paving project; an underground, APM Tunnel Structure; the Mid-Concourse Passenger Tunnel; a Hydrant Fueling System; a Parking Structure; the Rental Car Lobby; enclosed pedestrian bridges; Rental Car Wash/Fuel Facilities; and Baggage Handling Systems.

A more detailed description of the terminal development plan can be found in the 2003 Terminal Plan by HNTB.

Figure 2-8 SLC Landside Terminal and South Concourse

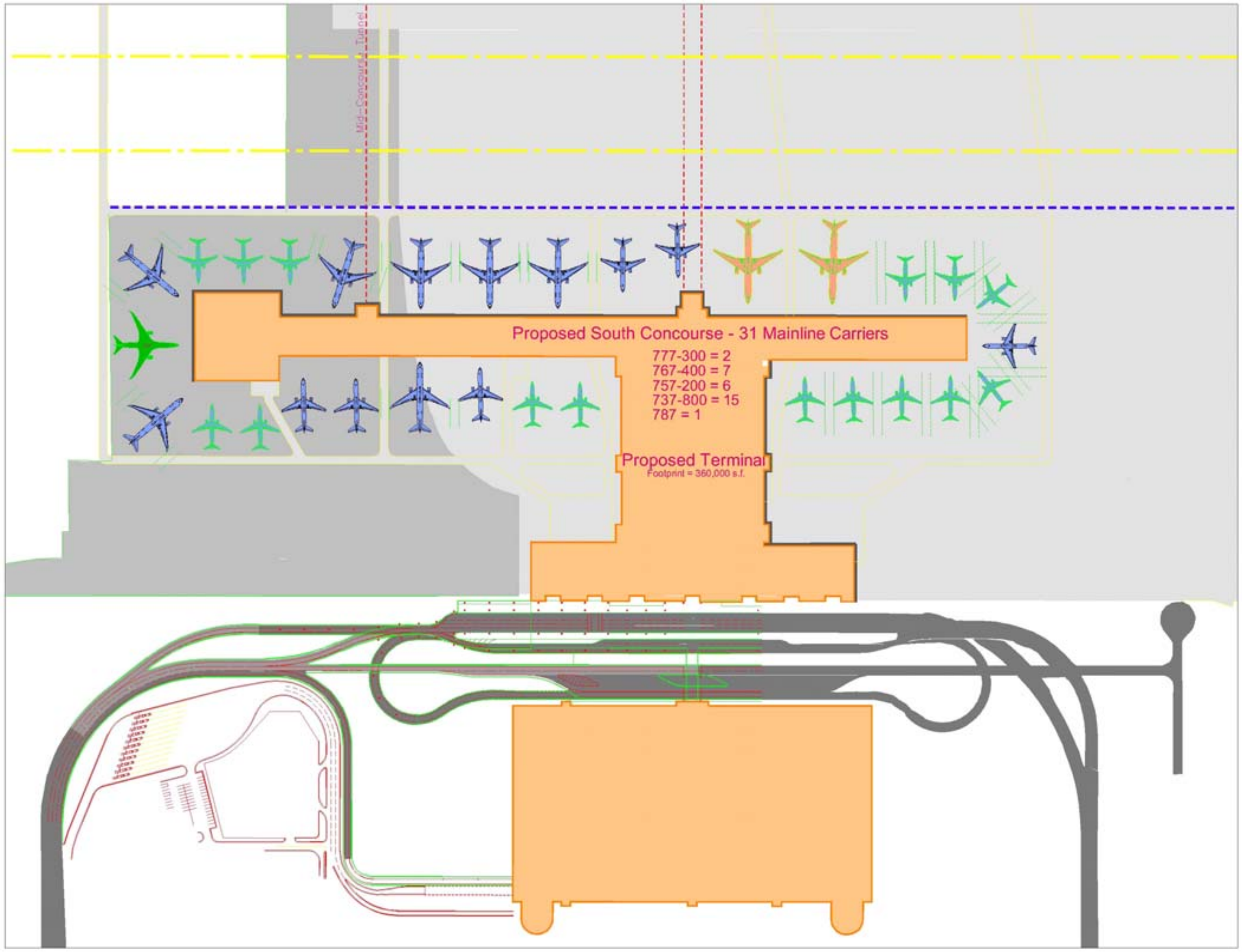
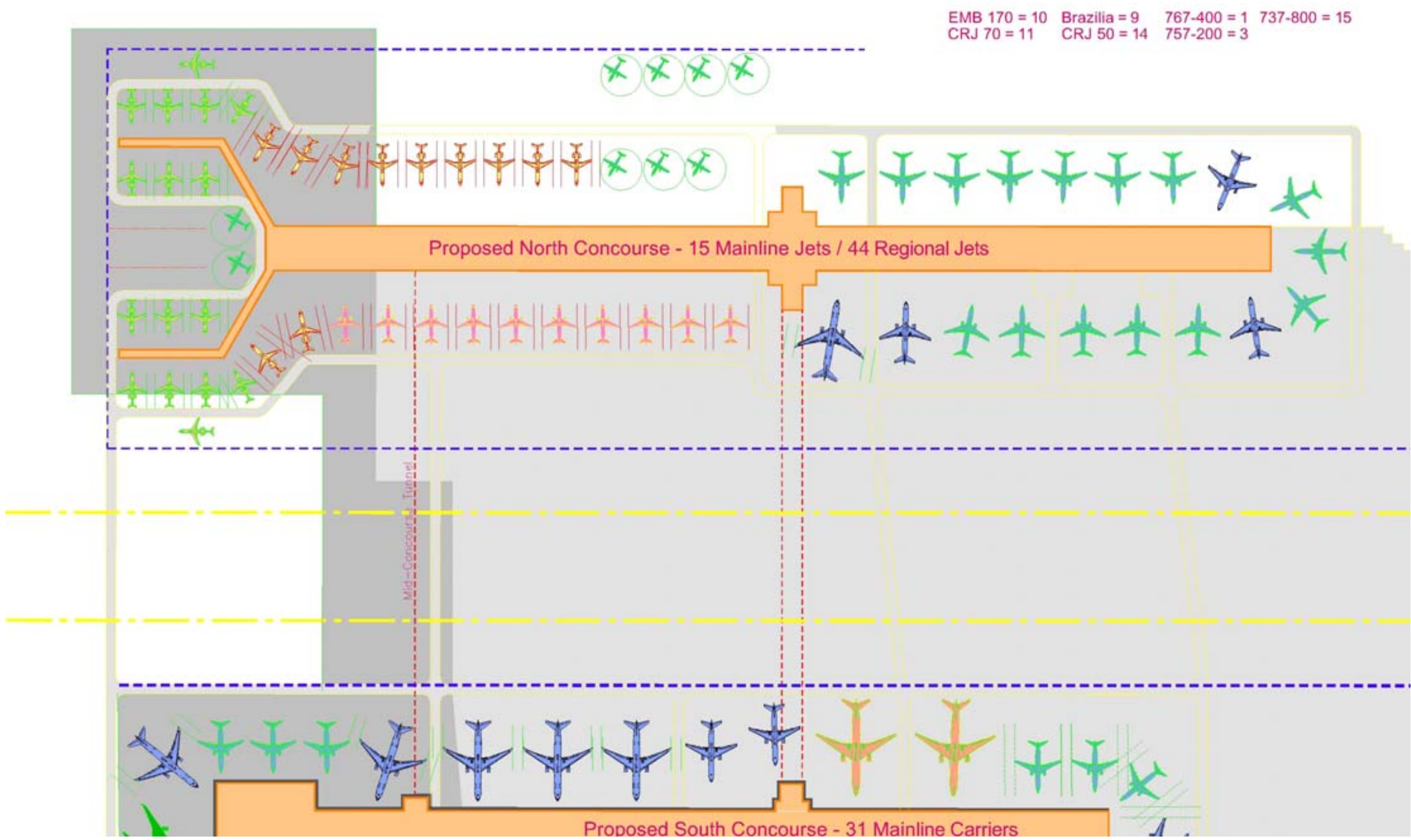


Figure 2-9 SLC North Concourse

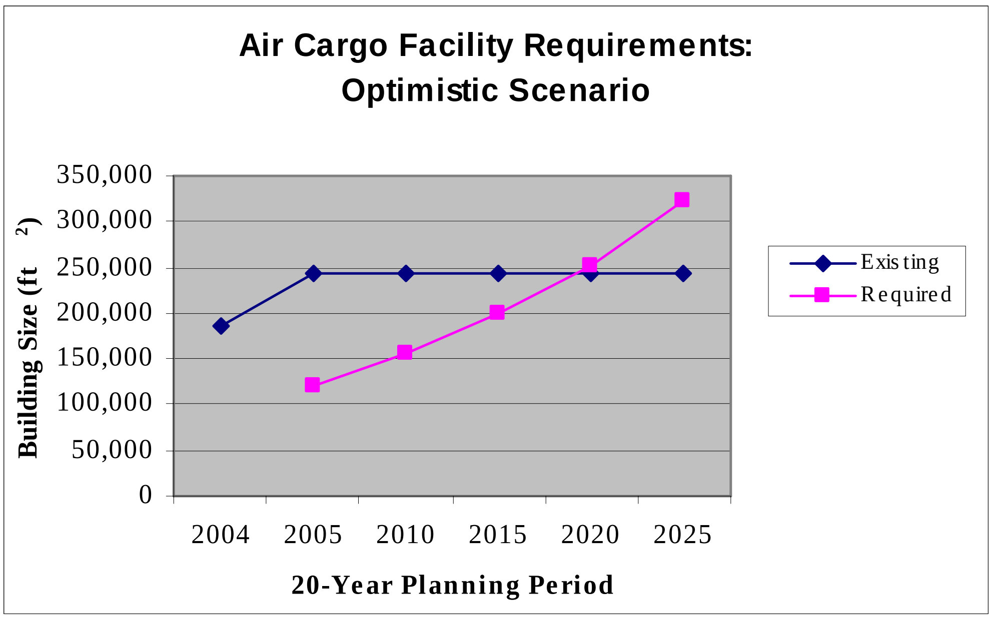


2.4 AIR CARGO

2.4.1 Air Cargo Facilities

Figure 2-10 presents the capacity of existing cargo facilities and the projected requirements through 2025. Facility requirements were determined by assuming 1.5 square feet of building space per annual ton of cargo (including all-cargo freight operators, air passenger carriers, and the Air Mail Facility). This ratio is an average square feet per ton based on a national survey of cargo facilities. As shown, the facilities are expected to meet the forecast demand until 2020. However, by 2025, an additional 79,000 square feet of cargo facilities may be required to meet demand.

Figure 2-10



It should be noted that cargo carriers DHL, Airborne Express, and UPS all conduct a great deal of sorting and processing at off-airport facilities, thus decreasing their need for additional on-airport facilities. At this time, these carriers confirm that they do not have any unmet demand.

These calculations consider a new 59,000-square foot DHL facility planned for the consolidated cargo area adjacent to Runway 16L. The DHL facility is currently in the site planning stage and is expected to be constructed in 2006.

Also considered was the existing U.S. Postal Service Air Mail Facility at SLC, which is 40,000 square feet. Current air mail demand on the facility has decreased substantially from the previous planning period. It is expected that the current facilities will adequately meet projected demand for the new 20-year planning period of 2005 to 2025.

2.4.2 Air Cargo Apron

SLC currently has approximately 296,000 square yards of cargo apron. This apron area exists on the north and south ends of the Airport, with approximately 155,000 square yards located on the north end and 141,000 square yards located on the south end. Air cargo apron size can vary considerably based on aircraft size and tenant requirements and are often a function of available land and airport layout. A general planning criterion of five square feet of apron for every one square foot of building was used to project cargo apron requirements. Using this planning factor, apron requirements for SLC are provided in **Table 2.8**. As shown, apron requirements for the cargo carriers total 538,836 square yards by 2025.

Table 2.8
SALT LAKE CITY INTERNATIONAL AIRPORT
AIRPORT LAYOUT PLAN UPDATE

Air Cargo Apron Requirements--Optimistic Scenario

Year	Apron Area (SY)	Deficiency (SY)
2006-Existing	296,000	
2010	259,286	(36,714)
2015	330,469	34,469
2020	421,448	125,448
2025	538,836	242,836

Source: HNTB Analysis.

2.5 GENERAL AVIATION FACILITIES

General aviation facility requirements are identified based on the projections of GA demand presented in the forecast. Overall GA demand is projected to increase slightly through the planning period, and some areas are experiencing a shortage of facilities. General aviation jet traffic at SLC is forecast to increase throughout the planning period, while turboprop and both multi- and single-engine traffic is expected to decline.

The Airport has recently completed a preliminary layout plan for GA facilities. The plan will ensure that the area is laid out in a flexible manner to accommodate future demand. As GA activity is diverted from SLC, the department will have the opportunity to provide facilities elsewhere in the system. This section identifies GA hangars, apron areas, terminal buildings, and other infrastructure needed to satisfy the 2025 requirements.

2.5.1 Hangar Requirements

Demand for hangar space is typically related to the local climate and the type of based aircraft. Areas with more severe weather conditions, such as the snowy winter months in Salt Lake City, have a higher demand for hangar storage facilities. Large investments in jet and turboprop aircraft also increase the demand for hangar storage of these types of aircraft. SLC has a relatively high demand for hangar storage, with about 80 to 90 percent of the based aircraft shelter in hangars.

The size and type of aircraft storage should address changes in forecast demand. Based on the forecasts prepared in 2004, SLC is expected to experience a slight decline in based aircraft over the planning period, from 422 in 2005 to 409 in 2025. Also, while based single-engine aircraft will decline by nearly 20 percent, based jet aircraft will nearly double to 98 in 2025.

T-Hangar Requirements

The current (2006) complement of T-hangar and shade hangar facilities can accommodate up to 226 aircraft. As of February 2006, there were about 29 vacancies.

Due to the decline in single-engine aircraft, and the projected increase in based jet aircraft, no additional T-hangars are recommended at this time. It is assumed that the majority of the future based aircraft, including jets and multi-engine aircraft, will require conventional hangar accommodations.

Conventional Hangars

Conventional GA hangar and support space that the two FBOs operate at the Airport total approximately 270,000 square feet. Salt Lake City Jet Center operates seven 10,000 square foot hangars, for a total of approximately 70,000 square feet. Million Air operates 10 hangars, ranging in size from 18,000 to 30,000 square feet, for a total of approximately 200,000 square feet. Generally, the demand for conventional hangar space is based on the assumptions that 20 percent of the based single-engine aircraft, 80 percent of the based light multi-engine aircraft, and 100 percent of the based turboprop and jet aircraft will require conventional hangar space. An additional 15 percent of the space is required for maintenance areas. However, the demand for conventional hangar space may be even greater, as discussed above.

At this time, there is not an immediate need for conventional hangars, however in future years, demand grows steadily. **Table 2.9** shows the deficiencies in conventional hangar space for future forecast years.

Table 2.9
Salt Lake City International Airport
Conventional Hangar Requirements
Optimistic Scenario

Year	Area (SF)	Deficiency/ Surplus (SF)
2004-Existing	270,000	-
2005-Requirement	266,700	(3,300)
2010	299,150	29,150
2015	331,650	61,650
2020	362,600	92,600
2025	395,050	125,050

Source: HNTB Analysis.

The GA Strategic Plan reserves land for several hangars to be constructed totaling over 450,000 square feet. Therefore, any deficiencies outlined above can be met. Development of conventional hangars will be undertaken as demand presents itself, as depicted in the Plan. Hangars varying in size from 90 feet by 90 feet to 110 feet by 110 feet are illustrated in the Plan, which is depicted in **Figures 2-11 and 2-12**. The Plan is designed to be flexible as general aviation demand changes over the next several years. This plan adequately addressed the shift to more sophisticated GA traffic but does so in a conservative manner, as demand dictates. Due to the ease of constructing hangars in a timely fashion, this is thought to be a desirable plan. However, it should be noted that the GA Plan offers more than 300,000 square feet of hangar space in excess of the projected need. It may be desirable to reduce the size of the GA Plan by at least 200,000 square feet, and reserve valuable Airport lands for other purposes.

2.5.2 Aircraft Apron and Tie-Down Requirements

The GA apron at the Airport is comprised of the conventional hangar circulation apron, based aircraft tie-down apron, and transient aircraft apron adjacent to the hangars and terminal facilities. Total existing apron area is approximately 137,000 square yards.

Apron requirements for projected based and transient aircraft were calculated assuming 300 square yards per single engine aircraft, 600 square yards per multi-engine or turbo-prop type aircraft, 1350 square yards per jet, and 450 square yards per rotorcraft. For transient aircraft, it was assumed that only 25 percent of the peak-day aircraft would require parking at one time.

Figure 2-11

General Aviation Plan - South

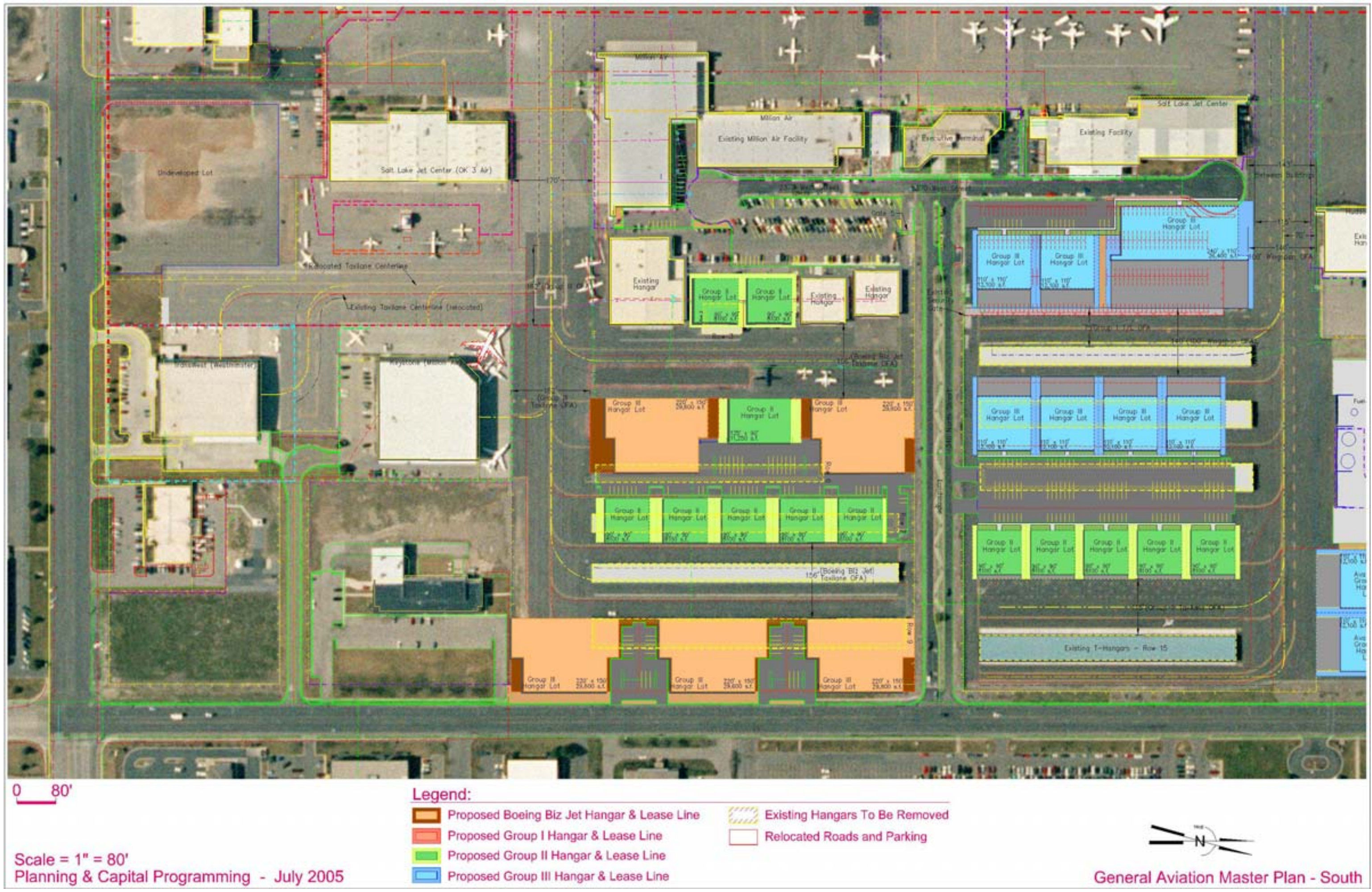
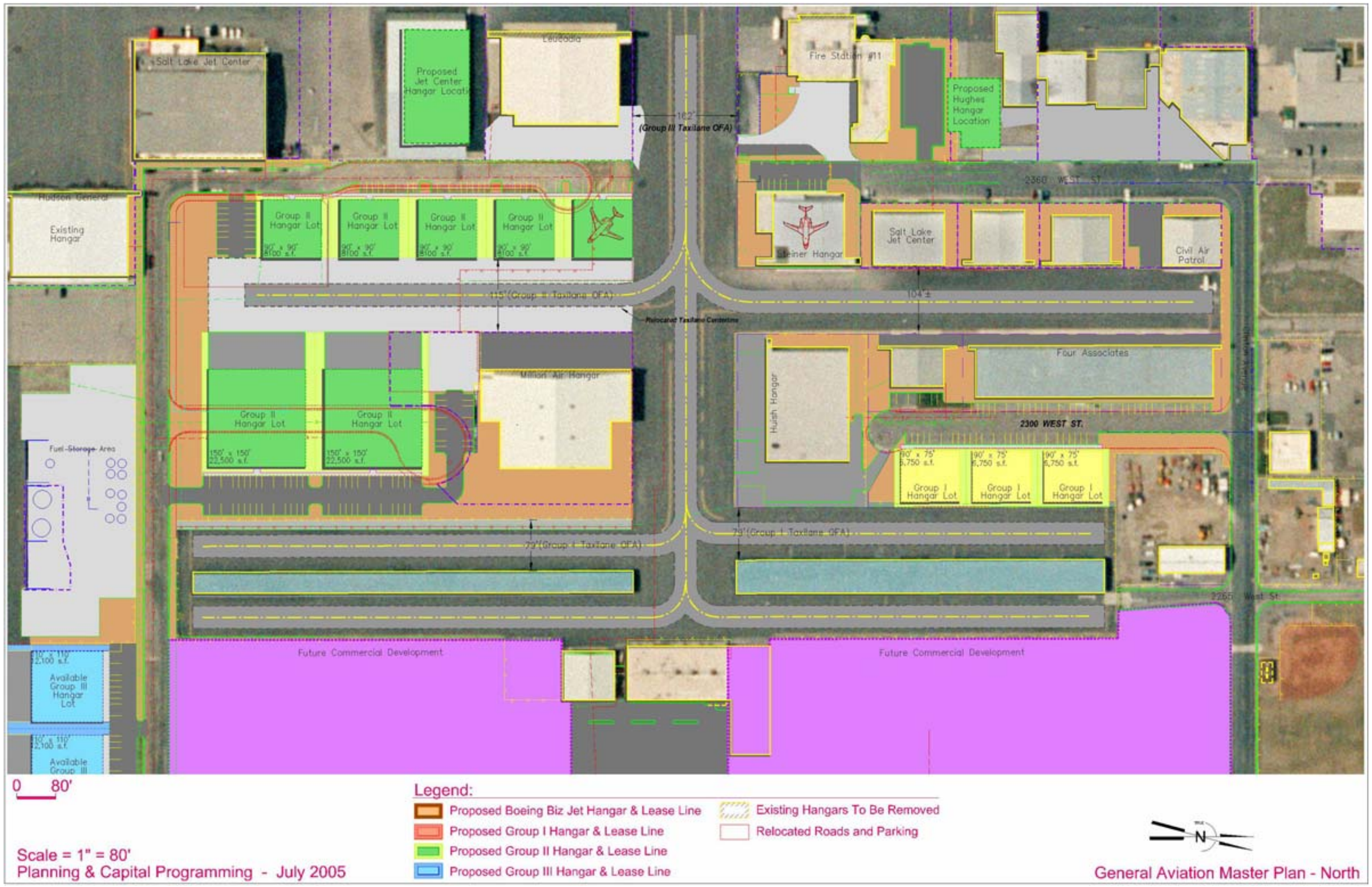


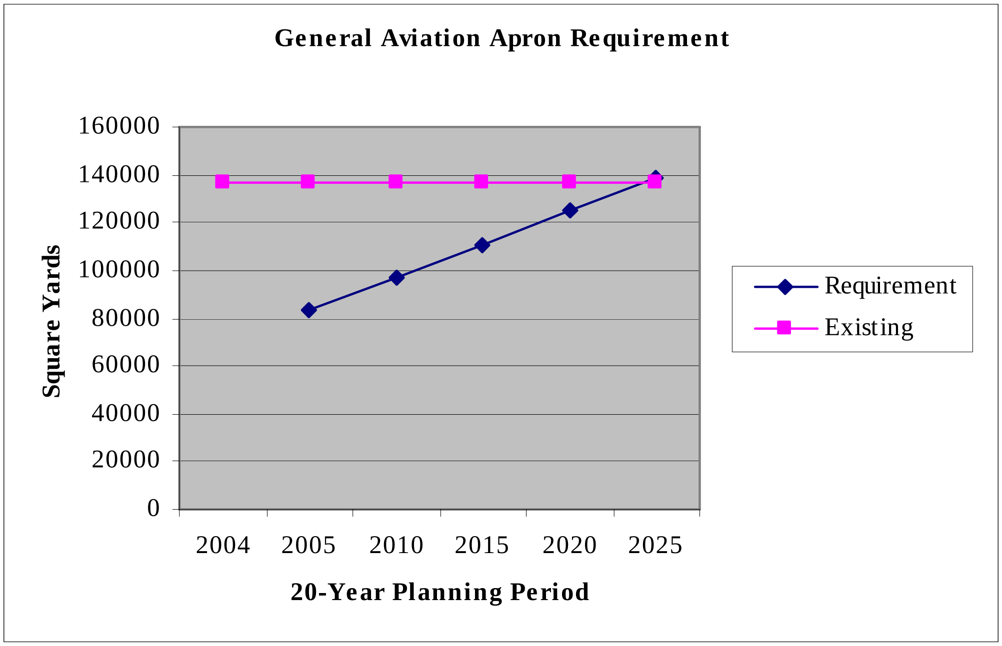
Figure 2-12

General Aviation Plan - North



As illustrated in **Figure 2-13**, the existing apron is thought to be sufficient for nearly the entire planning period. However, it should be noted that FBO management has expressed concerns with crowding on the transient aprons. It is recommended that land be reserved for future expansion of the transient aprons, and that the volume of operations on the aprons be closely monitored. Expansion may occur as warranted.

Figure 2-13



2.5.3 GA Terminal Facilities

Terminal and administration building requirements for general aviation are derived from FAA planning ratios that include space allocations for the following areas:

- Waiting area/pilot lounge
- Management/operations
- Public restrooms
- Concessions

There is a total of approximately 50,000 square feet of available general aviation terminal space in the Airport's two FBOs.

Planning criteria for GA terminal facilities are based on average daily itinerant departures. Assuming a planning factor of 35 square feet per passenger or pilot, and an average of 3.5 passengers/pilots per daily itinerant departure, the existing facilities exceed general aviation terminal demand. **Table 2.10** shows required terminal space based on average day, peak month (ADPM) activity.

Table 2.10
Salt Lake City International Airport
General Aviation Terminal Requirements

Year	Area (SF)	Deficiency/ (Surplus)
2004-Existing	50,000	-
2005-Requirement	19,171	(30,829)
2010	21,131	(28,869)
2015	23,214	(26,786)
2020	25,174	(24,826)
2025	27,134	(22,866)

Source: HNTB Analysis.

2.6 SUPPORT FACILITIES

2.6.1 Airport Maintenance Facility

The requirements for future facilities are based on staff size and material and equipment needed to maintain existing and future facilities. Currently, the 229,000-square foot Airport maintenance facilities occupy approximately 22 acres in the North Support Area. The facilities include 10 buildings which provide the following functions snow equipment storage; covered vehicle storage; vehicle maintenance; roads and grounds maintenance; urea, salt and sand storage; greenhouse and warehouse; facilities maintenance for HVAC, plumbing, mechanical, paint, sign, and carpentry shops and support; and general cold storage. It is projected that the current maintenance facilities will adequately support Airport demand throughout the 20-year planning period of 2005 to 2025.

2.6.2 Fuel Storage Facilities

There are multiple fuel storage facilities at SLC, designed to accommodate both airline and GA fuel demand. ASGI operates the airline fuel facility on the northwest side of the Airport, which has a total capacity of 6.3 million gallons of Jet A fuel (this facility also has one tank of unleaded automobile gasoline). Based on current usage, the total aviation fuel facility supply is approximately 12 days.

GlobeGround/AirServ also operates an airline fuel facility located near the general aviation fuel facilities, on the southeast side of the field. This facility has a capacity of 250,000 gallons of Jet A, 8,000 gallons of diesel fuel, and 16,000 gallons of automobile fuel. The amount of aviation fuel sold per day from this facility is approximately 70,000 gallons.

Using a planning factor incorporating a six-day supply, the existing airline fuel farm can accommodate the projected commercial Jet A fuel requirements for the air carriers through the planning period.

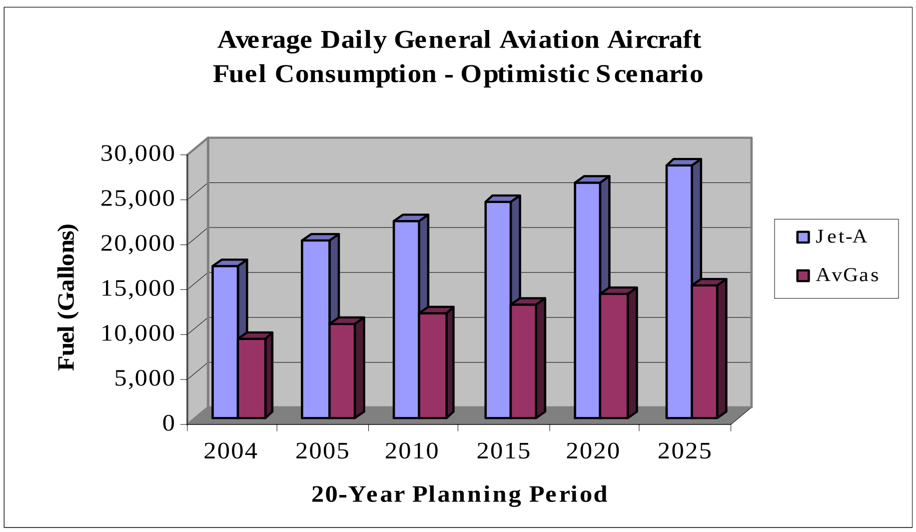
To meet GA demand, each FBO operates its own fuel facility. Salt Lake City Jet Center has a total capacity of 65,000 gallons of Jet A and 30,000 gallons of 100 Low Lead (100LL) fuel. Daily fuel usage is a total of about 10,000 gallons. Approximately 8,000 gallons of 100LL are sold daily from this facility, while approximately 2,000 gallons of Jet A are sold daily. The operator generally tries to keep the fuel tanks as full as possible.

Million Air's fuel farm has a capacity of 60,000 gallons of Jet A and 30,000 gallons of 100LL (there is also one tank with a capacity of 10,000 gallons of unleaded automobile gasoline). Daily sales of 100LL fuel are approximately 1,000 gallons, while daily sales of Jet A fuel are approximately 15,000 gallons. Fuel is delivered daily, and the operator generally keeps the tanks at full levels.

Interviews with the FBOs indicated that the total average daily Jet A consumption is approximately 17,000 gallons, while 100LL consumption is approximately 9,000 gallons. These consumption rates are equal to the existing GA fuel storage capacities. To accommodate current demand, daily fuel deliveries are required. **Figure 2-14** depicts future daily fuel consumption for the forecast period.

It is recommended that storage be offered for at least a two-day supply of general aviation fuel. Therefore, to accommodate existing and future demand for GA fueling, it is recommended that capacity be increased by 22,000 gallons of Jet A and 12,000 gallons of 100LL. This additional capacity should be accommodated in the existing fuel farm.

Figure 2-14



2.6.3 Airline Maintenance Facilities

Airline maintenance hangars and facilities are a function of corporate airline decisions and are very difficult to forecast. These facilities are typically determined by the airline headquarters location, hubbing characteristics, fleet size, maintenance scheduling, climate, and location of terminating flights.

SLC currently has two maintenance facilities located in the North Support Area, one supporting Delta Air Lines and one supporting SkyWest Airlines. Both of these facilities were designed with the capability of expansion. One of the main aspects of Delta's transformation plan includes the dehubbing of their Dallas/Ft. Worth operation, and the relocation of those flights and assets to grow hub operations in

Atlanta, Cincinnati, and Salt Lake City. With these additional operations, larger maintenance facilities may be required in the future and the existing hangar does have expansion capability. Although no expansion is recommended at this time, land should be reserved for future expansion of airline maintenance facilities.

2.6.4 Flight Kitchen Facilities

The Flight Kitchen at SLC is operated by Caterair in a 60,000 square foot facility located in the South Support Area. Although this is the only Flight Kitchen that is currently in operation at SLC, it is expected to adequately support flight operations at SLC throughout the planning period. As a result of the recent downturn in the airline industry and subsequent operational changes, airlines for the most part have stopped serving food onboard, rendering large Flight Kitchen facilities unnecessary.

2.6.5 ARFF Facilities

Airports certified under Federal Aviation Regulation Part 139 (Certification and Operations: Land Airports Serving Certain Air Carriers) must comply with specific ARFF operational requirements. The two primary considerations in determining compliance are response time requirements and equipment and agent requirements.

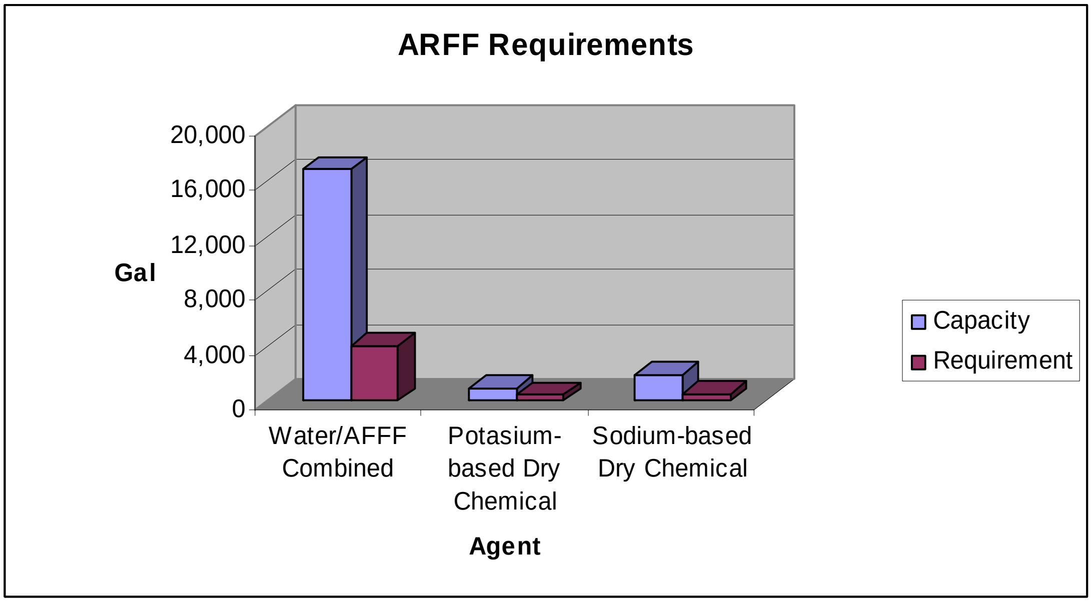
SLC is classified as an Index D airport. Index D requirements and the SLC ARFF equipment capacities are illustrated in **Figure 2-15**. SLC exceeds the equipment and agent ARFF requirements throughout the planning period.

SLC has two ARFF facilities, one in the South Support Area and one in the North Support Area, which enables the Authority to meet the FAR Part 139 response time requirements. It is projected that the two ARFF facilities will allow SLC to meet response times throughout the planning period. On average, there are 12 personnel on duty at any one time to respond to an ARFF emergency, six in each facility. The two stations together total nearly 40,000 square feet and are thought to be adequate throughout the planning period.

2.7 SURFACE TRANSPORTATION AND PARKING REQUIREMENTS

Although surface transportation and parking requirements were not considered as a part of this planning effort, the Airport's consultant recently completed an effort on conceptual planning of these elements, and that plan is outlined below. The landside components included in the conceptual planning were all of the access and circulation roadways; all of the terminal curb roadways; all structured and surface public parking; new common entry and exit plazas for the expanded parking system; new rental car ready and return area and customer center facility inside the new garage; wash/fuel facilities around the garage; new remote rental car storage and maintenance facilities; expanded employee parking; commercial vehicle staging area; park-and-wait lot; and other landside support facilities.

Figure 2-15

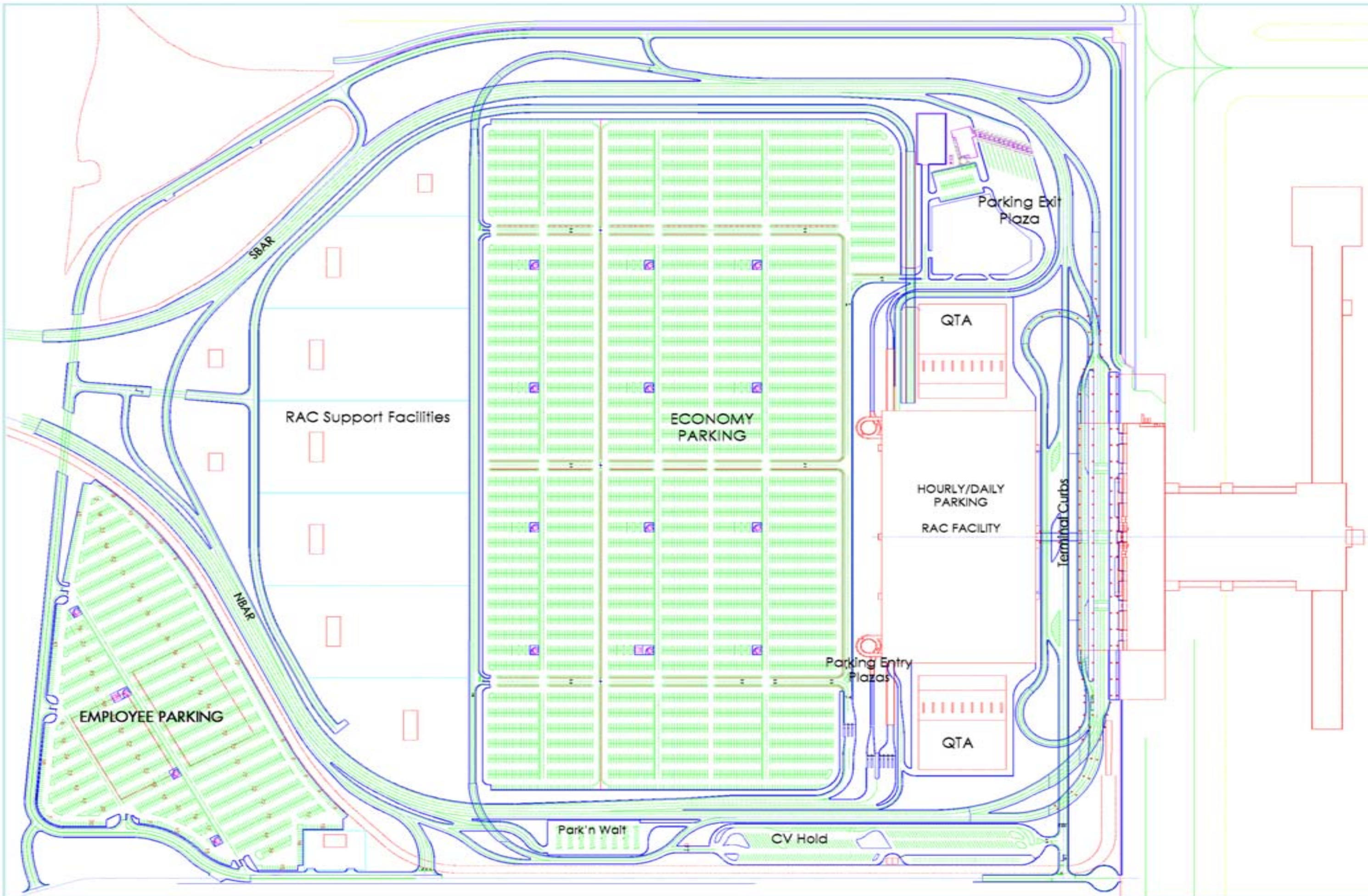


These elements were proven to work successfully in conjunction with the long-term terminal passenger demand of 34 million annual passengers. The landside improvements were arrayed into a series of 25 construction phases, for which the first 12 will serve the original terminal and garage in an interim condition.

Special features of the landside system include a roadway between the rental car ready and return areas for exclusive use of the rental car jockeys, an improved parking revenue control system which includes pay-on-foot and credit card in/out capability, all commercial vehicle areas controlled by an expanded automated vehicle identification system, two special recirculation roadway for commercial vehicles which minimize travel distances and times, a park-and-wait area upstream of the arrivals curb to decrease recirculating traffic while waiting for terminating passengers, and areas provided for the Code Orange or Code Red vehicles security searches. More detail descriptions about the characteristics of the landside elements as they currently stand in the planning or design phase are presented in the 2003 Landside Plan by HNTB. A graphic depiction of the roadway and parking improvements is presented in **Figure 2-16**.

Figure 2-16

SLC Landside Layout



2.8 SUMMARY

The demand/capacity analysis for SLC illustrates that the Airport could achieve greater capacity and reduced delay through the realignment of Runway 17-35. Airspace analysis indicates that only semi-independent operations can be achieved with the use of standard terminal area approach procedures, and a separation of 3,200 feet will incur the least demolition and reconstruction costs. The realigned runway should be 10,000 feet in length, and the environmental analysis and preliminary design of the relocated runway should begin in the 2010 to 2015 timeframe.

To meet existing and future demand, Runway 16L-34R should be extended 3,100 feet to the north. This runway extension is justified immediately, and environmental analysis and design of this project should begin as soon as possible. This 15,100-foot runway is expected to meet current and projected demand. To provide long-term additional airfield capacity, a fourth parallel runway should be constructed in the 2025 to 2030 timeframe.

These projects, as well as the details of the GA Plan, will be incorporated into the ALP drawing.

Chapter Three
Capital Improvement Plan and Airport Plan

The purpose of this chapter is to describe the CIP and the recommended development plan for SLC. These plans will be incorporated into the ALP. The recommended improvements are based on the forecasts of aviation demand and the facility requirements that were discussed in previous chapters.

This chapter discusses the development plans listed in the current CIP and determines if those recommendations continue to remain valid. Any new recommendations for development will also be discussed and will be categorized by area, including airfield, terminal, and landside. It should be noted that the CIP is updated monthly to ensure it takes into consideration latest developments.

3.1 AIRPORT CAPITAL IMPROVEMENT PLAN (CIP)

3.1.1 Current CIP

The Airport's current (as of March 2006) CIP includes the following projects, grouped by year(s):

Year 2006:

- Taxiway H Reconstruction-H2-H4
- Taxiway K Resurface
- Taxiway Centerline Light Trench Pavement Reconstruction
- Concourse Apron Rehabilitation - Phase I
- Land Acquisition (general)

Year 2007:

- Runway 17/35 Pavement Resurface
- Runway 14/32 Pavement Resurface
- Runway 16R/34L Drainage Improvements
- Taxiway R Overlay
- Concourse E Elevator Replacement
- Airport Wildlife Mitigation
- Energy optimization System/Chilled Water Loop
- North Cargo Fiber Infrastructure
- Storm Water System Mod's for DWQ permit
- Miscellaneous Asphalt Overlay Program - Phase II
- Land Acquisition (general)
- Parking Garage Schematic Design

Year 2008:

- Concourse B Apron Reconstruction (Multi-year project)
- Taxiway S & R/W 14/32Midfield Drainage Improvements
- Terminal 2/IT Security Screening Expansion – phase II
- Runway 16R/34L Pavement Surface Grooving
- Vertical Circulation – Airside
- SLC GA Taxiway Extension
- Parking Structure Roof Replacement
- Land Acquisition (general)
- Asphalt Overlay Program - Phase III

- Program Documentation (update Schematic Design)

Year 2009:

- Runway 16L/34R Extension Environmental Assessment
- Development Program - Apron Modifications
- Mid-Concourse Tunnel (North 450')
- Mechanical Plant – Phase 1
- South Concourse (West) – West Half
- RAC Service Facilities
- Fuel System (West Half)
- Cargo Apron Expantion
- Relocated Rental Car Service Facilities
- Land Acquisition (general)

Year 2010:

- Taxiway S Reconstruction - East and West sections
- Taxiway Q Centerline Lighting and Overlay
- Concourse B Apron Reconstruction - Phase II
- Demolish Vacated Cargo Buildings
- Land Acquisition (general)
- Mechanical Plant- Phase 2
- South Concourse (West) – East Half
- Terminal
- Parking Garage
- Elevated Roadway

Year 2011:

- Extend Taxiway G (South)
- Environ. & Wetland Mitigation (for Runway 16L Extension)
- Modify 2200 North Street (for Runway 16L Extension)
- Relocate North Point Canal (for Runway 16L Extension)
- Relocate Power Transmission Lines (for R/W 16L Extension)
- Concourse C Apron Reconstruction - Phase I
- 48-inch Storm Drain Relocation
- Apron (East)
- Fuel System (East)

Year 2012-2016:

- Taxiway U Extension
- East Airfield Tunnel
- Taxiway E and F Reconstruction (Taxiway H - F1)
- Concourse C Apron Reconstruction - Phase II
- Taxiway E and F Reconstruction (Taxiway F1- F2)
- Light Rail to Airport (three-year program)
- East Apron Pavement Rehabilitation
- Taxiways A and B Joint, Surface, and Repair Work
- Reconstruct Runway 16L/34R in PCC Pavement
- Reconstruct Runway 16L/34R Connecting Taxiways in Concrete
- South Cargo Apron Reconstruction - South End
- South Cargo Apron Reconstruction - North End
- Overlay Entrance/Exit Roads (constructed in FY2005)
- Corporate Hangar Site Preparation
- Runway 17/35 Realignment & Taxiway Reconstruction (recommended to be rescheduled for 2020-2025 timeframe)

- Extend Cargo Taxiway V to 40th West
- Runway 16L/34R & Associated Taxiway
- Taxiways U and V 4000 West Tunnel for R/W 16R/34L Access
- Runway 16R/34L Joint, Surface, and Repair Work
- APM Tunnel (South Half)
- North Concourse
- Demolish Existing Buildings
- Demolish Parking Garage
- South Concourse (East)
- Demolish Concourse C and D

It is noted that the current CIP is not entirely consistent with the projects deemed necessary in the previous Master Plan. For example, the Master Plan called for T-hangar development throughout the 20-year planning period, while this project is no longer included in the CIP. This absence is, however, consistent with the SLCDA's 2004 GA Plan and the recommendations in this report.

Several of the projects included in the current CIP are maintenance items which are required for the basic upkeep of the Airport. These projects should remain unchanged in the Plan. However, some projects, although still valid, should be completed in different phases of the development plan, as discussed below.

3.1.2 Updated CIP

Three major projects have been identified for additions or modifications to the Current CIP. They are:

- Airport Master Plan Update—to be added to 2008 CIP.
- Environmental Impact Statement, Design and Construction for Runway 17-35 Realignment should be phased and rescheduled in the CIP in the 2015-2020 timeframe.
- Fourth Runway Project should be phased and added to the CIP in the post-2025 timeframe.

The implementation of these projects will be dependent on funding availability. An updated CIP is illustrated in **Appendix B** of this Report.

3.2 AIRPORT PLANS

Projects to be added to, or deleted from, the ALP have been grouped into the following areas: Airfield, Terminal, Parking and Roadways, Cargo, GA, and Support Facilities.

3.2.1 Airfield

The ALP will illustrate the realignment of Runway 17-35 to Runway 16L-34R. The length of this runway will be 10,000 feet. An extension to 15,100 feet will be depicted on Runway 16-34.

3.2.2 Terminal

The current terminal plan is designed to meet the demand of 34 million annual passengers (MAP), or 17.5 million annual enplanements. If the Optimistic Forecast is reached in 2025, the Airport will reach 19.1 annual enplanements. This indicates that the SLCDA should initiate planning for the next major terminal expansion in the 2015 to 2020 timeframe. The ALP will continue to illustrate a reserved area for future terminal development, adjacent to the existing north terminal and Runway 16L-34R. To facilitate this development, the ALP will continue to indicate a relocation of the Airfield Maintenance Facilities to a consolidated complex between the parallel runways.

3.2.3 Parking and Roadways

Like the terminal plan, the current landside plan is designed to meet the demand of 34 million annual passengers. However, unlike the terminal, there are no plans in place that depict expansion beyond 34 MAP. One potential option is for the landside to operate at a decreased level of service in the long-term planning period. No additional lands will be reserved for future roadway development; generally any modifications should be made to existing arteries. However, reserved land for future parking facilities will be indicated on the ALP.

3.2.4 Cargo

It is recommended that all air cargo carriers continue to shift their operations to the new dedicated cargo area on the north airfield, between the parallel runways. The cargo area adjacent to the approach end of Runway 34R should continue to be used for airline belly cargo operations, and this area will continue to be designated as a cargo area. However, as buildings become vacant, they should be designated for future aviation use. It is recommended that the SLCDA study potential reuse options for these buildings and land.

3.2.5 General Aviation

GA facility requirements analysis indicated that the GA Plan was reserving more space than necessary for conventional hangar development. Therefore, the area reserved for GA development could be reduced significantly. Also, in light of the recommendations for SLCIA in the GA Plan, the T-hangar development currently illustrated on the ALP on the north airfield, adjacent to the approach end of Runway 17, will be deleted from the Plan. This area will be reserved for future aviation and non-aviation development.

3.2.6 Support Facilities

As discussed, the ALP will depict the relocation of the Airport maintenance complex to the area currently shown on the ALP, between Runway 16L-34R and existing Runway 17-35.

3.3 OBSTRUCTION MITIGATION AND AIRSPACE PLAN

The primary goal of the FAA is to provide safe operating conditions and environments for aircraft. This goal includes the regulation of airspace surrounding airports to ensure that there are no objects or obstructions that may interfere with aircraft operations. The FAA sets forth guidelines for airspace obstructions in the Title 14 Code of Federal Regulations (14 CFR) Part

77, *Objects Affecting Navigable Airspace*. This regulation states the exact dimensions required of the airspace surrounding airports. The Salt Lake City International Airport complies with the FAA and the Part 77 surfaces for airspace.

3.3.1 Part 77 Surfaces

The Part 77 surfaces, also known as the imaginary surfaces, are determined by the type of airport and the runways at that airport. The category of each runway, based on the existing and proposed approaches, determines the exact size of that runway's Part 77 surfaces. The dimensions and slope of the Part 77 surfaces are determined by the most precise approach existing or proposed for that runway end. The Part 77 surface is comprised of five separate imaginary surfaces. They include:

1. Primary Surface – The primary surface is a rectangular area that surrounds the runway and extends 200 feet beyond each runway end. Its elevation is the same as the runway and its width can be as low as 250 feet and as high as 1,000 feet depending on the category of runway.

2. Horizontal Surface – The horizontal surface is an oval shaped area encompassing the runway, located 150 above the airport elevation. Its width will vary from 5,000 feet to 10,000 feet depending on the runway service category.

3. Conical Surface – The conical surface extends upward at a slope of 20:1 (horizontal:vertical) and outward for 4,000 feet from the edge of the horizontal surface. Its shape is the same as the horizontal surface.

4. Transitional Surface – The transitional surface consists of a sloping area which begins at the edge of the primary and approach surfaces and slopes upward at 7:1 (horizontal:vertical) until it intersects the horizontal surface.

5. Approach Surfaces – The approach surfaces begin at the end of the primary surface (200 feet beyond the runway end) and slopes upward at a predetermined ratio while flaring outward horizontally. The width and elevation of the approach surfaces conforms to that of the primary surface; while the slope, length, and width of the outer ends is determined by the runway service category and existing or proposed instrument approach procedures.

3.3.2 Height Restrictions

Any proposed development projects around an airport should be reviewed in accordance with 14 CFR Part 77 regulations to ensure that there will be no conflicts between the new construction and the Part 77 surfaces. No object should penetrate the Part 77 surfaces. If an object does penetrate the Part 77 surfaces, the FAA can determine if the object needs to be modified or if the approach to that runway needs to be modified to comply with the Part 77 regulation. The FAA must be notified of all new construction around an airport with a

7460-1 form. This notification applies to any construction or alteration (a) of more than 200 feet in height above the ground level at this site, and/or (b) of greater height than an imaginary surface extending outward and upward at 100:1 for a horizontal distance of 20,000 feet from the nearest point of the nearest runway.

3.3.3 Part 77 Airspace Plan

The airspace plan is designed to accurately depict the Part 77 surfaces on the quadrangle (1" = 2,000') composite for the area around the Airport.

All runway ends at SLC are currently classified as precision approach runways with 50:1 approach slopes.[1] The proposed new Runway 16L and 34R will be equipped as a precision approach runway.

Obstructions to the Part 77 airspace surrounding SLC are marked on the runway obstructions figures of the ALP set. An Obstruction Disposition Table can also be found on this figure which lists known obstructions with the surfaces that each one penetrates, as well as the amount of penetration in feet.

There are other structures located on the Airport, which penetrate the Part 77 surfaces. These structures include the Visual Approach Slope Indicator (VASI), the Automated surface Weather Observing System (AWOS), and the windsock. These structures are lighted and are necessary for the safe navigation of aircraft. These structures are also frangible and will give way if struck by an aircraft.

No objects, other than those necessary for safe navigation, are permitted to penetrate the Part 77 surfaces. Every effort should be made to ensure that the airport environment remains obstruction-free.

3.3.4 General Conclusions

Any and all non-necessary obstructions to the imaginary surfaces should be removed from the Airport environment. Numerous factors including excessive relocation costs often complicate the process of creating an obstruction-free airspace. Obstructions which cannot be removed should be equipped with hazard beacons so they can be clearly seen during all hours of the day. Every effort should be made to clear all obstructions from the approach areas of the busiest runways.

There is no clearly defined point at which an obstruction will render one or all of the runways at an airport unusable. There are many factors that influence the severity of the obstruction such as the height, location, and type of obstruction. Salt Lake City and Salt Lake County should continue to prohibit construction that will interfere with the imaginary surfaces and coordinate possible conflicting alterations or construction projects with the FAA and local and State government planning agencies.

[1] Runway 35 has an 18:1 obstruction clearance slope but the approach is classified as precision.

3.4 AIRPORT LAYOUT PLAN

The ALP is a group of drawings that serves as the primary tool for the guidance of growth at SLC. The various drawings depict the recommendations contained within this narrative report accompanying the ALP Update. The ALP set was prepared in accordance with the FAA's Denver Airport District Office ALP checklist. The ALP set was reduced from its working size of 24" x 36" in order to be incorporated in the ALP Update document for easy reference. This reduced size ALP set is located in the **Appendix C**. The 13 separate drawings which constitute the ALP set include:

- Sheet 1 – Title Sheet
- Sheet 2 – Data Sheet
- Sheet 3 – Airport Layout Plan
- Sheet 4 – Terminal Area Plan
- Sheet 5 – Airspace Plan (Part 77-Full)
- Sheet 6 – Airspace Plan (Part 77-Conical)
- Sheet 7 – Runway 16L-34R Plan and Profile
- Sheet 8 – Runway 16R-34L Plan and Profile
- Sheet 9 – Runway 17-35 Plan and Profile
- Sheet 10 – Runway 14-32 Plan and Profile
- Sheet 11 – On Airport Land Use Plan
- Sheet 12 – Exhibit "A" Property Map
- Sheet 13 – Vicinity Plan with 2025 DNL Noise Contours

3.4.1 Title Sheet

The Title Sheet of the ALP set serves as a cover sheet and provides information such as the Airport name, owner, location, and company that prepared the ALP set. An index of drawings, graphic representations of the Airport location and the Airport vicinity are also presented on the title sheet.

3.4.2 Data Sheet

The Data Sheet of the ALP set displays wind rose information, basic airport and runway data, and runway protection zone data. The wind rose data includes all-weather, IFR, and VFR information. The information presented in the Airport and Runway Data blocks covers the existing, future, and proposed conditions of the Airport.

3.4.3 Airport Layout Plan

The ALP is the graphical representation, to scale, of the existing and proposed Airport facilities. It serves as a bird's eye view of the Airport and shows clearance and dimensional information required for conformance with applicable FAA standards. The ALP establishes the ultimate configuration of all runways, taxiways, and apron areas at this point in time. In addition, areas are shown which should be reserved for development, and areas that should be acquired to allow the expansion of aviation-related and non-aviation-related commercial revenue producing facilities.

3.4.4 Terminal Area Plan

The Terminal Area Plan shows a close up view of the terminal and surrounding areas of the Airport. All existing and proposed terminal related facilities are included on this drawing. Also shown are all terminal related roadways. This Plan allows Airport managers to see what specific Airport improvements are proposed for the terminal area.

3.4.5 Airspace Plan

The current and future airspace surrounding the Airport is shown on the Airspace Plan. This sheet incorporates a graphical representation of the Imaginary Surfaces as described within FAR Part 77. The imaginary surfaces are established in relation to the Airport elevation and to each runway end. The size of each imaginary surface is based on the runway category and type of planned approach.

3.4.6 Runway Plan and Profile

The Runway Approach and RPZ Plans are used to determine if any obstructions are present within the approach areas or runway protection zones of the runways. One sheet was developed for each Runway, which depicts the RPZ for that runway.

3.4.7 Airport Land Use Plan

The Airport Land Use Plan is a graphic representation indicating general development guidelines for all existing on-airport property and ultimate proposed acquisition areas. The purpose of this plan is to provide overall developmental guidance for the Airport and immediately adjacent areas influenced by Airport operations, if applicable. The Land Use Plan shows all areas of the Airport categorized by specific use.

3.4.8 Airport Property Map

The Airport Property Map depicts the boundary of the Airport as well as all surrounding parcels and deed metes and bounds. Airspace and avigation easements are also shown on this exhibit. All leased areas are shown with the acreage of each parcel and the name of the lessee.

3.4.9 Airport Vicinity Plan

The Airport Vicinity Map defines both graphically and in tabular form how various tracts of land within the airport boundary are distributed. Also depicted on this drawing are the projected 2020 noise contours.

The purpose of this drawing is to provide information necessary for analyzing the current and future aeronautical uses of the land. All groups or organizations currently leasing land from the Airport are depicted on this drawing.

Appendix A
Preliminary Airspace Analysis Findings

HNTB

The HNTB Companies

Memorandum

To: Rebecca Henry Date: December 28, 2004

From: Scott Litsheim

Subject: SLC Runway 17-35 Realignment – U.S. TERPS

INTRODUCTION

We have completed a preliminary review of the air traffic operations and terminal instrument procedures that are possible for the three parallel runway alternatives, i.e. 1,200', 3,200', and 5,000' separations from the mix of operations that were provided by facsimile. The purpose of the analysis was twofold, the first to determine whether or not instrument approach procedures are feasible for each of the three runway alternatives, and the second to determine whether or not the runway alternatives can take full advantage of the separation from the existing runways.

This initial review considered terrain as the primary constraint, and a more complete review may be desirable to fully develop instrument approach, missed approach, and departure procedures, and to incorporate not only terrain but also available obstacle data.

The results of the analysis show that instrument approaches do appear feasible to all three Runway 17-35 realignment alternatives, although a detailed analysis has not been done for obstacle data other than terrain. However, in terms of whether the alternatives can take full advantage of separation from existing runways, both the 3,200 and 5,000' alternatives likely have limitations. The 3,200' alternative limits the ability to operate a mix of independent arrivals and departures to north flow operations only. The 5,000' alternative also does not appear to offer the maximum advantage afforded by that separation, since it currently appears unlikely that simultaneous independent triple approaches will work due to missed approach climb gradients that are higher than currently allowed. Similarly, independent departures from a newly aligned runway with a 5,000' separation in south flow also do not appear feasible at this time because of resultant unacceptable climb gradients.

To address this question of whether the runway alternatives take full advantage of the separation from the existing runways, U.S. TERPS criteria have been applied to develop the instrument procedures that correspond to applicable air traffic control (ATC) rules, as they apply to the following runway separations and proposed operating scenarios:

GENERAL FINDINGS

The initial general findings are outlined below and are based on the rules for air traffic control separation and the criteria for instrument flight procedure obstacle clearance:

1,200' separation

The ATC rules for simultaneous departures from parallel runways spaced less than 2,500' apart call for 1 NM mile separation between departing aircraft and a 15° divergence between departure courses. This analysis assumed that aircraft departing the center runway will fly a straight-ahead course and aircraft departing ultimate Runway 16L-34R diverge 15° (see Figure 1). Given a 15° course divergence, departures from the newly aligned runway will required a minimum climb gradient of approximately 420-490'/NM. However, note that departures from existing Runways 34L/R and 35 already have climb gradients of 260-340'/NM, and that departures from existing Runways 16L/R and 17 already have climb gradients of 400-410'/NM. While the proposed minimum climb gradients for the newly aligned runway are slightly higher, they are less than the 500'/NM threshold which requires Flight Standards Service approval prior to authorization, and it has been indicated that these climb gradients are readily attainable by airliners. Additionally, RNAV or FMS departure procedures could also be developed for such equipped aircraft that would allow lower climb gradient requirements on the order of 260-300'/NM. In either case, it therefore appears that this alternative takes full advantage of the runway separation as far as departures-only operations.

ATC rules for arrivals to parallel runways spaced less than 2,500' apart are that arrivals operate dependently with a minimum of 1,000 feet vertical or 3 miles separation between aircraft during turn on to final approach. Note that since there were no proposed operating scenarios for this alternative, the additional runway appears to offer no advantage. Also note that if approaches are ever proposed, also considering that the separation only affords dependent operations from the adjacent runway, then it seems quite probable that the same approach minimums as the existing Runway 16L-34R may be achieved for ultimate Runway 16L-34R.

Independent operations between departures and arrivals are not authorized for parallel runways spaced less than 2,500' apart, and thus the runway separation itself offers no advantage.

3,200' separation

ATC rules for simultaneous departures from parallel runways spaced at least 2,500' apart require a 15° divergence between departure courses. There is not the added requirement of 1 mile separation between departing aircraft as there is for runways spaced less than 2,500' apart. This analysis assumed that aircraft departing the center runway will fly a straight-ahead course and aircraft departing ultimate Runway 16L-34R diverge 15°. Given a 15° course divergence, departures from the newly aligned runway will require approximately the same minimum climb gradients as for the 1,200' alternative. Therefore, this alternative also appears to take full advantage of the runway separation as far as departures-only operations.

For arrivals to parallel runways spaced from 2,500-4,300' apart, ATC rules indicate that arrivals can operate dependently as long as there is a 1.5 mile separation diagonally between successive aircraft. Note that since there were no proposed operating scenarios for this alternative, the additional runway appears to offer no advantage. Also note that even though independent approaches with Runway 16C-34C may be possible with a 2.5-3.0° localizer offset and a precision runway monitor (PRM), there are terrain issues that would limit use of the runway for certain flow directions (see the following section).

Independent operations between departures and arrivals are authorized for parallel runways spaced 2,500’ or more apart as long as the departure course diverges 30° from the missed approach course for the arriving aircraft (see Figure 2). This analysis assumed that aircraft making a missed approach on the center runway will fly a straight-ahead course and that aircraft departing ultimate Runway 16L-34R diverge 30°. In these cases, north flow operations are possible provided there is a minimum departure climb gradient of approximately 482’/NM. For south flow operations, departures may require a minimum climb gradient of approximately 570’/NM, which are rare and require Flight Standards Service approval. Thus, since the feasible south flow departure course is likely to be straight-ahead only, departures from the newly aligned runway would be dependent on arrivals to the adjacent center runway, and thus partially negate the advantage of the runway separation. However, the same caveat for development of RNAV or FMS departure procedures applies. Initial indications are that if those routes are implemented, then departure climb gradients of approximately 458-474’/NM apply (see Figure 3). Thus, allowing for simultaneous independent departures, and thereby taking full advantage of the runway separation.

5,000’ separation

The ATC rules for simultaneous departures from parallel runways spaced 2,500’ or more apart are described in the preceding section for the 3,200’ alternative, and accordingly the 1,800’ of additional separation in and of itself offers no particular advantage over the 3,200’ alternative for departures-only operations.

ATC rules state that simultaneous independent triple arrivals to parallel runways spaced at least 5,000’ apart can operate independently as long as there is a 45°course divergence between missed approach courses. This analysis assumed that missed approaches for the center runway continue straight-ahead and that the missed approaches for ultimate Runway 16L-34R will diverge 45°. The analysis was performed for Category III missed approach procedures for ultimate Runway 16L-34R (see Figure 4). In these cases, the missed approach procedures appear likely to have missed approach climb gradients greater than the standard 200’/NM, which are not currently authorized by the FAA except for Department of Defense procedures. Moreover, the indicated missed approach climb gradients for the newly aligned runway are approximately 530-570’/NM, and would not only require prior approval from Flight Standards Service, but also may not be readily attainable by all commercial airliners.

However, note that SFO has a published Category III missed approach climb gradient of 240’/NM for Runway 28R. This is less than the approximately 530-570’/NM missed approach climb gradient initially indicated for ultimate Runway 16L-34R. But it may be that if positive course guidance can be established to define the new course following the initial turn, e.g.

new VOR/TACAN or NDB, then it is theoretically possible to find a route over the relatively lower mountain passes in the terrain to the east, using more moderate climb gradients. Likewise, if precision RNAV becomes operational or Required Navigation Performance (RNP) procedures are developed for specifically-equipped and qualified aircraft, then Category III missed approach procedures may then be approved, making it possible to allow for simultaneous independent triple approaches. Until then, simultaneous independent triple parallel approaches seem unlikely to be authorized.

ATC rules for independent operations between departures and arrivals for parallel runways spaced 2,500’ or more apart are described above for the 3,200’ alternative. It was assumed for this analysis that the required climb gradients for the added separation are similar in magnitude. Therefore, it also seems at this point that there is only partial utilization of the advantage afforded by this separation. However, the same caveat for development of RNAV or FMS departure procedures applies here also. Initial indications are that if those routes are implemented, then departure climb gradients of approximately 458-474’/NM apply (see Figure 4). Thus, allowing for simultaneous independent departures, and thereby taking full advantage of the runway separation.

DETAILED FINDINGS

The initial detailed findings are outlined below and are based on the rules for air traffic control separation and the criteria for instrument flight procedure obstacle clearance as outlined above:

1,200’ separation

- If there are to be simultaneous departure procedures for ultimate Runway 16L-34R, with 1 mile separation and departure courses diverging 15° from Runway 16C-34C, then it is likely that any obstacle departure procedure (ODP) and/or standard instrument departure (SID) developed will require non-standard minimum climb gradients of approximately 420-490’/NM. Although many aircraft have RNAV or FMS capability, not all aircraft are so equipped and therefore not all aircraft would be able to use any RNAV ODPs or RNAV SIDs developed, which possibly have approximately 260-300’/NM climb gradients.
- Otherwise, the development of any SID with a standard climb gradient that uses ground-based NAVAIDs appears unlikely due to coverage gaps, which result in the need for ATC controller input and are therefore less desirable.

3,200’ separation

- During times when there are no arrivals, if there are to be independent departure procedures for ultimate Runway 16L-34R, with departure courses diverging 15° from 16C-34C, then it is likely that any ODP and/or SID developed will require non-standard minimum climb gradients of approximately 420-490’/NM. It may be possible to develop RNAV ODPs and/or RNAV SIDs with non-standard minimum climb gradients of approximately 260-

300'/NM, although either of the climb gradients are achievable by most commercial airliners).

- Otherwise, the development of any SID with a standard climb gradient that uses ground-based NAVAIDs appears unlikely due to the coverage gaps mentioned above.
- When there are north flow arrivals to Runway 34C, north flow departures for ultimate Runway 34R may operate independently, since the required departure climb gradient of approximately 482'/NM is allowed.
- When there are south flow arrivals to Runway 16C, the south flow departures for ultimate Runway 16L may be dependent, since the required departure climb gradient is approximately 570'/NM. Climb gradients greater than 500'/NM are rare and require authorization from Flight Standards Service.
- When there are south flow arrivals to Runway 16C, the south flow departures for ultimate Runway 16L may operate independently if RNAV or FMS procedures are developed, since the required departure climb gradient for these procedures is approximately 458'/NM.
- Development of RNAV ODPs and/or SIDs may be possible that do not require a non-standard climb gradient. Current indications are that even the development of an RNAV ODP and/or SID will likely require higher-than-standard climb gradients for 5,000' option.
- Dual simultaneous approaches with Runway 16C-34C may be possible with a 2.5-3.0° localizer offset and precision runway monitor (PRM).

5,000' separation

- During times when there are no arrivals, if there are to be independent departure procedures for ultimate Runway 16L-34R, with departure courses diverging 15° from 16C-34C, then it is likely that any ODP and/or SID developed will require non-standard minimum climb gradients of approximately 420-490'/NM, or perhaps the development of RNAV ODPs and/or RNAV SIDs with non-standard minimum climb gradients of approximately 260-300'/NM.
- Otherwise, the development of any SID with a standard climb gradient that uses ground-based NAVAIDs appears unlikely due to the coverage gaps mentioned above.
- When there are south flow arrivals to Runway 16C, the south flow departures for ultimate Runway 16L may operate independently if RNAV or FMS procedures are developed, since the required departure climb gradient for these procedures is approximately 458'/NM.
- Triple simultaneous independent parallel instrument approaches appear at this point to be unlikely, as the required missed approach climb gradients for ultimate Runway 16L-34R will require ILS missed approach climb gradients that are approximately 530-570'/NM. Note that this determination is based on an analysis of Category III operations for ultimate Runway 16L-34R, as well as the current published Category III instrument approach procedures for Runway 16R-34L. Ultimate Runway 16R-34L will become one of the two outer parallels for a triple parallel runway configuration, and the current criteria for a triple parallel runway configuration specify that only one of the two outer

parallels can have a climb-to-altitude and turn missed approach segment that is greater than 500 feet above the touchdown zone elevation (TDZE). Since the existing Runway 16R-34L procedures have published climb-to-altitude and turn missed approach segments that are 777’ and 774’ above their TDZEs, respectively, any climb-to-altitude and turn missed approach procedure developed for ultimate Runway 16L-34R will have to start lower than may otherwise be possible. RNAV turning missed approaches were not evaluated.

SUMMARY

In conclusion, due to terrain limitations, the possible future operating scenarios are as follows:

1,200’ separation
According to ATC rules in the departures-only mode, this alternative allows for simultaneous independent departures from the two existing runways, and simultaneous successive departures from the realigned runway. No scenarios are proposed for a mix of arrivals and departures that utilize the newly aligned runway, and such a mix would not be consistent with standards for 1,200' separation.

3,200’ separation
According to ATC rules, in the departures-only mode, this alternative allows for simultaneous independent departures from all three runways. The operations scenario for a proposed mix of dual independent arrivals and triple independent departures appears feasible for north flow operations only. For dual independent arrivals and triple departures in south flow, departures from all three runways can operate simultaneously and independently from one another, but departures from ultimate Runway 16L are dependent on arrivals to the adjacent runway.

5,000’ separation
According to ATC rules in the departures-only mode, this alternative allows for simultaneous independent departures from all three runways.

For the proposed mix of triple arrivals and triple departures in north flow, dual arrivals to the existing two runways can operate simultaneously and independently, arrivals to the newly aligned runway will be dependent, and triple departures from all three runways can operate simultaneously and independently from one another, or from arrivals to each adjacent runway, respectively.

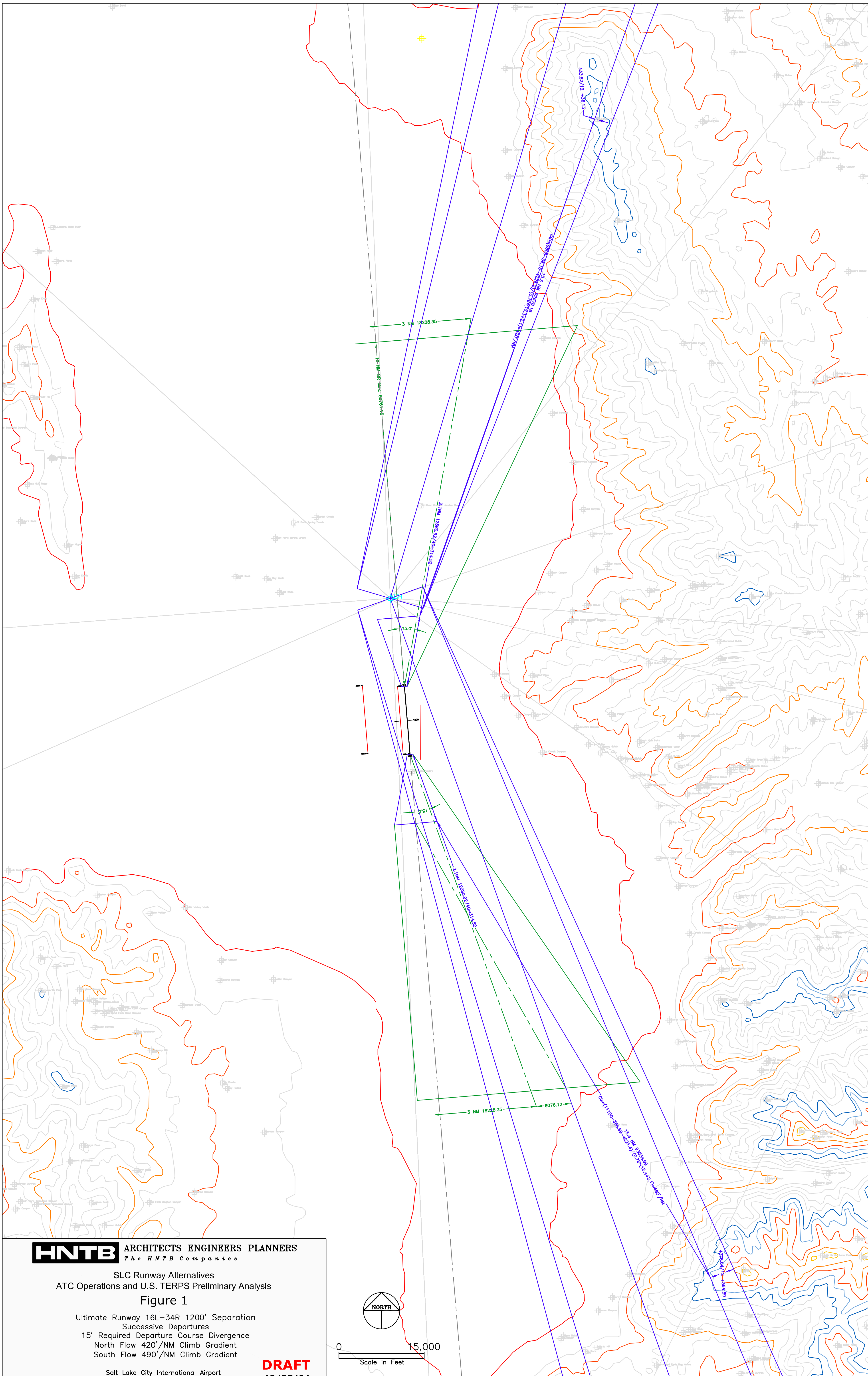
For the proposed mix of triple arrivals and triple departures in south flow, dual arrivals to the existing two runways can operate simultaneously and independently, arrivals to the newly aligned runway will be dependent, and departures from all three runways can operate simultaneously and independently from one another, but only the existing two runways can operate departures simultaneously and independently from arrivals to each adjacent runway, respectively. Independent departures from the newly aligned runway in south flow do not appear feasible at this time because of resultant unacceptable climb gradients.

In terms of triple arrivals in either direction, these also do not appear feasible at this time because of resultant unacceptable ILS missed approach climb gradients.

Finally, as already briefly touched upon, it may be that the FAA will develop new ATC separation rules for RNP flight procedures, which will make the 5,000’ alternative more useable.

M:\docs\38742 Salt Lake City Airspace\Memos\Memo_SLC Runway Realignment TERPS.doc

Cc: Greg Albjerg



HNTB ARCHITECTS ENGINEERS PLANNERS
The HNTB Companies

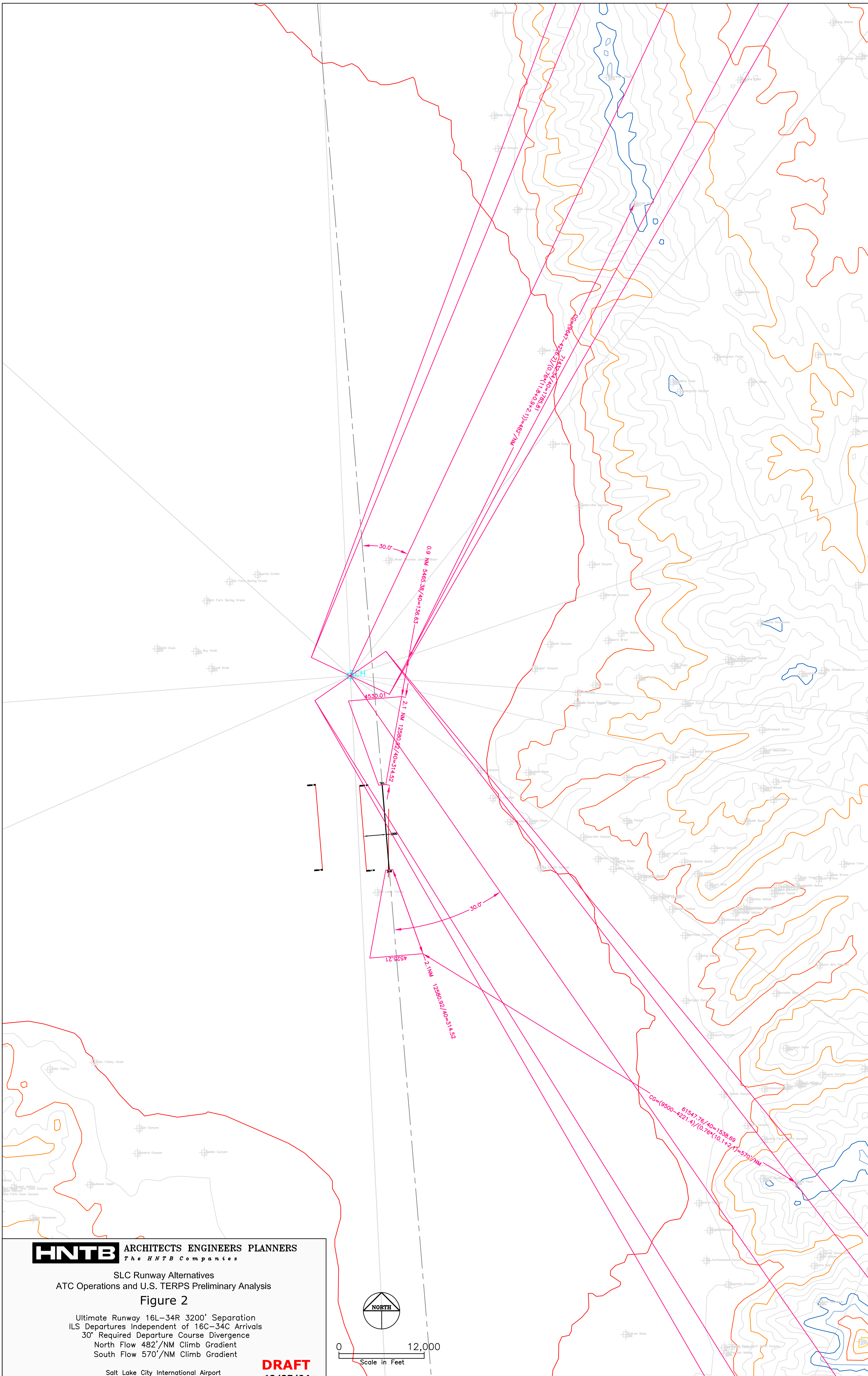
SLC Runway Alternatives
ATC Operations and U.S. TERPS Preliminary Analysis

Figure 1

Ultimate Runway 16L–34R 1200' Separation
Successive Departures
15° Required Departure Course Divergence
North Flow 420'/NM Climb Gradient
South Flow 490'/NM Climb Gradient

Salt Lake City International Airport
Salt Lake City, Utah

DRAFT
12/27/04



HNTB ARCHITECTS ENGINEERS PLANNERS
The HNTB Companies

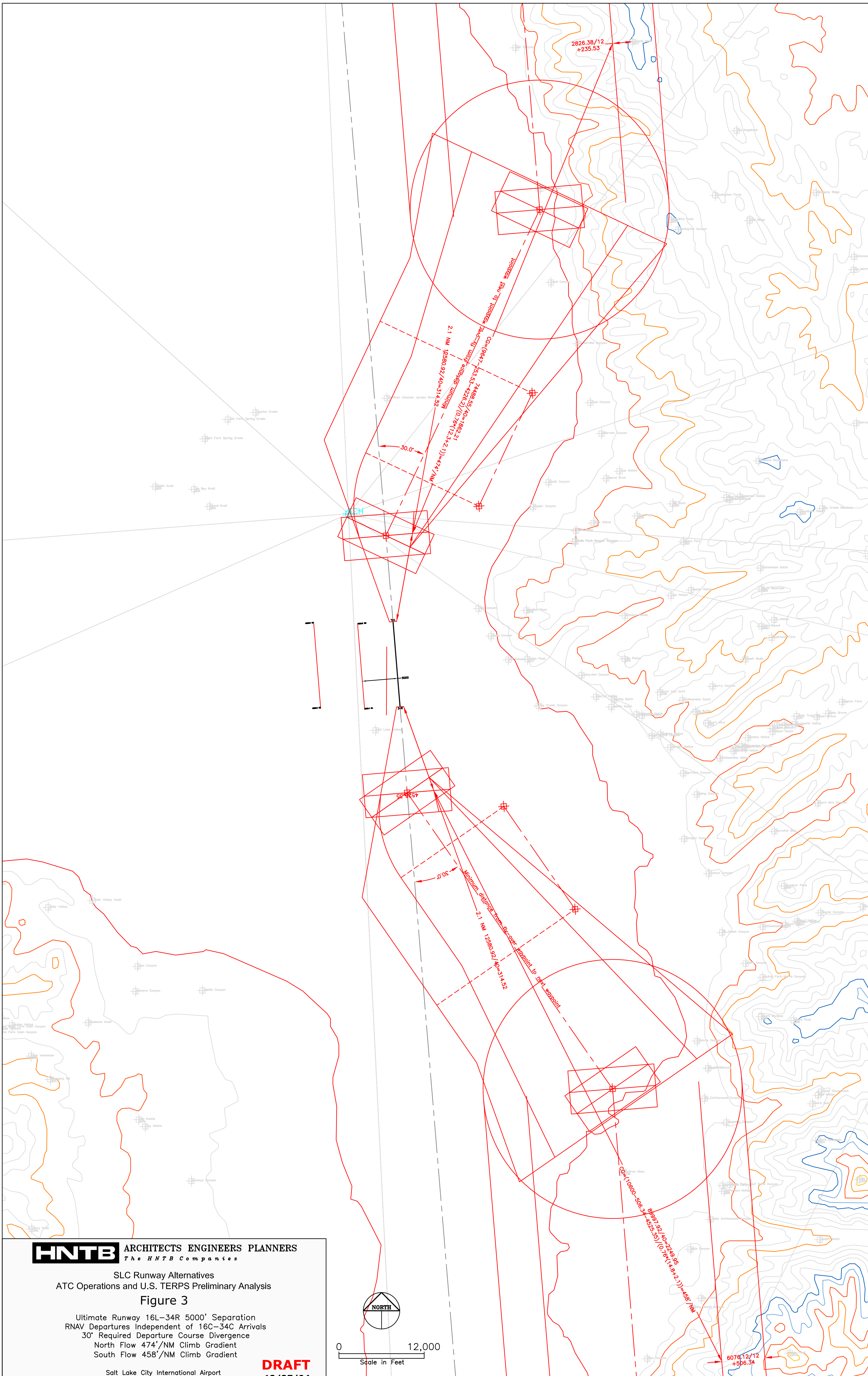
SLC Runway Alternatives
ATC Operations and U.S. TERPS Preliminary Analysis

Figure 2

Ultimate Runway 16L–34R 3200' Separation
ILS Departures Independent of 16C–34C Arrivals
30° Required Departure Course Divergence
North Flow 482'/NM Climb Gradient
South Flow 570'/NM Climb Gradient

Salt Lake City International Airport
Salt Lake City, Utah

DRAFT
12/27/04



HNTB ARCHITECTS ENGINEERS PLANNERS
The HNTB Companies

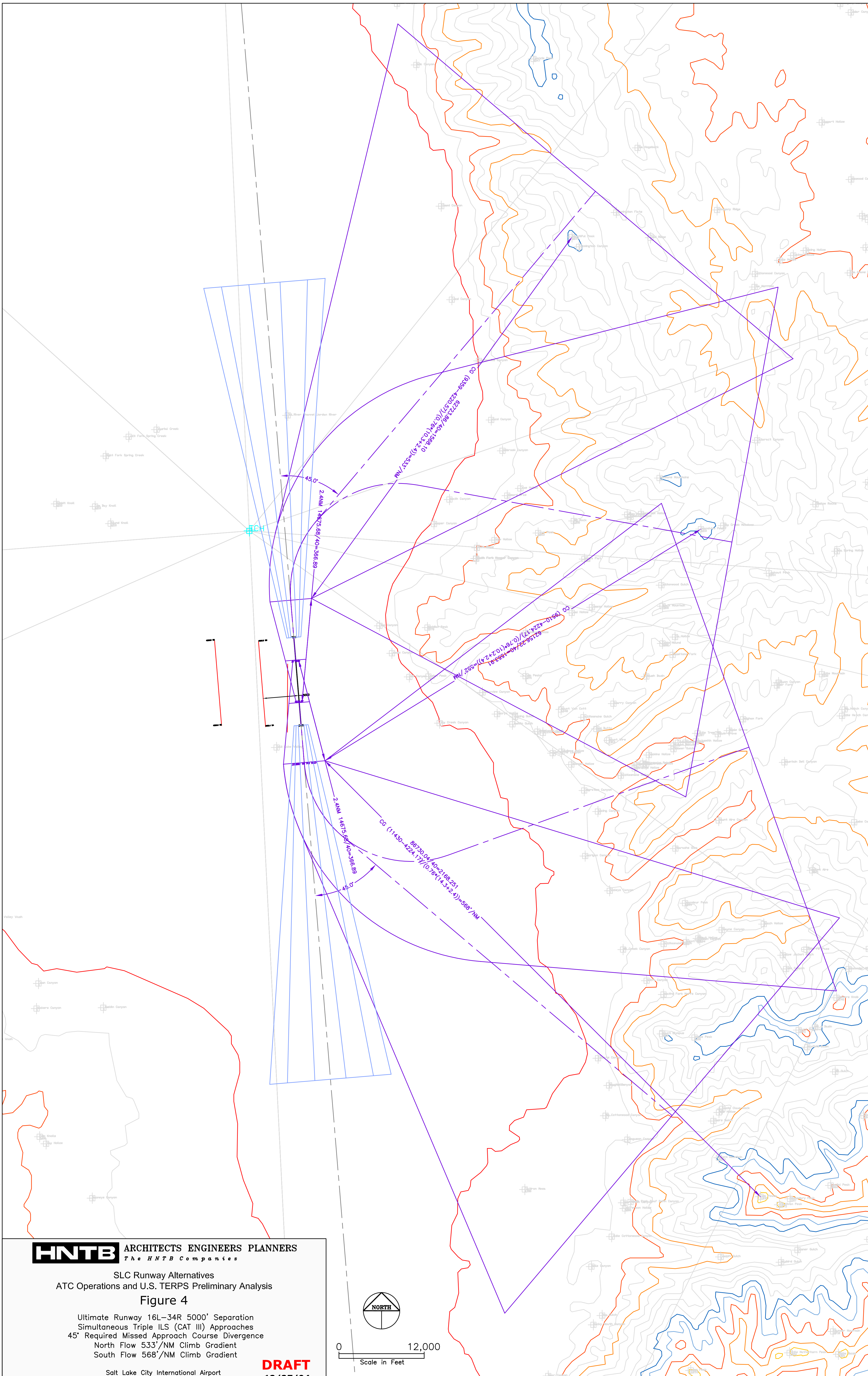
SLC Runway Alternatives
ATC Operations and U.S. TERPS Preliminary Analysis

Figure 3

Ultimate Runway 16L–34R 5000' Separation
RNAV Departures Independent of 16C–34C Arrivals
30° Required Departure Course Divergence
North Flow 474'/NM Climb Gradient
South Flow 458'/NM Climb Gradient

Salt Lake City International Airport
Salt Lake City, Utah

DRAFT
12/27/04



HNTB ARCHITECTS ENGINEERS PLANNERS
The HNTB Companies

SLC Runway Alternatives
ATC Operations and U.S. TERPS Preliminary Analysis

Figure 4

Ultimate Runway 16L–34R 5000' Separation
Simultaneous Triple ILS (CAT III) Approaches
45° Required Missed Approach Course Divergence
North Flow 533'/NM Climb Gradient
South Flow 568'/NM Climb Gradient

Salt Lake City International Airport
Salt Lake City, Utah

DRAFT
12/27/04

Appendix B
Updated CIP

Salt Lake City Department of Airports
CAPITAL IMPROVEMENT PROGRAM (CIP) FY2006-2016

Project Name	Total Proj.Budget	Construct. Cost	Fed. FY	Source	Grant Total	ENTITLE	DISC/State	PFC	PFC #	LOCAL	Start
CITY FY 2006											
SLCIA											
Taxiway H Reconstruction-H2-H4	$10,900,000	$10,000,000	FY2006	Fed, local	$8,000,000	$0	$8,000,000	$2,900,000	6	$0	May-06
Taxiway K Resurface	$4,299,000	$3,849,000	FY2006	Fed, local	$3,020,171	$3,020,171	$0	$1,278,829	10	$0	Apr-06
Taxiway Centerline Light Trench Pavement Reconstruction	$2,081,000	$1,869,000	FY2006	Fed, local	$906,300	$906,300	$0	$1,174,700	10	$0	Apr-06
Concourse Apron Rehabilitation* (2 year project)	$9,535,000	$8,789,000	FY06, 07	Fed, local	$5,396,449	$796,449	$4,600,000	$4,138,551	10	$0	Apr-06
Land Acquisition (general)	$518,000	$518,000			$0	$0	$0	$0		$518,000	on-going
SLCIA - Subtotal FY 06	**$27,333,000**	**$25,025,000**			**$17,322,920**	**$4,722,920**	**$12,600,000**	**$9,492,080**		**$518,000**	
GENERAL AVIATION											
Airport II Apron Rehabilitation (multi year funding program)*	$2,512,200	$2,310,200	FY05-07	Fed, local	$1,800,000	$1,000,000	$800,000	$712,200	10	$0	May-06
Airport II Hangar Development*	$1,420,000	$1,264,000			$0	$0	$0	$0		$1,420,000	Jun-06
TVA - Access Gate Modifications	$33,300	$27,000		State-local	$24,250	$0	$24,250	$0		$9,050	May-06
General Aviation - Subtotal FY 06	**$3,965,500**	**$3,601,200**			**$1,824,250**	**$1,000,000**	**$824,250**	**$712,200**		**$1,429,050**	
AIRPORT CIP - SUBTOTAL FY06	**$31,298,500**	**$28,626,200**			**$19,147,170**	**$5,722,920**	**$13,424,250**	**$10,204,280**		**$1,947,050**	

Dependent on disc. funding**
Pre-scoping estimate*

Salt Lake City Department of Airports
CAPITAL IMPROVEMENT PROGRAM (CIP) FY2006-2016

Project Name	Total Proj.Budget	Construct. Cost	Fed. FY	Source	Grant Total	ENTITLE	DISC/State	PFC	PFC #	LOCAL	Start
CITY FY 2007											
SLCIA											
Runway 17/35 & 14/32 & Taxiway R Pavement Resurface*	$11,559,000	$10,527,000	FY2007		$8,672,000	$3,172,000	$5,500,000	$2,887,000	10	$0	Apr-07
Runway 16R/34L Storm Drainage Improvements*	$2,792,000	$2,427,000	FY2007		$2,200,000	$0	$2,200,000	$592,000	TBD	$0	May-07
Concourse E Elevator Replacement	$181,000	$160,000			$0	$0	$0	$181,000	10	$0	Apr-07
Airport Wildlife Mitigation*	$2,000,000	$1,700,000			$0	$0	$0	$2,000,000	TBD	$0	May-07
Wetland Mitigation Site Modifications	$100,000	$80,000			$0	$0	$0	$0		$100,000	Jun-07
Energy Optimization System/Chilled Water Loop	$575,000	$500,000			$0	$0	$0	$0		$575,000	Apr-07
North Cargo Fiber Infrastructure	$1,000,000	$850,000			$0	$0	$0	$0		$1,000,000	May-07
Storm Water System Mod's for DWQ permit*	$2,000,000	$1,700,000			$0	$0	$0	$2,000,000	TBD	$0	Jun-07
Miscellaneous Asphalt Overlay Program - Phase II*	$976,000	$911,000			$0	$0	$0	$0		$976,000	Jul-06
Land Acquisition (general)	$518,000	$518,000			$0	$0	$0	$0		$518,000	on-going
SLCIA - Subtotal FY 07	**$21,701,000**	**$19,373,000**			**$10,872,000**	**$3,172,000**	**$7,700,000**	**$7,660,000**		**$3,169,000**	
DEVELOPMENT PROGRAM											
Parking Garage Schematic Design*	$2,000,000	$0			$0	$0	$0	$0		$2,000,000	Jul-06
Development Program - Subtotal FY07	**$19,500,000**	**$0**			**$0**	**$0**	**$0**	**$17,500,000**		**$2,000,000**	
GENERAL AVIATION											
General Aviation - Subtotal FY 07	**$0**	**$0**			**$0**	**$0**	**$0**	**$0**		**$0**	
AIRPORT CIP - SUBTOTAL FY 07	**$41,201,000**	**$19,373,000**			**$10,872,000**	**$3,172,000**	**$7,700,000**	**$25,160,000**		**$5,169,000**	

Dependent on disc. funding**
Pre-scoping estimate*

Salt Lake City Department of Airports
CAPITAL IMPROVEMENT PROGRAM (CIP) FY2006-2016

Project Name	Total Proj.Budget	Construct. Cost	Fed. FY	Source	Grant Total	ENTITLE	DISC/State	PFC	PFC #	LOCAL	Start
CITY FY 2008											
Concourse B Apron Reconstruction (Multi-year project)*	$11,000,000	$10,000,000	FY08/09		$7,936,898	$7,936,898	$0	$3,063,102	TBD	$0	Jun-08
T/W S & R/W 14/32 Midfield Drainage Improvements*	$4,850,000	$4,150,000			$3,761,025	$0	$3,761,025	$0		$1,088,975	Jun-08
SLC GA Taxiway Extension*	$1,432,000	$1,276,000			$1,156,430	$0	$1,156,430	$275,570	TBD	$0	Jun-08
Vertical Circulation - Airside	$700,000										
Runway 16R/34L Pavement Surface Grooving*	$2,300,000	$2,000,000			$0	$0	$0	$2,300,000	TBD	$0	May-08
Terminal 2/IT Security Screening Expansion - Phase II	$400,000	$350,000			$0	$0	$0	$400,000	TBD	$0	Apr-08
Parking Structure Roof Replacement	$1,378,000	$1,300,000			$0	$0	$0	$0		$1,378,000	May-08
Asphalt Overlay Program - Phase III*	$255,000	$236,000			$0	$0	$0	$0		$255,000	Jul-07
Land Acquisition (general)	$518,000	$518,000			$0	$0	$0	$0		$518,000	on-going
SLCIA - Subtotal FY08	**$22,833,000**	**$19,830,000**			**$12,854,353**	**$7,936,898**	**$4,917,455**	**$6,038,672**		**$3,239,975**	
DEVELOPMENT PROGRAM											
Program Documentation (Update Schematic Design)*	$17,500,000	$0			$0	$0	$0	$17,500,000	TBD	$0	Apr-08
Development Cost Estimate Update -included w/design cost		$0			$0	$0	$0	$0		$0	
Development Program - Subtotal FY08	**$17,500,000**	**$0**			**$0**	**$0**	**$0**	**$17,500,000**		**$0**	
GENERAL AVIATION											
Airport II Taxiway A Resurface (UDOT Funding FY07-08)	$356,816	$300,000	FY2007	State	$200,000	$0	$200,000	$0		$156,816	May-08
Tooele Fire Suppression System*	$700,000	$600,000			$570,000	$0	$570,000	$130,000	TBD	$0	May-08
Airport II Utility Infrastructure Extension*	$500,000	$435,000		Local	$0	$0	$0	$0		$500,000	Jun-08
General Aviation - Subtotal FY08	**$1,556,816**	**$1,335,000**			**$770,000**	**$0**	**$770,000**	**$130,000**		**$656,816**	
AIRPORT CIP - SUBTOTAL FY 08	**$41,889,816**	**$21,165,000**			**$13,624,353**	**$7,936,898**	**$5,687,455**	**$23,668,672**		**$3,896,791**	

Dependent on disc. funding**
Pre-scoping estimate*

1/8/2007

Salt Lake City Department of Airports
CAPITAL IMPROVEMENT PROGRAM (CIP) FY2006-2016

Project Name	Total Proj.Budget	Construct. Cost	Fed. FY	Source	Grant Total	ENTITLE	DISC/State	PFC	PFC #	LOCAL	Start
FY 2009											
Runway 16L/34R Extension Enviro. / Planning Analysis	$1,600,000	$1,600,000	FY2009	Fed, local	$1,500,000	$0	$1,500,000	$100,000	TBD	$0	Apr-09
Cargo Apron Expansion*	$6,344,550	$5,517,000			$5,000,000		$5,000,000	$1,344,550	TBD	$0	May-09
Relocated Rental Car Service Facilities*	$22,000,000	$19,000,000			$0	$0	$0	$0	CFC	$22,000,000	Mar-09
Land Acquisition (general)	$518,000	$518,000			$0	$0	$0	$0		$518,000	on-going
SLCIA - Subtotal FY09	**$30,462,550**	**$26,635,000**			**$6,500,000**	**$0**	**$6,500,000**	**$1,444,550**		**$22,518,000**	
DEVELOPMENT PROGRAM											
Mid-Concourse Tunnel (North 450')	$8,596,800	$7,164,000			$0	$0	$0	$8,596,800	TBD	$0	Jul-08
Mechanical Plant - Phase 1	$23,896,200	$19,913,500			$0	$0	$0	$23,896,200	TBD	$0	Jul-08
South Concourse (West) - West Half	$98,152,800	$81,794,000			$0	$0	$0	$98,152,800	TBD	$0	Aug-08
RAC Service Facilities	$31,992,000	$26,660,000			$0	$0	$0	$31,992,000	TBD	$0	Jan-09
Fuel System (West Half)	$12,160,800	$10,134,000			$0	$0	$0	$12,160,800	TBD	$0	Mar-09
Apron (West Half)	$59,284,800	$49,404,000			$0	$0	$0	$59,284,800	TBD	$0	Mar-09
Development Program - Subtotal FY09	**$234,083,400**	**$195,069,500**			**$0**	**$0**	**$0**	**$234,083,400**		**$0**	
GENERAL AVIATION											
TVA - Sewer Infrastructure & Culinary Water System	$650,000	$600,000			$200,000	$0	$200,000	$0		$450,000	May-09
General Aviation - Subtotal FY09	**$650,000**	**$600,000**			**$200,000**	**$0**	**$200,000**	**$0**		**$450,000**	
AIRPORT CIP - SUBTOTAL FY 09	**$265,195,950**	**$222,304,500**			**$6,700,000**	**$0**	**$6,700,000**	**$235,527,950**		**$22,968,000**	

Dependent on disc. funding**
Pre-scoping estimate*

Salt Lake City Department of Airports
CAPITAL IMPROVEMENT PROGRAM (CIP) FY2006-2016

Project Name	Total Proj.Budget	Construct. Cost	Fed. FY	Source	Grant Total	ENTITLE	DISC/State	PFC	PFC #	LOCAL	Start
FY 2010											
Taxiway S Reconstruction - East & West sections (PCI=48)	$911,000	$790,000			$716,000	$716,000	$0	$0		$195,000	Jun-10
Taxiway Q Centerline Lighting & Overlay*	$2,500,000	$1,800,000			$1,631,000	$1,631,000	$0	$0		$869,000	May-10
Concourse B Apron Reconstruction - Phase II*	$6,000,000	$5,000,000			$4,531,500	$0	$4,531,500	$0		$1,468,500	May-10
Demolish Vacated Cargo Facilities*	$1,000,000	$900,000			$0	$0	$0	$0		$1,000,000	Jun-10
Land Acquisition (general)	$518,000	$518,000			$0	$0	$0	$0		$518,000	on-going
SLCIA - Subtotal FY10	**$10,929,000**	**$9,008,000**			**$6,878,500**	**$2,347,000**	**$4,531,500**	**$0**		**$4,050,500**	
DEVELOPMENT PROGRAM											
Mechanical Plant - Phase 2	$23,896,200	$19,913,000			$0	$0	$0	$23,896,200	TBD	$0	Oct-09
South Concourse (West) - East half	$98,152,800	$81,794,000			$0	$0	$0	$98,152,800	TBD	$0	Jan-10
Terminal	$511,981,200	$426,651,000			$0	$0	$0	$511,981,200	TBD	$0	Jan-10
Parking Garage	$218,020,800	$181,684,000			$0	$0	$0	$218,020,800	TBD	$0	Jan-10
Elevated Roadway	$71,469,600	$59,558,000			$0	$0	$0	$71,469,600	TBD	$0	Mar-10
Development Program - Subtotal FY10	**$923,520,600**	**$769,600,000**			**$0**	**$0**	**$0**	**$852,051,000**		**$0**	
GENERAL AVIATION											
Airport II Runway/Taxiway Extension	$900,000	$750,000			$712,500	$0	$712,500	$0		$187,500	Jun-10
General Aviation - Subtotal FY10	**$900,000**	**$750,000**			**$712,500**	**$0**	**$712,500**	**$0**		**$187,500**	
AIRPORT CIP - SUBTOTAL FY10	**$935,349,600**	**$779,358,000**			**$7,591,000**	**$2,347,000**	**$5,244,000**	**$852,051,000**		**$4,238,000**	

Dependent on disc. funding**
Pre-scoping estimate*

Salt Lake City Department of Airports
CAPITAL IMPROVEMENT PROGRAM (CIP) FY2006-2016

Project Name	Total Proj.Budget	Construct. Cost	Fed. FY	Source	Grant Total	ENTITLE	DISC/State	PFC	PFC #	LOCAL	Start
FY 2011											
Extend Taxiway G (South)*	$4,700,000	$4,300,000			$3,900,000	$3,900,000	$0	$0		$800,000	May-11
Environ. & Wetland Mitigation (for Runway 16L Extension)	$2,260,000	$2,260,000			$2,048,238	$0	$2,048,238	$0		$211,762	Apr-11
Modify 2200 North Street (for Runway 16L Extension)	$4,145,000	$3,272,500			$2,965,866	$0	$2,965,866	$0		$1,179,134	Apr-11
Relocate North Point Canal (for Runway 16L Extension)	$2,000,000	$1,663,800			$1,507,902	$0	$1,507,902	$0		$492,098	Apr-11
Relocate Power Transmission Lines (for R/W16L Ext.)	$5,682,000	$4,941,000			$4,478,000	$0	$4,478,000	$0		$1,204,000	Apr-11
Concourse C Apron Reconstruction - Phase I*	$7,000,000	$6,000,000			$5,437,800	$0	$5,437,800	$0		$1,562,200	Jun-11
48" Storm Drain Relocation											May-11
SLCIA - Subtotal FY11	**$25,787,000**	**$22,437,300**			**$20,337,806**	**$3,900,000**	**$16,437,806**	**$0**		**$5,449,194**	
DEVELOPMENT PROGRAM											
Apron (East)	$119,832,000	$99,860,000			$0	$0	$0	$119,832,000	TBD	$0	Jul-10
Fuel System (East)	$6,843,600	$5,703,000			$0	$0	$0	$6,843,600	TBD	$0	Jul-10
Development Program - Subtotal FY11	**$126,675,600**	**$105,563,000**			**$0**	**$0**	**$0**	**$126,675,600**		**$0**	
GENERAL AVIATION											
TVA - Apron/Taxilane Development (2 year funding)	$727,000	$632,000	FY11-12		$600,000	$600,000	$0	$0		$127,000	Jul-10
General Aviation - Subtotal FY11	**$727,000**	**$632,000**			**$600,000**	**$600,000**	**$0**	**$0**		**$127,000**	
AIRPORT CIP - SUBTOTAL FY11	**$153,189,600**	**$128,632,300**			**$20,937,806**	**$4,500,000**	**$16,437,806**	**$126,675,600**		**$5,576,194**	
FY 2012-2016											
Runway 16L/34R & Associated Taxiway Extension	$27,390,000	$25,000,000			$22,000,000	$0	$22,000,000	$0		$5,390,000	2012
Taxiway U Extension* (to 40th West)	$2,438,800	$2,131,300			$1,931,597	$0	$1,931,597	$0		$507,203	2012
East Airfield Tunnel	$17,600,000	$15,275,000			$0	$0	$0	$17,600,000	TBD	$0	2012
T/W E and F Reconstruction (T/W H - F1)*	$11,681,000	$10,766,000			$9,757,225	$3,900,000	$5,857,225	$0		$1,923,775	2012
Concourse C Apron Reconstruction - Phase II*	$7,000,000	$6,000,000			$5,437,800	$0	$5,437,800	$0		$1,562,200	2012
T/W E and F Reconstruction (T/W F1- F2)*	$8,800,000	$8,110,000			$7,350,093	$3,900,000	$3,450,093	$0		$1,449,907	2013
Light Rail to Airport (3 year program)*	$40,000,000	$35,000,000			$0	$0	$0	$40,000,000	TBD	$0	2013
East Apron Pavement Rehabilitation	$4,000,000	$3,000,000			$2,718,900	$0	$2,718,900	$0		$1,281,100	2014
Taxiways A and B Joint, Surface, and Repair Work*	$1,500,000	$1,000,000			$0	$0	$0	$0		$1,500,000	2014
Runway 16L/34R Pavement Rehabilitation*	$9,000,000	$8,000,000			$7,250,400	$3,900,000	$3,350,400	$0		$1,749,600	2014
Reconstruct R/W 16L/34R Connecting T/W's in Concrete*	$9,000,000	$8,000,000			$7,250,400	$0	$7,250,400	$0		$1,749,600	2014

Dependent on disc. funding**
Pre-scoping estimate*

Salt Lake City Department of Airports
CAPITAL IMPROVEMENT PROGRAM (CIP) FY2006-2016

Project Name	Total Proj.Budget	Construct. Cost	Fed. FY	Source	Grant Total	ENTITLE	DISC/State	PFC	PFC #	LOCAL	Start
Runway 17/35 Realignment & Taxiway Reconstruction	$110,000,000	$100,000,000			$50,000,000	$0	$50,000,000	$0		$60,000,000	2015
South Cargo Apron Reconstruction - North End*	$15,773,000	$14,537,000			$3,600,000	$3,600,000	$0	$0		$12,173,000	2015
Overlay Entrance/Exit Roads (constructed in FY2005)*	$5,750,000	$5,000,000			$0	$0	$0	$0		$5,750,000	2015
Corporate Hangar Site Preparation*	$1,150,000	$1,000,000			$0	$0	$0	$0		$1,150,000	2015
South Cargo Apron Reconstruction - South End*	$17,505,000	$16,133,000			$3,600,000	$3,600,000	$0	$0		$13,905,000	2016
Extend Cargo Taxiway V to 40th West*	$4,600,000	$4,414,000			$4,000,000	$0	$4,000,000	$0		$600,000	2016
Taxiway's U & V 4000 West Tunnel for R/W 16R/34L Access*	$18,000,000	$15,000,000			$0	$0	$0	$0		$18,000,000	2016
Runway 16R/34L Joint, Surface, and Repair Work	$3,200,000	$2,500,000			$0	$0	$0	$0		$3,200,000	2016
DEVELOPMENT PROGRAM											
APM Tunnel (South Half)	$20,505,600	$17,088,000			$0	$0	$0	$20,505,600	TBD	$0	2012
North Concourse	$70,287,600	$58,573,000			$0	$0	$0	$70,287,600	TBD	$0	2012
Demolish Existing Buildings	$11,456,400	$9,547,000			$0	$0	$0	$11,456,400	TBD	$0	2013
Demolish Parking Garage	$9,820,800	$8,184,000			$0	$0	$0	$9,820,800	TBD	$0	2013
South Concourse (East)	$165,465,600	$137,888,000			$0	$0	$0	$165,465,600	TBD	$0	2014
Demolish Concourses C and D	$3,577,200	$2,981,000			$0	$0	$0	$3,577,200	TBD	$0	2016
GENERAL AVIATION											
TVA - Land Acquisition Reimbursement (SLC 06 budget)	$1,956,000	$1,956,000			$1,858,194	$0	$1,858,194	$97,806	TBD	$0	acquired
TVA - Property Boundary Fence	$450,000	$316,000			$300,000	$300,000	$0	$0		$150,000	2013
TVA - T-Hangars and Infrastructure*	$1,500,000	$1,425,000			$150,000	$150,000	$0	$0		$1,350,000	2014
TVA-Entrance Road Improvements & SR 138 Connection*											2015
TVA Runway & Taxiway Resurface*	$1,200,000	$1,000,000			$950,000	$150,000	$800,000	$250,000	TBD	$0	2015
Airport #2 Runway Resurface*	$1,200,000	$1,000,000			$950,000	$150,000	$800,000	$250,000	TBD	$0	2015
TOTAL FY 2012-2016	**$574,417,000**	**$495,824,300**			**$107,104,609**	**$19,650,000**	**$87,454,609**	**$339,311,006**		**$128,001,385**	

Dependent on disc. funding**
Pre-scoping estimate*

Appendix C
Reduced-Size ALP Set
(to be provided)