Grand Canyon

★ NATIONAL PARK AIRPORT ★

TERMINAL AREA PLAN

TERMINAL AREA PLAN

for

GRAND CANYON NATIONAL PARK AIRPORT

Prepared for the

ARIZONA DEPARTMENT OF TRANSPORTATION

by
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in association with
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December 2009

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Chapter One

INVENTORY

Grand Canyon
NATIONAL PARK AIRPORT
TERMINAL AREA PLAN

CHAPTER ONE

INVENTORY

The Terminal Area Plan for Grand Canyon National Park Airport (GCN) was undertaken by the Arizona Department of Transportation Multimodal Planning Division (ADOT/MPD) Aeronautics Group to evaluate and recommend a terminal area layout to meet anticipated terminal area demands. This plan is intended to include, but not be limited to:

- Recommendations for the location of the terminal building and a general terminal building layout.
- A motor vehicle circulation plan that shows: 1) access to any new structures in the southern portion of the terminal area; 2) motor vehicle parking for buses and shuttles to the Grand Canyon National Park; and 3) general aviation fixed base operator traffic flow.
- Motor vehicle parking for the terminal area and terminal building, and pedestrian access to the terminal building that minimizes walking distance.
- A development plan that supports the airport's goal of maximizing revenue and maintaining the airport on a self-sustaining basis.
- Recommendations for future uses and modifications, if needed, of the existing terminal building.
- Identification of potential problems in the development of the terminal area.

The inventory of existing conditions and facilities is the first step in any facility planning process. This infor-

mation was collected through on-site staff, air traffic control, tenants, and others as well as online and literature searches.

AIRPORT SETTING

Grand Canyon National Park Airport is located immediately south of the unincorporated community of Tusayan in the Kaibab National Forest, and six miles south of the Grand Canyon National Park. The airport is accessible from Arizona Highway 64 which continues northward through Tusayan to the main gate of the park's South Rim. While the park hosts approximately 4.5 million visitors annually, this area of Coconino County is uniquely remote from incorporated cities and population centers. The population of Tusayan is just over 600. The city of Williams is the closest incorporated city at 60 miles to the south, while the county seat of Flagstaff is located 81 miles southeast. **Exhibit 1A** depicts the regional setting for GCN.

GCN is owned by the State of Arizona and operated by ADOT. It is classified in the Federal Aviation Administration's (FAA's) National Plan of Integrated Airport Systems (NPIAS) as a small hub commercial service airport. Small hub airports are defined as those commercial service airports enplaning between 0.05% and 0.25% of the total U.S. enplanements. In 2008, the airport's enplanement (commercial service boardings) totaled 366,890. Pulliam Airport in Flagstaff is the next closest commercial service airport. The next closest general aviation airport is Valle Airport located 18 miles to the south.

investigations, interviews with ADOT The airport's commercial activity is currently dominated by commercial tour operations. In fact, these air taxi operators comprised 95 percent of the airport's operations (takeoffs and landings) in 2008. Some air tours originate at GCN while others come to the airport from locations such as Las Vegas and Phoenix. Some deplane and board buses and other vehicles for land tours of the park as well. **Exhibit 1B** depicts the area airspace and other area airports.

AIRFIELD FACILITIES

Exhibit 1C and **Table 1A** depict the existing airfield facilities at Grand Canyon National Park Airport. GCN has a single Runway 3-21 that is 8,999 feet long and 150 feet wide. The grooved asphalt runway has a pavement strength rating of 88,000 pounds single wheel gear loading (SWL), 108,000 pounds dual wheel gear loading (DWL), and 160,000 pounds dual tandem gear loading (DTL).

The runway has medium intensity runway edge lighting (MIRL). Runway 3 is equipped with an instrument landing system (ILS) with minimums down to ¾-mile. Runway 3 also has several nonprecision approach procedures available that are identified in **Table 1A**. Runway 3 is equipped with a 1,400-foot medium intensity approach light system (MALS). Runway 21 does not have any straight-in instrument approach procedures. Runway 21 is equipped with runway end identifier lights (REILs) as well as a four-box visual approach slope indicator (VASI-4).

Exhibit 1A
VICINITY MAP

08MP08-1B-5/15/09

LEGEND

- Other than hard surfaced runway
- Airport with hard-surfaced runways 1,500' to 8,069' in length
- Airports with hard-surfaced runways greater than 8,069' or some multiple runways less than 8,069'
- VOR-DME
- VORTAC
- Compass Rose
- Class D Airspace
- Class E Airspace
- Class E Airspace with floor 700 ft. above surface
- Victor Airways
- Military Training Route
- Military Operations Area
- Wilderness Area

NORTH

NOT TO SCALE

Source: Las Vegas South and Phoenix North Sectional Charts, Federal Aviation Administration, National Charting Office 7/3/08

Exhibit 1B
VICINITY AIRSPACE
AND AIRPORTS

08MP08-1C-5/15/09

Exhibit 1C
AIRFIELD FACILITIES

TABLE 1A
Airfield Facilities
Grand Canyon National Park Airport

	Runway 3-21	
Length (feet)	8,999	
Width (feet)	150	
Surface Material	Asphalt/Grooved	
Load Bearing Strength		
Single Wheel Loading (SWL)	88,000 lbs.	
Dual Wheel Loading (DWL)	108,000 lbs.	
Dual Tandem Loading (DTL)	160,000 lbs.	
Instrument Approach Procedures	ILS; LOC/DME; RNAV(GPS); VOR (all Runway 3)	
Approach Aids	**RW 3** MALS	**RW 21** VASI-4L REILS
Pavement Markings	Precision	Non-Precision
Runway Lighting	MIRL	
Weather Reporting	ASOS	
Air Traffic Control Tower	FAA 0600-2000, Oct.-May 0700-1900, Jan. Sep.	

Abbreviations:
ASOS: Automated Surface Observation Station
DME: Distance Measuring Equipment
GPS: Global Positioning System
ILS: Instrument Landing System
LOC: Localizer
MALS: Medium Intensity Approach Lighting System
REILs: Runway End Identifier Lights
RNAV: Area Navigation
VASI-4: Visual Approach Slope Indicators – 4-box
VOR: Very High Frequency Omni-Directional Range

The runway is accessed by a full length parallel taxiway on its east side along with five exit taxiways. A large apron and all terminal area facilities are located along the east side of the northern half of the runway. The following sections discuss the terminal area facilities.

TERMINAL AREA FACILITIES

Exhibit 1D depicts the existing terminal area facilities at Grand Canyon National Park Airport. The large apron noted previously encompasses approximately 65,600 square yards and fronts most of the terminal area. It is essentially subdivided into three areas. The northern 14,600 square yards is utilized for general aviation. The airport's FBO facilities are located in this area along the east side. The next 30,000 square yards to the south are used for commercial service operations associated with the airport terminal building. The southernmost 51,000 square yards is currently designated as transient apron. There are currently no buildings along this section of ramp.

Immediately to the east of the general aviation facilities and the terminal are the terminal access road and an 83,000 square foot vehicle parking lot. There are also three separate helicopter facilities located north and east of the general aviation facilities and the

terminal. Each has its own buildings, apron, vehicle parking, and touchdown and lift-off (TLOF) facilities.

South of the parking lot are the airport administration and maintenance facilities. There is an airport housing area immediately to the east of this area. Further south is the airport traffic control tower (ATCT) as well as the new airport rescue and firefighting (ARFF) building. At the far southern end of the terminal area is a hangar used by the National Park Service. The following subsections discuss each of these areas more specifically.

AIRLINE TERMINAL

Exhibit 1E depicts the general floor plan of the main airline terminal building at Grand Canyon National Park Airport. The building was constructed in 1968 and expanded to its current footprint in 1972. The terminal building encompasses approximately 8,500 square feet. The building is approximately 220 feet long and 38 feet deep. There are five gates distributed along this linear terminal. Gate Two is in the north wing, Gates Three and Four operate out of the central foyer, while Gates Five and Six are in the south wing.

The area included in the terminal square footage does not include the airport's utility building which is attached at the north end and a garage at the south end. The utility building includes the main electrical vault, generator, water treatment, and water pump.

Three tour operators, Vision Airlines, Westwind Air Service, and Grand Canyon Airlines currently operate out of the airline terminal.

Vision Airlines specializes in on-demand charter and tour operations. Through its subsidiary, Vision Holidays, it offers scenic flights from Las Vegas to the Grand Canyon on 30-seat Dornier 328 and 19-seat Dornier 228 turboprop aircraft. Upon landing at GCN, passengers are loaded on Vision Motor Coach tour buses for a ground tour of the south rim.

Westwind Air Service operates a fleet of nine-passenger Cessna Grand Caravans and six-passenger Cessna 207s. Westwind provides air tours from GCN, as well as Grand Canyon tours that begin in Phoenix, Page, or Monument Valley and either stop or terminate at GCN. Some packages provide ground bus tours of the south rim as well.

Grand Canyon Airlines has merged with Scenic Airlines and Air Grand Canyon in the last two years. They primarily operate the 17-passenger Dehavilland Twin Otter "Vistaliners," as well as single engine Cessna 207 and 182 aircraft on their Grand Canyon air tours. Various tour packages are available from the GCN terminal. In addition, flights are available from Las Vegas with stops at GCN. Now under the same ownership, Grand Canyon Airlines/Scenic Airlines and Papillon also provide tour packages that include both fixed wing and helicopter flights.

08MP08-1D-5/15/09

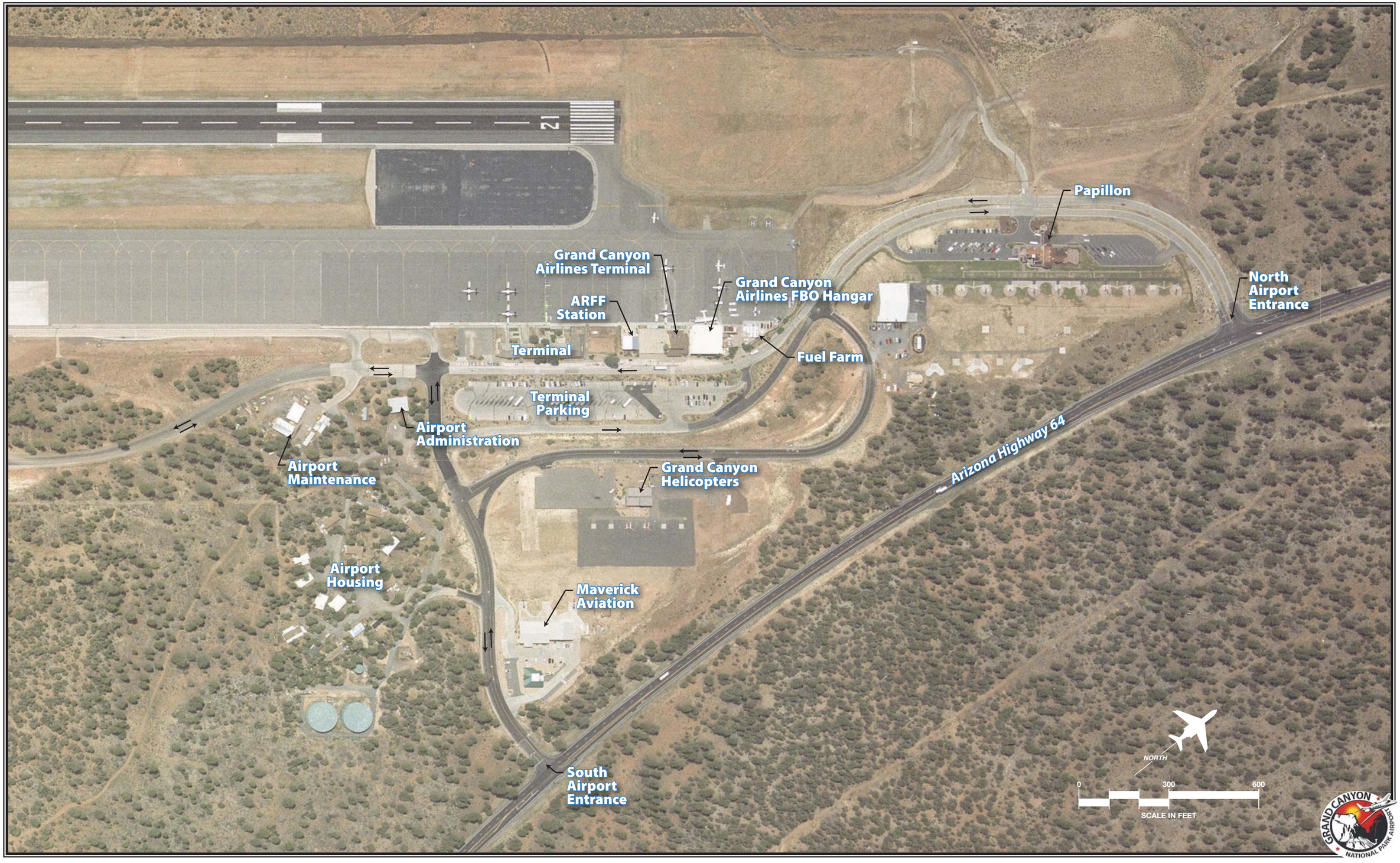

Exhibit 1D
TERMINAL AREA FACILITIES

08MP08-1E-5/15/09

Apron

Gates 5 & 6

Gates 3 & 4

Gate 2

Janitor's Storage

Medic Room

Office

Garage

Women's Restroom

Men's Restroom

Office

Office

Office

Counter

Janitor's Closet

Counter

Fireplace

Lobby

Gift Shop

Office

Closet

Passenger Holding Area

Counter

Office

Counter

Office

Storage Area

Counter

North Entrance Front

Main Electrical Room

Chem. Storage

Generator Room

Water Room Office

Water Treatment Area

Water Pump Room

Hallway

Electrical

Arrival/Departure Curb

LEGEND

Non-Terminal Facilities

0 20

SCALE IN FEET

NORTH

GRAND CANYON NATIONAL PARK AIRPORT

Exhibit 1E
PASSENGER TERMINAL

Vision Airlines and Westwind Air Service are located in the north wing of the building. The area includes ticket counters as well as a waiting area with 49 seats. Space in the north wing next to the central foyer has previously been utilized for concessionaires, but is currently unoccupied.

The central foyer provides a large waiting area with vaulted ceiling and a wood-burning fireplace located in the center. There are 51 seats in the central foyer, as well as vending machines and advertising along the walls.

Grand Canyon Airlines/Scenic Airline's ticket counter is located in the south wing ticket counter space immediately adjacent to the central foyer. There is additional counter space across the hall from the ticket counter that is currently unoccupied. The restrooms are located at the south end of the hall and next to Gates Five and Six. The gate area includes additional ticket counter space that is currently unoccupied as well as seating for 32. **Table 1B** summarizes the current terminal space.

TABLE 1B
Existing Passenger Terminal
Grand Canyon National Park Airport

	Area (s.f.)
Leasable Tenant Areas	2,823
Lobby & Waiting Area	990
Baggage Claim Area	972
Open Corridor Space	2,026
Public Restrooms	668
Management/Admin. Area	594
Mechanical/Equipment Area	413
Total Building Area	8,486

GENERAL AVIATION FACILITIES

There is currently one fixed base operator (FBO) on the airport. Grand Canyon Airlines (GCA) is located at the north end of the ramp on the east side of the general aviation apron area. The services provided include:

- Aerial sightseeing tours
- Aircraft charter flights
- Aircraft tie-downs
- Fueling and line services
- Aircraft service/repair
- Airframe maintenance
- Ground transportation

Their facilities front the general aviation ramp and include the 5,473 square foot GCA terminal building that houses the company's administrative offices, ticket counter, waiting area, and concessions for aerial tour operations.

Immediately to the north of the GCA terminal building is a 10,000 square foot hangar that houses their FBO and maintenance operations. The 14,600 square yard general aviation apron includes 21 marked tie-downs.

Further to the north is the FBO's fuel farm. This includes two 20,000 gallon tanks, one each for Avgas and Jet A, plus a 6,000 gallon tank for diesel fuel and a 2,000 gallon tank for unleaded mogas. Fuel is available daily from 7 a.m. to 7 p.m. with on-call service available during off-hours.

HELICOPTER FACILITIES

There are three separate helicopter facilities located on the airport. They are all located east of the terminal and airport access road, and are operated by helicopter tour operators. Each has its own touchdown and lift-off area as well as helicopter parking and private terminal facilities. They are depicted on **Exhibit 1D**.

Papillon Helicopters operates from the northernmost helicopter facility. There are three TLOFs as well as 12 helicopter pads for loading passengers in front of their terminal facility. There are eight additional pads for parking on the east side of the leasehold.

At the terminal building, there is parking for approximately 60 autos and nine tour buses. There is a covered, drive-up entrance to the terminal as well. Besides the terminal facility, Papillon has a large maintenance and storage hangar; a second, smaller hangar; and an above ground fuel tank.

Papillon offers a variety of tour packages as well as helicopter charters from GCN. They also offer flights from Vegas with stops at GCN with transfer to buses for ground tours of the South Rim. Their association with Grand Canyon Airlines also provides options for combined fixed wing and helicopter tour packages. They operate six-to-seven passenger AStar, Eco-Star, and Bell Long Ranger helicopters.

Directly east of the main passenger terminal and parking lot are the helicopter facilities of Grand Canyon Helicopters. This facility includes six helipads on the west edge of a 400-foot by 150-foot ramp that serves as the TLOF. Immediately to the west of the ramp are the private terminal and two vehicle parking lots. An above ground fuel storage tank is located at the north end of the north parking lot.

Grand Canyon Helicopters operates seven passenger Eco-Star helicopters on its tours of the Grand Canyon, and offers several packages from both GCN and Las Vegas.

Maverick Helicopters is located near the south airport entrance. Their leasehold includes three helipads and a private terminal with an adjacent maintenance hangar. An above ground fuel storage tank is located north of the hangar. Auto parking is provided to the east and is shared with a gift shop building that is currently unoccupied.

Maverick Helicopters is a part of the Maverick Aviation Group. Tour packages are available from GCN as well as Las Vegas and Phoenix. Some packages include a flight from Las Vegas to GCN on Maverick Airlines 19-seat Beech 1900B aircraft, then a helicopter tour on Maverick Helicopters seven-seat Eco-Star.

OTHER TERMINAL AREA FACILITIES

Other facilities in the terminal area include the National Park Service

(NPS) hangar, air traffic control tower (ATCT), airport rescue and firefighting (ARFF) facility, the airport administration building, the airport maintenance facilities, and airport housing.

National Park Service Hangar - The NPS maintains a hangar at the south end of the terminal area. The 60-foot by 60-foot hangar has access to the airfield via a loop taxiway. Ground access is currently controlled within the airport security gate.

ATCT - The airfield is served by an ATCT located approximately midfield on a hill on the east side of the airfield. Classified as a Level 5 ATC facility, the tower is owned and operated by the FAA. The tower's hours of operation are 6:00 a.m. to 8:00 p.m. from June 1 through September 30, and 7:00 a.m. to 7:00 p.m. the remainder of the year.

The tower extends 121 feet above ground level (AGL) with a 530 square foot cab at the top. A 5,000 square foot base building houses office, utility, and conference room space. There is parking for 30 vehicles. The ATCT complex has its own gated security.

ARFF Facility - The airport ARFF equipment has been located in a 2,150 square foot building northeast of the airline terminal. The airport is classified as an Index A facility, but has the capability to respond to Index B standards. A new ARFF facility is currently under construction near midfield, just west of the ATCT.

Airport Administration - The airport administration offices are housed in a 3,264 square foot modular facility southeast of the passenger terminal. The building includes offices for management and operations, conference room, restrooms, and the FAA field offices. There is unmarked gravel parking for approximately 30 vehicles.

Airport Maintenance Facilities – The airport maintenance facilities are located immediately south of the administration building. The facility houses snow removal equipment (SRE) as well as maintenance equipment. There are four buildings in the maintenance complex totaling approximately 5,000 square feet.

Airport Housing – To the immediate east of the administration building is the airport employee residential housing area. The airport currently has 14 employees, most of which are housed in this area. The houses are currently being replaced with more modern modular facilities. When the renovation is complete, there will be 20 residential units on the airport.

AIRPORT ACCESS AND PARKING

Besides the airport, Tusayan and the South Rim of Grand Canyon can be accessed by both rail and highway. The Grand Canyon Railways track runs 65 miles from Williams to its station in the Grand Canyon Village near the South Rim. The line passes approximately 1.5 miles west and southwest of the airport. The historic railroad has been in operation since 1901 and runs twice daily between the

Village and its headquarters in Williams.

Exhibit 1A depicts the major roadways serving the airport and the Grand Canyon. Arizona Highway 64 is the main access to the area. The two-lane highway extends from Interstate 40 near Williams to the south gate of Grand Canyon National Park. It provides direct access to the airport as well as the main arterial route through Tusayan. Besides rental cars and private vehicles, tour and shuttle buses provide ground access between the airport, Tusayan, and the Grand Canyon.

As depicted on **Exhibit 1D**, on-airport access is provided via an interior road system. There are two entrances to the airport from Highway 64. The north entrance is a four-lane, divided median roadway. Proceeding south into the airport, it provides access to Papillon Helicopters on the left. Another intersection slightly further south connects with a two-lane access road that proceeds south and east past Grand Canyon Helicopters.

At this point, the north and southbound lanes split to opposite sides of the terminal parking lot. There is parking lot access from the easternmost southbound lane. The roadway then continues south to pass in front of the general aviation area as well as in front of the terminal. A curb lane provides access for passengers to both facilities. Just south of the terminal, the north access road intersects with the south access road at a four-way stop. The road continues as a two-way two-lane road south past the airport administration and maintenance buildings to the security gate at the ATCT complex. A second security gate to the right protects access to the airfield, the new ARFF, and the NPS hangar.

Vehicles wishing to return to the terminal or the south entrance turn left at the four-way stop, then left again onto the two-lane, one-way road on the east side of the terminal parking lot. There are two access points to the parking lot from this roadway as well as a return to the southbound lanes at the north end of the parking lot. The roadway continues north to become the northbound lanes of the divided access road.

The south entrance is a two-lane roadway that provides access to Maverick Helicopters on the right and the airport housing and administration offices on the left. The road then intersects with virtually every other roadway on the airport before terminating at the security fence along the aircraft apron south of the passenger terminal.

Chapter Two

FORECAST UPDATE

Grand Canyon
NATIONAL PARK AIRPORT
TERMINAL AREA PLAN

CHAPTER TWO

FORECAST UPDATE

Terminal planning begins with the definition of demand that currently exists and that may reasonably be expected to occur during the useful life of the facility. In airport planning, this involves projecting potential aviation activity at least over a twenty year period. Forecasts of passengers, operations, and based aircraft serve as a basis for terminal area planning.

The Federal Aviation Administration (FAA) has a responsibility to review aviation forecasts that are submitted to the agency in conjunction with airport planning, including master plans, CFR Part 150 Studies, and environmental studies. The FAA reviews such forecasts with the objective of including them in its *Terminal Area Forecasts* (TAF) and the *National Plan of Integrated Airport Systems* (NPIAS). In addition, aviation activity forecasts are an important input to the benefit-cost analyses associated with airport development, and FAA reviews these analyses when federal funding requests are submitted.

As stated in FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems* (NPIAS), dated December 4, 2004, forecasts should be:

- Realistic
- Based on the latest available data
- Reflect current conditions at the airport
- Supported by information in the study
- Provide adequate justification for the airport planning and development

The forecast process for an airport master plan consists of a series of basic steps that can vary depending upon the issues to be addressed and the level of effort required to develop the forecast. The steps include a review of previous forecasts, determination of data needs, identification of data sources, collection of data, selection of forecast methods, preparation of the forecasts, and evaluation and documentation of the results.

This forecast analysis for Grand Canyon National Park Airport (GCN) was produced following these basic guidelines. The analysis is intended to be an update of the forecasts prepared as part of the airport's Master Plan completed in 2006. Other forecasts prepared since the Master Plan were also examined and compared against current and historic activity.

The historical aviation activity was then examined along with other factors and trends since the Master Plan that could affect demand. The intent was to confirm the master plan forecasts were still valid and update components if necessary. This will ensure a valid set of aviation demand projections for GCN that will permit the Arizona Department of Transportation (ADOT) to make planning adjustments as necessary to maintain a viable, efficient, and cost-effective facility.

NATIONAL AVIATION TRENDS

Each year, the FAA updates and publishes a national aviation forecast. Included in this publication are forecasts for the large air carriers, regional/ commuter air carriers, general aviation, and FAA workload measures. The forecasts are prepared to meet budget and planning needs of the constituent units of the FAA and to provide information that can be used by state and local authorities, the aviation industry, and the general public.

The current edition when this chapter was prepared was *FAA Aerospace Forecasts - Fiscal Years (FY) 2009-2025*, released on March 31, 2009. The forecasts use the economic performance of the United States as an indicator of future aviation industry growth. Similar economic analyses were applied to the outlook for aviation growth in international markets.

The aviation industry in the United States has experienced an event-filled decade. Since the turn of the century, the industry has faced the impacts of the events of September 11, 2001, scares from pandemics such as SARS, the bankruptcy of four network air carriers, all-time high fuel prices, and a serious economic downturn with global ramifications. The Bureau of Economic Research has determined that the current economic recession in the United States began in December 2007. Eight of the world's top 10 economies were in recession by January 2009.

The end of the recession is still to be determined, and many economists are suggesting it could be the deepest recession since World War II. The average length of periodic recessions since that time has been 10 months. This recession does not face the high infla-

tionary environment of the recession in the early 1980s, or the high energy costs of the mid-1970s recession. There was a 3.8 million loss of jobs in the first 14 months of the recession, with unemployment rising to eight percent, which is three percent above the long term norm.

The most recent U.S. Administration forecast used in preparing the FAA Aerospace forecasts anticipated the recession in the U.S. would end by the third quarter of FY 2009 (April-June), with a modest recovery over the next six quarters. Economic growth measured in gross domestic product (GDP) was projected to go from a -4.3 percent in the second quarter of FY 2009 to +3.8 percent in the third quarter of 2010. Between 2010 and 2013, GDP was projected to grow at rates ranging from 2.4 percent in 2010 to 4.5 percent in 2012. Economic growth was projected to slow to an average of 2.6 percent per year beyond 2013. The following subsections examine the FAA's forecasts for commercial air service and for general aviation.

COMMERCIAL AVIATION

After posting a net profit in 2007 for the first time since the events of 9-11, commercial aviation faced some significant challenges in 2008. Fuel prices became highly unpredictable at a time when a downturn in the economy was hitting the industry. U.S. carriers experienced a net loss for the year, with the same expected for foreign carriers. The losses were managed somewhat with moderate fare increases and a decrease in capacity (measured in available seat-miles or ASMs).

The FAA forecast carrier capacity and passenger demand to decline even further in 2009. Overall capacity was forecast to decline 6.7 percent with mainline domestic carriers forecast to decline 9.5 percent and regional airline capacity expected to decline 5.5 percent. Internationally, capacity was forecast to decline approximately 1.0 percent with slow growth in the Atlantic and Latin market, and shrinkage in the Pacific market. Over the long term, system capacity was projected to grow at an average of 3.1 percent annually.

Domestically, revenue passenger miles (RPMs) were forecast to decline by 8.9 percent in 2009. As the economy recovers, domestic RPMs are expected to grow by 2.7 percent in 2010. Continued economic growth and declining real yields are expected to generate an annual average RPM increase of 3.4 percent from 2010 through 2025.

Domestic enplanements were forecast to decline by 7.8 percent in 2009, with volume growing by 2.0 percent as the economy begins to recover. For the long term beyond 2010, domestic enplanements were projected to grow at an average of 2.7 percent per year.

International visitors are a significant portion of the total visitors to the Grand Canyon. Total passenger traffic between the U.S. and the rest of the world actually grew by 2.8 percent in 2008. The worldwide recession, however, was expected reduce international passengers to and from the U.S.

by 0.9 percent in 2009. An economic recovery is expected to bring 4.2 percent growth in 2010. After 2010, international passenger growth is expected to average 4.6 percent per year. **Exhibit 2A** depicts the history and projected growth in U.S. passenger enplanements.

GENERAL AVIATION

Deliveries of general aviation aircraft by U.S. manufacturers were down 3.1 percent in 2008 to 3,079 aircraft. Turbine aircraft deliveries were up, with jets growing 17.2 percent and turboprops 14.8 percent. In contrast, piston deliveries were down 17.6 percent. This was driven by a 18.9 percent decline in single-engine piston aircraft which dominate the market, while multi-engine aircraft deliveries were up 18.2 percent.

While shipments were down, the active general aviation fleet increased by an estimated 1.0 percent. Despite the increased fleet, general aviation activity at FAA towered airports declined 5.6 percent in 2008. Flight hours for general aviation aircraft decreased by 0.02 percent in 2008. The number of student pilots fell by 4.0 percent, the fourth consecutive year that student numbers have declined despite industry-wide programs to attract new pilots.

The FAA projects that the business use of aircraft will continue to grow faster than the personal and sport use. The active general aviation fleet is projected to increase at an annual average rate of 1.0 percent through 2025. Turbine-powered aircraft will continue to lead the way, growing at 3.2 percent per year.

The turbine jet fleet is projected to increase at 4.8 percent annually. In recent years, the very light jets (VLJs) were expected to add as many as 500 jets annually to the fleet. The bankruptcy of Eclipse and the closing of DayJet have reduced the expectations for rapid growth in the VLJ market. VLJ deliveries in 2008 totaled 262. Deliveries are expected to total 200 over the next two years, then increase to 270 to 300 annually after that.

Piston-powered aircraft are expected to decrease through 2013, then slowly increase for the remainder of the planning period for a net increase of just 0.1 percent annually. It is also expected that VLJs and the new light sport category will erode the high and low ends of the piston markets over the forecast period.

Active aircraft in the light sport category are expected to grow by 11.5 percent annually through 2013, then slow to 2.6 percent annual growth through 2025. **Exhibit 2B** depicts the FAA forecast for active general aviation aircraft.

General aviation hours flown is forecast to increase by 1.8 percent annually. As with active aircraft, turbine aircraft are forecast for the highest increases at 3.6 percent per year. Piston-powered aircraft are forecast for a 0.4 percent annual increase. The increasing size of the turbine fleet combined with the expanded fractional ownership fleet combine for the larger growth rate.

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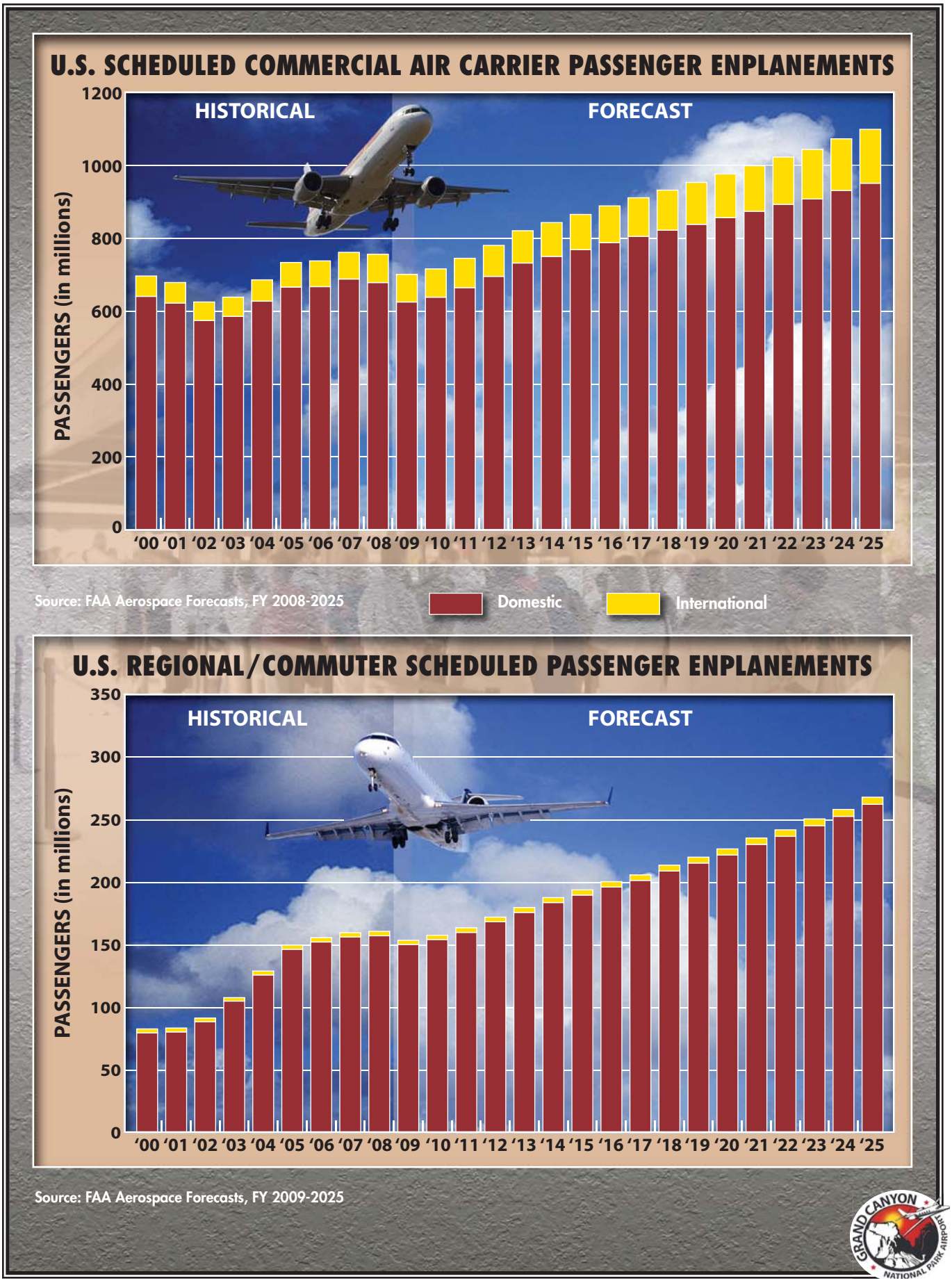
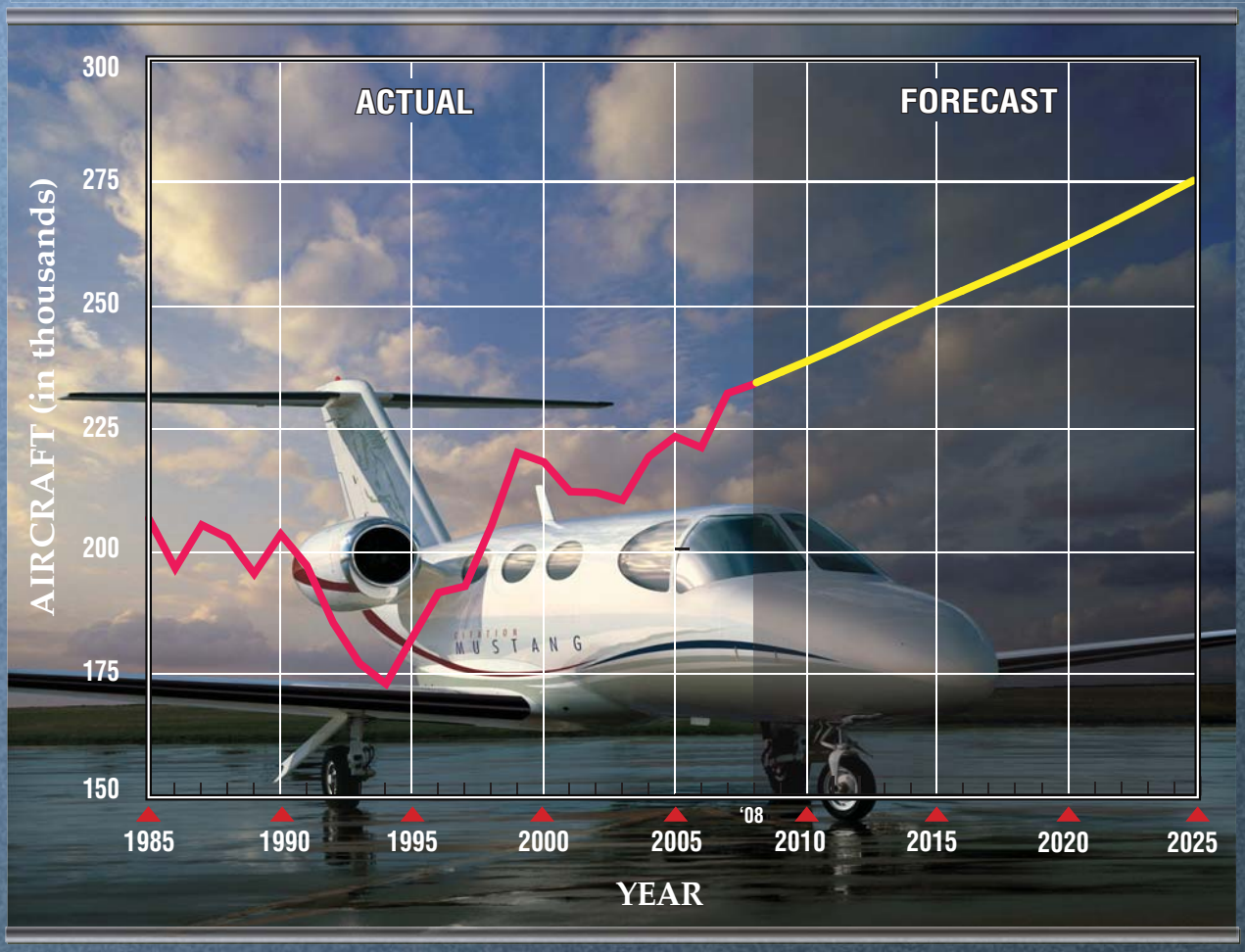


Exhibit 2A
U.S. COMMERCIAL AIR CARRIER AND
REGIONAL/COMMUTER FORECASTS

08MP08-2B-5/6/09

U.S. ACTIVE GENERAL AVIATION AIRCRAFT



U.S. ACTIVE GENERAL AVIATION AIRCRAFT (in thousands)

Year	FIXED WING				ROTORCRAFT		Experimental	Sport Aircraft	Other	Total
	PISTON		TURBINE							
	Single Engine	Multi-Engine	Turboprop	Turbojet	Piston	Turbine				
2008 (Est.)	146.6	19.1	9.6	11.4	3.1	7.1	24.1	7.0	6.0	234.0
2015	143.5	17.9	10.5	17.1	4.6	9.0	29.1	12.7	6.1	250.5
2020	144.9	17.0	11.5	20.9	5.3	9.9	32.0	14.4	6.0	261.8
2025	148.5	16.0	12.2	25.2	5.9	10.9	34.6	15.9	6.0	275.2

Source: FAA Aerospace Forecasts, Fiscal Years 2009-2025.

Notes: An active aircraft is one that has a current registration and was flown at least one hour during the calendar year.

Exhibit 2B
U.S. ACTIVE GENERAL AVIATION
AIRCRAFT FORECASTS

SOCIOECONOMIC TRENDS

Local and regional forecasts developed for key socioeconomic variables provide an indicator of the potential for creating growth in aviation activities at an airport. Typical variables used in evaluating potential for traffic growth include population and employment. This data is readily available on an annual historic basis at the state and county level.

The service area for the Grand Canyon National Park Airport, however, is extremely unique in its remote setting and the limited population and business that is not related to the National Park and its visitors. **Table 2A** presents the population forecasts for the area. The population of Tusayan was 562 in the 2000 census and was estimated at just over 600 in 2006. The Grand Canyon Village, which is an employee housing area in Grand Canyon National Park (GCNP), has a population that is generally around 1,460. The Arizona Department of Security, Research Division projects that Tusayan will grow to 711 residents in 2030, while Grand Canyon Village will remain at 1,460.

TABLE 2A
Population Forecast
Grand Canyon National Park Airport

Year	Tusayan	Grand Canyon Village	Coconino County	State of Arizona
HISTORIC				
2000	562	1,460	116,320	5,130,632
2006	605	1,460	132,826	6,239,482
FORECAST				
2010	627	1,460	141,457	6,999,810
2015	652	1,460	151,150	7,915,629
2020	673	1,460	159,345	8,779,567
2025	693	1,460	166,730	9,588,745
2030	711	1,460	173,829	10,347,543

Source: Arizona Department of Security, Research Division

While the population of Coconino County is projected to grow by over 30 percent by 2030, the majority of that population is located in and around communities such as Flagstaff, Page, and Williams, all at least 65 miles away. As a result, the economy of the community and the activity at GCN are more related to the visitors to the area. The following subsections discuss the park attendance and a recent tourism study related to the park.

PARK ATTENDANCE

Table 2B and **Exhibit 2C** present the annual attendance at Grand Canyon National Park as reported by the National Park Service (NPS). Between 1980 and 1995, attendance grew from 2.62 million visitors to 4.91 million, for an average annual growth rate of 4.3 percent. The GCNP's all-time high attendance was set in 1999 with 4.93 million visitors. Since the events of 9-

11, park attendance has flattened somewhat, fluctuating between 4.34 million and 4.67 million. In 2008, attendance was recorded as 4.49 million.

TABLE 2B
Air Tour Enplanement Forecast
Grand Canyon National Park Airport

	GCN Air Tour Enplanements	Park Attendance	Enpl. % Of Visitors	U.S. Enplanements (millions)	U.S. Market Share %
1980	183,000	2,618,713	7.0%	312.0	0.0587%
1981	157,000	2,674,117	5.9%	295.9	0.0531%
1982	205,000	2,499,799	8.2%	305.8	0.0670%
1983	199,000	2,448,545	8.1%	329.3	0.0604%
1984	186,000	2,360,767	7.9%	357.3	0.0521%
1985	69,000	2,983,436	2.3%	394.7	0.0175%
1986	136,000	3,347,872	4.1%	429.3	0.0317%
1987	450,000	3,513,084	12.8%	470.6	0.0956%
1988	421,800	3,858,708	10.9%	475.5	0.0887%
1989	393,687	3,968,605	9.9%	480.4	0.0819%
1990	207,734	3,752,901	5.5%	497.9	0.0417%
1991	436,049	3,905,989	11.2%	485.1	0.0899%
1992	483,243	4,547,027	10.6%	507.3	0.0953%
1993	533,808	4,928,509	10.8%	515.6	0.1035%
1994	549,113	4,704,070	11.7%	557.6	0.0985%
1995	535,656	4,908,073	10.9%	579.7	0.0924%
1996	642,221	4,730,680	13.6%	608.1	0.1056%
1997	533,867	4,851,932	11.0%	631.4	0.0846%
1998	537,404	4,578,084	11.7%	644.7	0.0834%
1999	599,338	4,930,153	12.2%	665.8	0.0900%
2000	563,574	4,816,560	11.7%	697.6	0.0808%
2001	411,138	4,400,823	9.3%	682.5	0.0602%
2002	330,980	4,339,139	7.6%	626.3	0.0528%
2003	334,985	4,464,813	7.5%	641.2	0.0522%
2004	376,782	4,672,911	8.1%	689.0	0.0547%
2005	406,000	4,426,394	9.2%	737.0	0.0551%
2006	390,420	4,368,810	8.9%	740.0	0.0528%
2007	373,716	4,515,733	8.3%	765.3	0.0488%
2008	368,672	4,491,141	8.2%	757.4	0.0487%
Regression vs. visitors					
2010	457,673	4,500,000	10.2%	716.5	0.0639%
2015	534,200	4,990,000	10.7%	867.3	0.0616%
2020	610,727	5,480,000	11.1%	978.3	0.0624%
2030	763,781	6,460,000	11.8%	1,238.5	0.0617%
Market Share of U.S. Domestic Enplanements					
2010	380,763	4,500,000	8.5%	716.5	0.0531%
2015	460,901	4,990,000	9.2%	867.3	0.0531%
2020	519,889	5,480,000	9.5%	978.3	0.0531%
2030	658,165	6,460,000	10.2%	1,238.5	0.0531%
Market Share of Grand Canyon Visitors					
2010	**382,500**	4,500,000	8.5%	716.5	0.0534%
2015	**449,100**	4,990,000	9.0%	867.3	0.0518%
2020	**548,000**	5,480,000	10.0%	978.3	0.0560%
2030	**742,900**	6,460,000	11.5%	1,238.5	0.0600%

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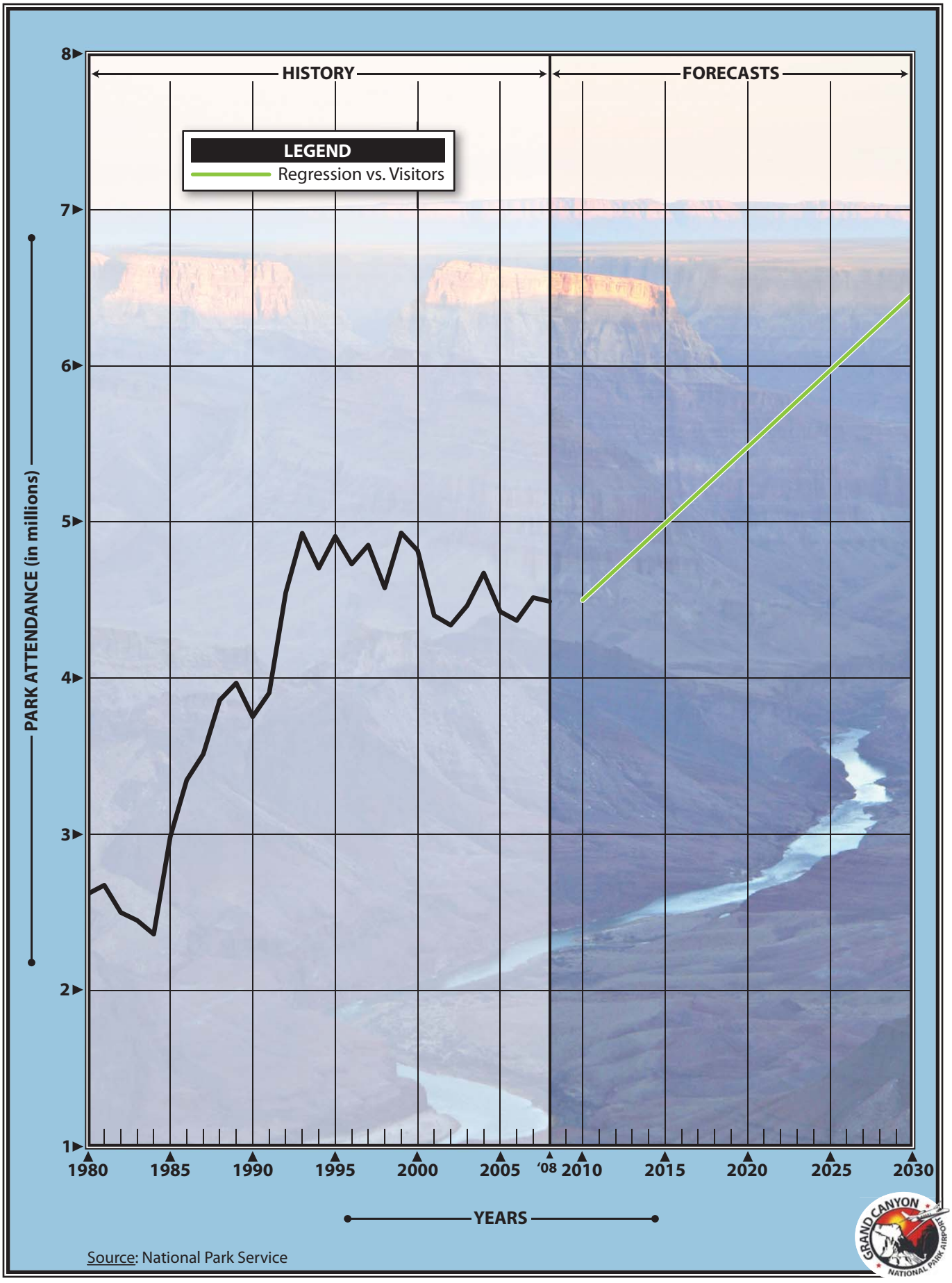

Exhibit 2C
ANNUAL PARK ATTENDANCE
GRAND CANYON NATIONAL PARK

In its *Environmental Assessment/Assessment of Effect* for the South Rim Visitor Transportation Plan, published in February 2008, the NPS forecast attendance to remain relatively flat around 4.5 million through 2010. Attendance was then projected to begin to grow to 5.48 million by 2020. These projections are presented on **Table 2B** and **Exhibit 2C** along with an interpolation for 2015 and an extrapolation for 2030.

GCNP TOURISM STUDY

In May of 2005, the Arizona Hospitality Research Center of Northern Arizona University published the *Grand Canyon National Park & Northern Arizona Tourism Study*. The study was prepared for the Arizona Department of Transportation in cooperation with the U.S. Department of Transportation, Federal Highway Administration. The primary purpose of the study was to look at visitor's highway usage and travel patterns, but it also examined other travel modes, including commercial air service.

The study included a year-long random sampling of 7,800 GCNP visitors who completed a short intercept survey in the park and 4,500 visitors who completed a longer in-depth survey. Some of the highlights of the survey as they relate to commercial service:

- A total of 16.4 percent of the visitors utilized commercial airlines in their trip to the GCNP.
- The majority (59 percent) were first time visitors to GCNP. First time visitors tended to utilize commercial airlines more (18.4 percent).
- GCNP was the primary destination of 37 percent of the visitors. These visitors also tended to use commercial airlines more (18.8 percent).
- Phoenix Sky Harbor International Airport (PHX) at 44.3 percent and Las Vegas International Airport (LAS) at 37.5 percent were the most commonly used airports. GCN was the arrival airport for 2.3 percent of the commercial airline users.
- Visitors who used commercial airlines tended to stay longer in the park (9.6 hours) than the average visitor (7.3 hours). Commercial service visitors, however, tended to stay less time in the area (4.8 days) than the average stay (5.3 days).

Since the vast majority of the passenger traffic at GCN is currently related to air tours, the information from the tourism study will be utilized later in this chapter to examine destination passenger potential.

COMMERCIAL SERVICE ACTIVITY FORECASTS

Commercial service activity at Grand Canyon National Air Park has historically been primarily comprised of air tour/sightseeing flights. While there has been scheduled service in the past, it is very limited today. The Official Airline Guide (OAG) included just two

scheduled airline flights during August 2008: a Papillon helicopter flight five days a week to and from Havasupai, and a Scenic Airlines flight five days a week to Las Vegas. Neither requires security under F.A.R. Part 139. The following commercial service analysis is divided into two parts: first is the demand for air tour/sightseeing flights, and second is the potential for scheduled service to serve non-air tour or "destination" passengers.

AIR TOUR/SIGHTSEEING PASSENGERS

Table 2B and **Exhibit 2D** depict the history of enplanements at GCN. As is evident from the table and exhibit, passenger activity increased three-fold in one year from 1986 to 1987. This occurred in spite of a mid-air collision between two air tour flights over the canyon in the summer of 1986. This led Public Law 100-91, the *National Overflights Act,* which was enacted in August 1987.

The increased popularity in aerial sightseeing tours brought an increased concern not only for safety, but for protecting the natural quiet in the park. In June 1987, the FAA issued Special Federal Aviation Regulation (SFAR) 50 to establish flight regulations in the vicinity of the park. Public Law 100-91 required the analysis of 1) the effects of overflights on National Parks, 2) whether SFAR 50 was successful in restoring natural quiet, and 3) the designation of flight-free zones in the park.

In June 1988, the FAA published SFAR 50-2, which revised flight procedures over the GCNP, established flight-free zones, and established routes for commercial air tour operators. By 1990, passenger traffic had declined more than two-fold from 1987, but began to increase once again in 1991. In 1996, the airport reached an all-time high of 642,221 enplanements.

That year, President Clinton directed the Secretary of Transportation to issue proposed regulations for GCNP that would limit sightseeing to immediately reduce aircraft noise and further restore the natural quiet in accordance with the *Overflights Act*.

Enplanements remained in the 500,000 to 600,000 range through the remainder of the decade. In 2001, enplanements declined to 411,000 and have been below that level since. The level of regulation and limitations of air tour flights to preserve the natural quiet remains today as an on-going issue. This is being addressed in part by operators acquiring and increasing the use of quieter technology rotorcraft and aircraft, as well as aircraft with increased seating capacity, thereby increasing the number of passengers per flight.

Exhibit 2D presents the air tour enplanement forecast as included in the 2005 Master Plan. The forecasts were prepared with 2002 as the base year. This was the first full year of activity after 9-11, and passenger traffic was at the lowest level since 1990. A strong recovery in activity was projected in the short term, while over the

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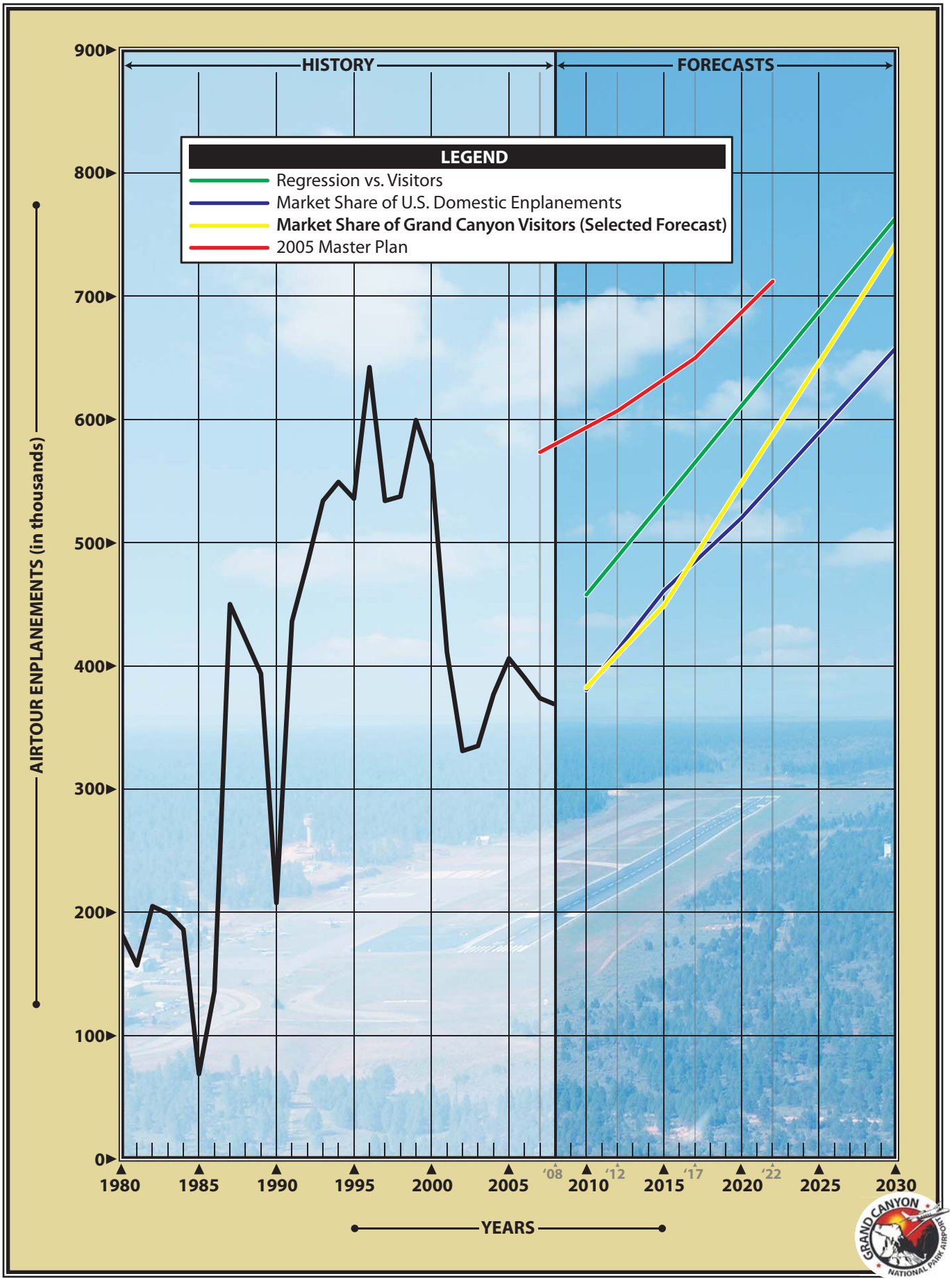

Exhibit 2D
AIR TOUR ENPLANEMENT FORECASTS

long term it was recognized that SFAR 50-2 would eventually limit the number of additional overflights and subsequently enplanement levels. For purposes of the Master Plan, the maximum allowable air tour enplanement level was estimated at 711,900.

As the exhibit shows, actual traffic has lagged significantly behind the projections. For example, 2007 enplanements totaled 406,000 compared to the forecast of 573,300, and actual enplaned passengers have declined to 368,672 since.

Table 2B examines GCN enplanements as a percentage of park attendance and as a percentage of U.S. enplanements. The park attendance percentage was over 10 percent during the 1990s, with a peak of 13.6 percent in 1996. Since 2001, the percentage of enplanements to park visitors has generally been in the eight to nine percent range. Similarly, the airport's share of U.S. enplanements was higher during the 1990s and has generally been declining since 2001.

A regression analysis was run for GCN enplanements with park attendance and U.S. enplanements as the independent variables. While neither provided a high correlation, the park attendance regression was best with a correlation factor (Pearson's "r") of 0.847. The resulting projection from this regression is presented on **Table 2B** and **Exhibit 2D**.

A second projection was developed based upon the airport maintaining a constant "market share" of U.S. enplanements. The average market share since 2001 was utilized with the results included for comparison on the table and exhibit.

While both are below the master plan forecast for the short term, the regression is slightly higher in the long term, while the market share is lower. Given the economic times, an increase in enplanements as a percentage of GCNP visitors should not be expected in the short term. Over the long term, however, a growth in that percentage similar to the regression analysis is more probable. It is also somewhat in line with the air tour ceiling that will eventually be reached due to SFAR 50-2 restrictions.

The third projection on the exhibit and table takes this into account. It projects the air tour share of the visitor market to gradually grow from current levels back to a share level similar to just prior to 9-11 before reaching an estimated maximum level between 700,000 and 750,000 enplanements long term. This projection is recommended for use in the Terminal Area Master Plan.

DESTINATION PASSENGERS

With nearly 5.0 million annual visitors, the Grand Canyon National Park is one of the most popular tourist destinations in the United States. Over 80 percent of those visitors come to the South Rim. With limited permanent population, these visitors form the potential passenger traffic for Grand Canyon National Park Airport.

As has been indicated in the previous section, virtually all of the current passenger traffic at GCN is related to aerial sightseeing tours. While some may fly in on a scenic tour flight from Las Vegas or Phoenix, then get on a charter vehicle for a ground tour, there is currently very little traffic that could be considered as destination without that air tour tie-in. The airport currently has a Class II Part 139 certification, which limits it to scheduled service by small airplanes and unscheduled charter operations by large air carrier aircraft. To provide scheduled service by large aircraft, a Class I certificate would be required.

The *Grand Canyon National Park & Northern Arizona Tourism Study* discussed in an earlier section provides insight into how visitors to GCNP access the area, and their overall trip plan. This information was utilized to examine the destination passenger potential for GCN if scheduled airline service were available. **Table 2C** outlines this potential.

TABLE 2C
Destination Passenger Forecast
Grand Canyon National Park Airport

	Actual		Forecast		
	2004	**2008**	**2015**	**2020**	**2030**
Total Park Visitors	4,672,911	4,491,141	4,990,000	5,480,000	6,460,000
Visitor Airline Use					
% using commercial airlines	16.4%	16.4%	16.4%	16.4%	16.4%
Total using comm.. airlines	766,357	736,547	818,360	898,720	1,059,440
% using GCN	2.3%	2.3%	2.3%	2.3%	2.3%
Total GCN enplanements	17,626	16,941	18,822	20,671	24,367
South Gate % Visitors	67.2%	75.9%	76.0%	76.0%	76.0%
South Gate Visitors (NPS)	3,140,318	3,407,695	3,792,400	4,164,800	4,909,600
% using commercial airlines	16.7%	16.7%	16.7%	16.7%	16.7%
Total using commercial airlines	524,433	569,085	633,331	695,522	819,903
East Gate % Visitors	13.9%	16.1%	16.0%	16.0%	16.0%
East Gate Visitors (NPS)	649,966	723,608	798,400	876,800	1,033,600
% using commercial airlines	14.0%	14.0%	14.0%	14.0%	14.0%
Total using commercial airlines	90,995	101,305	111,776	122,752	144,740
Total South Rim Visitors	3,790,284	4,131,303	4,590,800	5,041,600	5,943,200
Total using commercial airlines	615,428	670,390	745,107	818,274	964,607
Capture rate (all comm.. airline visitors)	2.86%	2.53%	2.53%	2.53%	2.53%
Primary Destination Visitors					
% Grand Canyon Primary destination	37.0%	37.0%	37.0%	37.0%	37.0%
Primary destination total	1,728,977	1,661,722	1,846,300	2,027,600	2,390,200
% using commercial airlines	18.8%	18.8%	18.8%	18.8%	18.8%
Total primary dest. using comm. airlines	325,048	312,404	347,104	381,189	449,358
Destination Enplanement Forecast	**17,626**	**16,941**	**52,066**	**114,357**	**269,615**
Current and Potential GCN Capture Rate	5.4%	5.4%	15.0%	30.0%	60.0%

Source: Park Attendance – National Park Service Public Use Statistics Office Web Site; Park Attendance Forecast – South Rim Visitor Transportation Plan Environmental Assessment, February 2008; Grand Canyon National Park & Northern Arizona Tourism Study, Arizona Hospitality Research Center, Northern Arizona University, May 2005

The surveys indicated that 16.4 percent of the GCNP visitors used commercial airlines as part of their trip. This would suggest an overall airline passenger potential of approximately 737,000 in 2008. It is recognized,

however, that the vast majority of these (82 percent) flew into large hub airports in Phoenix or Las Vegas and then used other transportation modes to access the GCNP. The survey indicated that just 2.3 percent indicated flying into GCN. This represents approximately 17,000 in 2008.

Assuming that only South Rim visitors would consider flying into GCN, the maximum destination passenger potential for 2008 would be 670,000. The survey results suggest that GCN is currently capturing approximately 2.5 percent of this traffic.

In many cases, the Grand Canyon is just one of many planned stops on a visitor's itinerary. For example, a trip to the Grand Canyon may be a side trip for Las Vegas travelers, or just part of a vacation trip that includes other attractions in Arizona and the southwest United States. The study survey indicated that the Grand Canyon was the primary destination for 37 percent of the visitors. Of those that indicated the Grand Canyon as their primary destination, 18.8 percent indicated that they used commercial airline service as part of their trip.

Applying these percentages to the 2008 visitor census provides a destination passenger potential of 312,464. Those indicating they currently use GCN comprise 5.4 percent of this total.

Thus, the survey does indicate good passenger potential. The ability to capture a larger share of the potential destination passenger market, however, will be highly dependent upon the level of air service (frequency, destinations, aircraft type, etc.) and air fares. Small commuter turboprop service, such as what is currently available to northern Arizona communities such as Page and Kingman, could capture 10 to 20 percent of the market potential. A slightly higher level of service such as is available to Flagstaff (30-70 seat turboprops and regional jets) could increase the capture rate to between 30 and 60 percent with reasonable air fares and code-sharing agreements with major airlines. The high end capture rate would likely include several commercial jet charters and very competitive air fares and schedules as well as generate new visitors to the area.

Table 2C depicts a destination passenger forecast based upon this range in capture rate. A 15 percent capture is depicted for 2015. This assumes that service would initially provide a five to 10 percent capture and grow. A 30 percent capture by 2020 represents a market continuing to be built, with perhaps a second entrant. 2030 is intending to depict a mature capture rate in the long term. This would likely need to include multiple airlines providing service to several destinations.

One of the airlines currently providing air tours has a charter operation that utilizes Boeing 737 aircraft. They are currently considering operating flights to GCN that would provide a vehicular tour service, but allow passengers flexibility to stay at GCNP for more than the day. Increased TSA security will need to be provided at the airport for this to occur.

For purposes of this plan, the forecast on **Table 2C** will be utilized to represent the reasonable range in destination passengers that GCN could potentially attract over the planning period.

COMMERCIAL SERVICE OPERATIONS

The commercial service fleet mix is needed to project airline operations for the airport. A projection of the fleet mix for Grand Canyon National Park Airport has been developed by reviewing the equipment used by the carriers serving the airport and by evaluating the equipment used by other airlines that could potentially serve the airport in the future.

Air Tour Operations

Changes in equipment, airframes, and engines have always had a significant impact on airlines and airport planning. There are many ongoing programs by the manufacturers to improve performance characteristics. These programs continue to focus on improvements in fuel efficiency. GCN has experienced these changes with the airlines providing air tours from the airport. **Table 2D** depicts the air tour fleet mix by seating capacity for the last four years (2005-08). The fixed wing fleet mix has grown from an average of 17.5 average seats per flight in 2005 to 19.5 in 2008. As can be seen from the table, the fleet has transitioned from 76 percent aircraft with at least 17 seats to over 93 percent in 2008. Boarding load factors are also up from 73 percent in 2006 to 81.1 percent in 2008. Thus, average enplanements per departure have grown from 13.0 to 15.8.

The fleet mix for helicopter air tours has remained in the 6-7 seat range, but the boarding load factor has increased from 81.7 percent to 85.6 percent. As a result, despite little growth in seating capacity, the average enplanements per departure on the helicopters has grown from 5.3 to 5.6.

At the bottom of the table is a summary of the total air tour activity. Although the enplanements per departure has grown for both the helicopters and the fixed wing air tours, the combined ratio has actually declined. The number of fixed wing enplanements and subsequent departures have been declining the past four years, while helicopter activity has actually increased, particularly in the last year (2008). The percentage of air tour enplanements carried by fixed wing aircraft has declined from 58.0 percent in 2006 to 41.2 percent in 2008. Fixed wing departures have declined from 34.8 percent to 19.8 percent of the total air tour departures. This has resulted in a decline in the overall seats per departure average from 10.6 to 9.1 in the past year.

TABLE 2D
Historic Air Tour Fleet Mix and Operations
Grand Canyon National Park Airport

Fixed Wing Fleet Mix Seating Capacity	**2005**	**2006**	**2007**	**2008**
Air Tour Operators				
> 79	0.0%	0.0%	0.0%	0.0%
60-79	0.0%	0.0%	0.0%	0.0%
40-59	0.0%	0.0%	0.0%	0.0%
20-39	23.4%	23.0%	27.2%	23.7%
12-19	52.8%	57.7%	55.8%	69.6%
8-11	2.3%	2.1%	2.9%	3.3%
5-7	18.7%	14.1%	11.8%	3.3%
< 5	2.7%	3.0%	2.2%	0.0%
Totals	100.0%	100.0%	100.0%	100.0%
Seats/Departure	17.5	17.9	18.7	19.5
Boarding Load Factor	76.7%	72.9%	78.0%	81.1%
Enplanements/Departure	13.4	13.0	14.6	15.8
Annual Enplanements	233,074	226,505	198,408	151,803
Annual Departures	17,350	17,364	13,593	9,617
Annual Operations	34,700	34,728	27,186	19,234
Average Daily Flights	48	48	38	27
Helicopters				
Seats/Departure	6.5	6.5	6.5	6.5
Boarding Load Factor	81.7%	82.6%	85.2%	85.6%
Enplanements/Departure	5.3	5.4	5.5	5.6
Annual Enplanements	172,926	163,915	175,308	216,869
Annual Departures	32,553	30,527	31,640	38,991
Annual Operations	65,106	61,054	63,280	77,982
Average Daily Flights	90	85	88	108
Total Air Tour Activity				
Seats/Departure	10.3	10.6	10.2	9.1
Boarding Load Factor	78.8%	76.7%	81.2%	83.7%
Enplanements/Departure	8.1	8.2	8.3	7.6
Total Tour Enplanements	406,000	390,420	373,716	368,672
Fixed Wing Enplaned Percentage	57.4%	58.0%	53.1%	41.2%
Total Tour Departures	49,903	47,891	45,233	48,608
Fixed Wing Departure Percentage	34.8%	36.3%	30.1%	19.8%

Table 2E depicts a projection of the future fleet mix and operations for air tour operators. This assumes that, over time, the ratio of fixed wing passengers will return to 2004 levels. As passenger traffic increases, the need to carry more passengers per flight for the noise considerations of the park could drive this shift back to more fixed wing passenger traffic.

TABLE 2E
Air Tour Fleet Mix and Operations Forecasts
Grand Canyon National Park Airport

Fixed Wing Fleet Mix **Seating Capacity**	**2008**	**2015**	**2020**	**2030**
Air Tour Operators				
> 79	0.0%	0.0%	0.0%	0.0%
60-79	0.0%	0.0%	0.0%	0.0%
40-59	0.0%	0.0%	0.0%	10.0%
20-39	23.7%	36.0%	40.0%	40.0%
12-19	69.6%	60.0%	55.0%	50.0%
8-11	3.3%	2.0%	1.0%	0.0%
5-7	3.3%	2.0%	1.0%	0.0%
< 5	0.0%	0.0%	0.0%	0.0%
Totals	100.0%	100.0%	100.0%	100.0%
Seats/Departure	19.5	21.3	23.0	25.5
Boarding Load Factor	81.1%	82.0%	83.0%	85.0%
Enplanements/Departure	15.8	17.5	19.1	21.7
Annual Enplanements	151,803	202,095	274,000	408,595
Annual Departures	9,617	11,600	14,400	18,900
Annual Operations	19,234	23,200	28,800	37,800
Average Daily Flights	27	32	39	52
Helicopters				
Seats/Departure	6.5	6.5	6.5	6.5
Boarding Load Factor	85.6%	86.0%	87.0%	88.0%
Enplanements/Departure	5.6	5.6	5.7	5.7
Annual Enplanements	216,869	247,005	274,000	334,305
Annual Departures	38,991	44,200	48,500	58,400
Annual Operations	77,982	88,400	97,000	116,800
Average Daily Flights	108	123	135	162
Total Air Tour Activity				
Seats/Departure	9.1	9.6	10.3	11.1
Boarding Load Factor	83.7%	84.0%	84.8%	86.2%
Enplanements/Departure	7.6	8.0	8.7	9.6
Total Tour Enplanements	368,672	449,100	548,000	742,900
Fixed Wing Enplaned Percentage	41.2%	45%	50%	55%
Total Tour Departures	48,608	55,800	62,900	77,345
Fixed Wing Departure Percentage	19.8%	20.8%	22.9%	24.5%

Destination Airline Operations

In the late 1980s and early 1990s, Grand Canyon National Park Airport had scheduled destination service by American West Express using the 34-seat DeHaviland Dash 8 turboprop. That airline is now USAirways Express and still provides service to some airports in Arizona using the Dash 8 as well as Canadair Regional Jets (CRJs). Other small commercial airports in the state receive service

from Great Lakes Airways utilizing 19-seat Beech 1900 aircraft.

GCN has been served by non-scheduled charters using larger commercial service jets over the years as well. While charters will continue to serve the airport, there may also be future potential to develop scheduled jet service. In today's airline environment, there are several airlines that provide service on less than a daily basis. Airlines such as Allegiant and Sun Country provide this type of service at airports in Arizona today. A current air tour operator, Vision Air, also operates Boeing 737 aircraft in its fleet and is considering some flights to GCN.

Table 2F provides a projected fleet mix based upon the GCN destination passenger forecast. At lower enplanement levels, the regional aircraft mentioned above can be expected to carry most of the destination passengers, with some allowance for charter or non-daily scheduled flights by larger commercial jets. As traffic grows, the mix can be expected to shift more towards these aircraft as well as regional jets.

TABLE 2F
Destination Airline Fleet Mix and Operations Forecast
Grand Canyon National Park Airport

Fleet Mix **Seating Capacity**	**2010**	**2015**	**2020**	**2030**
Major Airlines				
> 165	0.0%	0.0%	0.0%	0.0%
135-164	5.0%	5.0%	20.0%	30.0%
105-134	0.0%	0.0%	0.0%	0.0%
80-104	0.0%	0.0%	0.0%	20.0%
60-79	0.0%	0.0%	35.0%	30.0%
40-59	0.0%	20.0%	0.0%	0.0%
20-39	45.0%	45.0%	45.0%	20.0%
< 20	50.0%	30.0%	0.0%	0.0%
Totals	100.0%	100.0%	100.0%	100.0%
Seats/Departure	30.0	36.2	66.0	87.0
Boarding Load Factor	70.0%	72.0%	74.0%	75.0%
Enplanements/Departure	21.0	26.1	48.8	65.3
Annual Enplanements	31,302	52,066	114,357	269,615
Annual Departures	1,500	2,000	2,000	4,100
Annual Operations	3,000	4,000	4,600	8,200
Average Daily Flights	4	6	7	12

GENERAL AVIATION ACTIVITY FORECASTS

BASED AIRCRAFT

Based aircraft at GCN are unique in that most are associated with the air tour operators. The number of non-commercial, general aviation based aircraft is limited by the area's population and its remote location. Of the 46 aircraft currently considered as based at GCN, 44 are associated with the air tour operators. Helicopters comprise 32 of these aircraft.

Table 2G presents a history of based aircraft as recorded by the FAA in its Terminal Area Forecast Detail Report for GCN issued December 2008. The number of based aircraft grew from 20 to 35 between 1990 and 1995. During this period, air tour passenger enplanements grew from 207,000 to 535,000. By 2000, based aircraft grew to 52, although enplanements remained relatively constant at 563,000. After 9-11, the air tour enplanements declined sharply, but have been growing back slowly. Based aircraft have declined to the current 46.

Table 2G also presents three recent forecasts of based aircraft. The first is from the 2005 Master Plan, which projected based aircraft to grow from 51 in 2003 to 53 by 2012 and 65 by 2012. The Arizona State Airport System Plan (AzSASP), which is currently in draft form provided a range of forecasts through 2030. From 48 based aircraft in 2007 the range projected 50 to 51 based aircraft by 2012, and 56 to 65 by 2030. The FAA Terminal Area Forecast (TAF), issued in December 2008 projected based aircraft to grow from 46 to 47 by 2012 and 51 in 2025.

Exhibit 2E graphically presents these projections for comparison. The entire range of the AzSASP forecasts falls between the Master Plan (high) and TAF (low) projections.

TABLE 2G
Previous Based Aircraft Forecasts
Grand Canyon National Park Airport

Year	Based Aircraft
Actual	
1990	20
1991	20
1992	35
1993	35
1994	35
1995	35
1996	35
1997	47
1998	47
1999	52
2000	52
2001	51
2002	51
2003	51
2004	48
2005	48
2006	41
2007	46
2008	46
2005 Master Plan	
2007	47
2012	53
2017	59
2022	65
2007 AzSASP (low range)	
2012	51
2017	50
2030	51
2007 AzSASP (high range)	
2012	62
2017	56
2030	65
2008 FAA TAF	
2015	48
2020	50
2025	51

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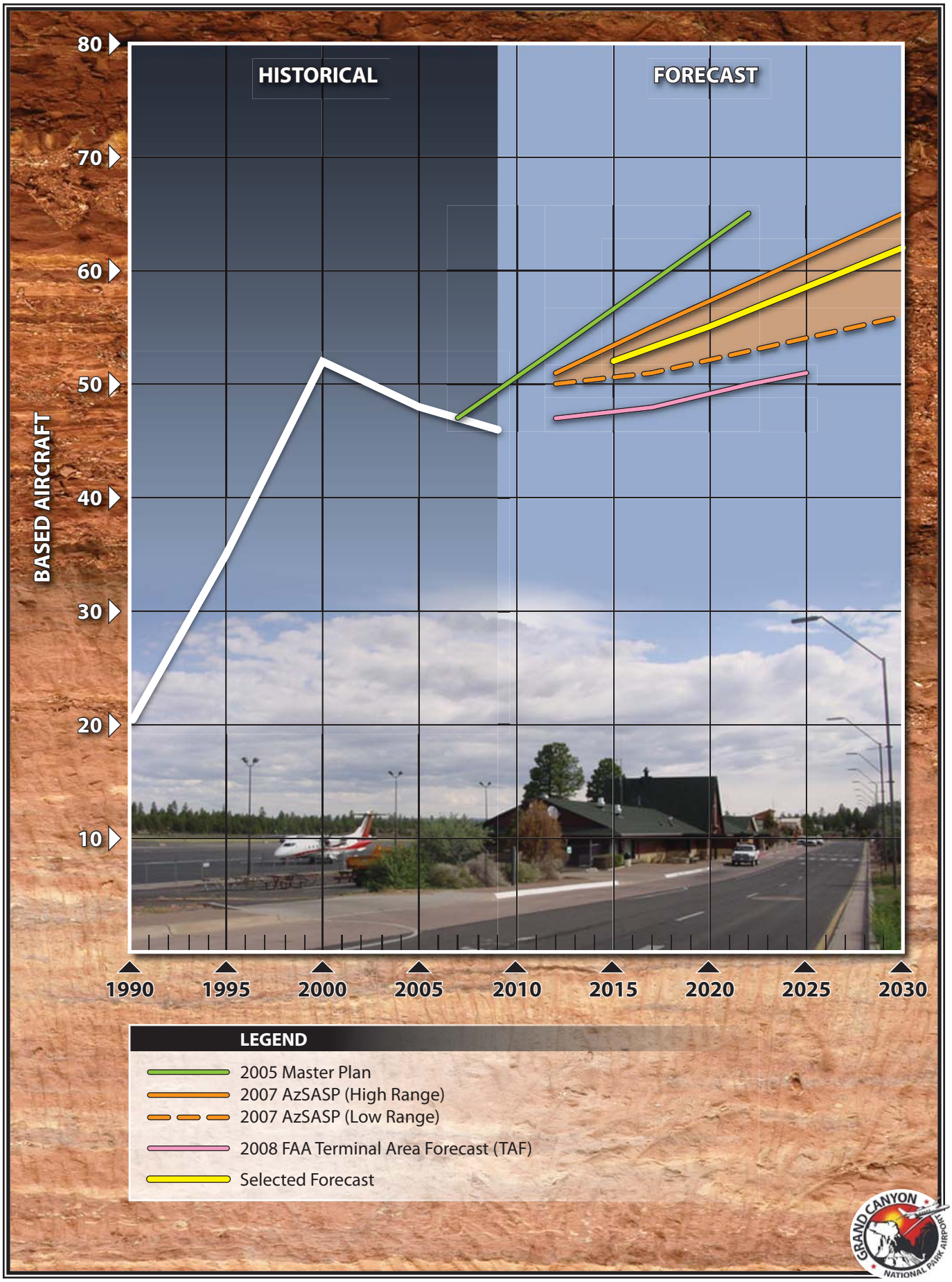

Exhibit 2E
BASED AIRCRAFT FORECAST

Based aircraft can be expected to increase as air tour operations increase; however, the rate of growth should not be expected to be identical. A portion of the operations increase can be absorbed within the current based fleet. Some of it may also be served by aircraft that are brought in, but would not be considered based at the airport. This could be especially true during peak periods of the year. As a result, a forecast that lies within the range of the AzSASP projections was selected for the purposes of the Terminal Area Plan. This forecast is depicted on **Exhibit 2E** and **Table 2H**.

TABLE 2H
Based Aircraft Forecast

		Piston		Turbine		
	Total	**Single Engine**	**Multi-Engine**	**Prop**	**Jet**	**Helicopter**
ACTUAL.						
2008	46	6	8	0	0	32
FORECAST						
2015	52	7	10	0	0	35
2020	55	7	10	1	0	37
2030	62	8	11	4	0	39

Table 2H also presents the based aircraft fleet mix forecast. The air tour fleet is expected to add seating capacity over the planning period. This will be accomplished primarily with additional multi-engine piston and turboprop aircraft.

GENERAL AVIATION OPERATIONS

General aviation operations are classified by the airport traffic control tower (ATCT) as either local or itinerant. A local operation is a take-off or landing performed by an aircraft that operates within sight of the airport, or which executes simulated approaches or touch-and-go operations at the airport. Itinerant operations are those performed by aircraft with a specific origin or destination away from the airport. Generally, local operations are characterized by training operations or aircraft check flights. Typically, itinerant operations increase with business and commercial use, since business aircraft are operated on a higher frequency.

ITINERANT OPERATIONS

Table 2J and **Exhibit 2F** depict general aviation itinerant operations, as counted by the ATCT at Grand Canyon National Park Airport since 1990. As is evident from examination of the table and exhibit, GA itinerant operations have been in a general state of decline since 1992. Between 1992 and 2007, itinerant operations declined by nearly 63 percent to 3,701. In 2008, operations increased slightly to 3,763. In the first four months of 2009, however, GA itinerant operations were up over 14 percent. If this remains positive for the entire year, it will be the first consecutive year increase since 1991-92.

TABLE 2J
General Aviation Itinerant Operations
Grand Canyon National Park Airport

Year	GCN Itinerant Operations	US ATCT GA Itinerant (millions)	GCN Share %
1990	7,382	23.10	0.0320%
1991	7,543	22.20	0.0340%
1992	7,880	22.10	0.0357%
1993	7,293	21.14	0.0345%
1994	6,812	21.06	0.0323%
1995	6,519	20.86	0.0313%
1996	5,649	20.82	0.0271%
1997	6,013	21.70	0.0277%
1998	5,338	22.09	0.0242%
1999	5,778	23.02	0.0251%
2000	5,177	22.84	0.0227%
2001	4,810	21.43	0.0224%
2002	5,234	21.45	0.0244%
2003	5,042	20.23	0.0249%
2004	4,943	20.01	0.0247%
2005	4,245	19.32	0.0220%
2006	3,829	18.74	0.0204%
2007	3,701	18.58	0.0199%
2008	3,763	17.37	0.0217%
2005 Master Plan			
2012	7,400	16.54	0.0447%
2017	8,500	17.86	0.0476%
2022	10,500	19.26	0.0545%
2007 AzSASP (low range)			
2012	3,800	16.54	0.0230%
2017	3,900	17.86	0.0218%
2030	4,300	22.02	0.0195%
2007 AzSASP (high range)			
2012	4,000	16.54	0.0242%
2017	4,200	17.86	0.0235%
2030	5,000	2.57	0.0222%
2008 FAA TAF			
2015	3,596	17.33	0.0208%
2020	3,616	18.70	0.0193%
2025	3,636	20.44	0.0178%
Terminal Plan Forecast			
2015	4,600	17.33	0.0267%
2020	5,000	18.70	0.0267%
2030	6,000	22.57	0.0267%

Table 2J also depicts the number of GA itinerant operations counted at towered airports across the country over the same time period. Nationally, operations declined from 1990 through 1996, then recovered what

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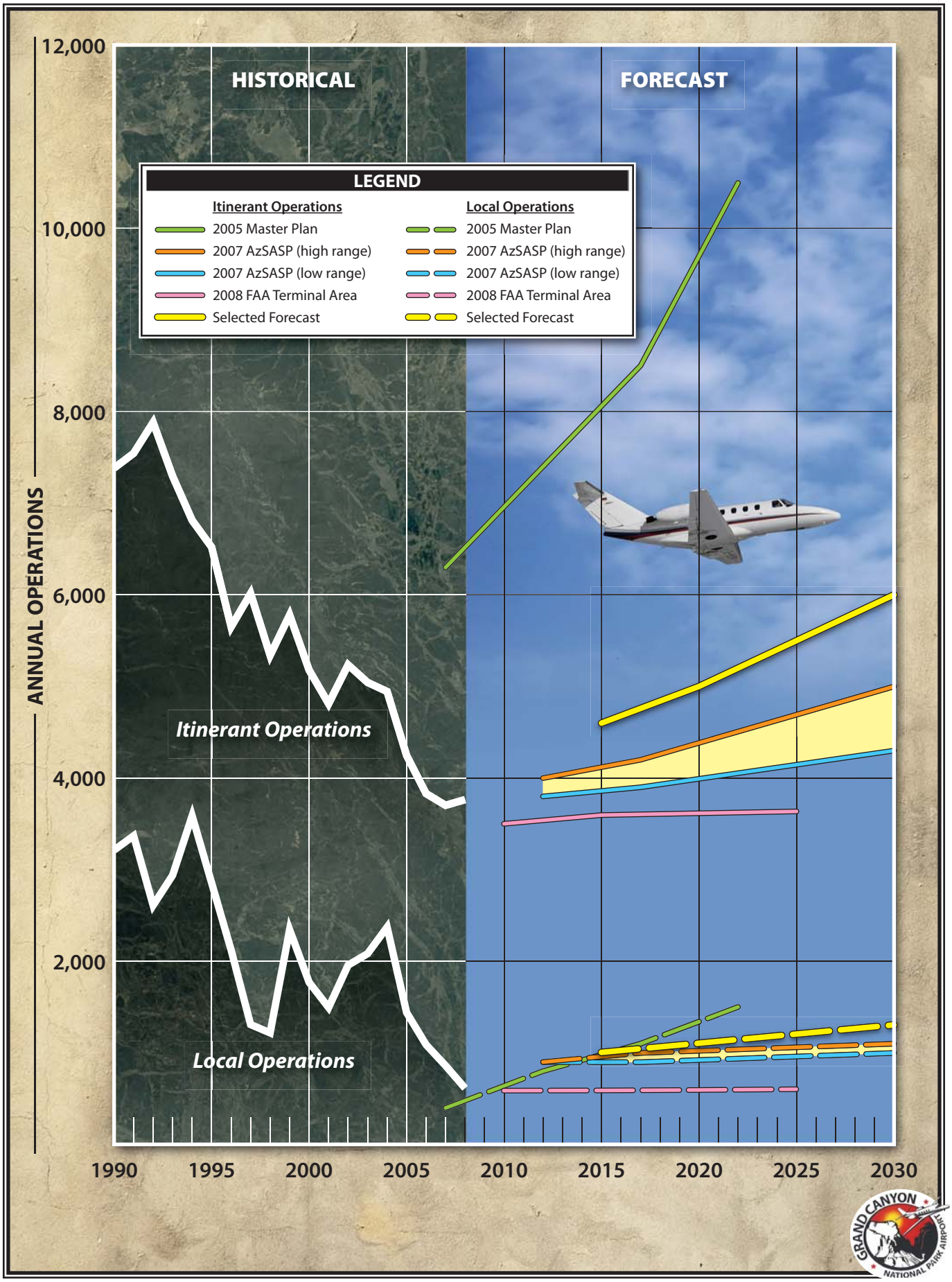

Exhibit 2F
GENERAL AVIATION
OPERATIONS FORECAST

was lost over the next three years. From that point in 1999, however, the decline in operations began again and has continued through the current decade. Even with the national decline, GCN's market share as a percentage of GA itinerant operations at towered airports across the country generally declined from 0.0251 percent in 1999 to 0.199 percent in 2007. For 2008, the market share stood at 0.0217 percent.

In *FAA Aerospace Forecasts Fiscal Years 2009-2025*, the FAA projects itinerant general aviation operations at towered airports. **Table 2J** presents this forecast as well. With itinerant GA operations decreasing at an annual average rate of 3.4 percent over the last eight years, the FAA forecasts a similar rate of decline through at least 2010. After that an annual average increase of 1.5 percent is forecast through 2020. Overall, the average annual growth rate between 2008 and 2025 is projected to be 1.0 percent.

The three recent forecasts for general aviation itinerant operations are also presented on the same table and exhibit. As with based aircraft, the 2005 Master Plan forecast is the highest, with the AzSASP range of forecasts in the middle, and the FAA TAF being the lowest projection. In fact, the FAA TAF shows a continued decline to 3,501 annual operations in 2010 followed by a growth of just 115 operations through 2025.

The market share for each of these forecasts is also compared on the table. The Master Plan forecast would result in an increase in market share over the planning period, while the other two would see a decreasing market share, although the decrease resulting from the TAF forecast is more significant.

The 2008 operations level is above the level forecast in the TAF for 2025, and the first four months indicate that traffic is up by 14 percent in 2009. This would suggest that the TAF is pessimistic for the purposes of this Terminal Area Plan. If this growth rate were maintained, operations would reach 4,300 for 2009, matching the 2025 low range forecast of the AzSASP. It would also represent a 0.0265 percent market share which is similar to the average market share the airport has experienced over the last 19 years (0.0267 percent).

For planning purposes, a projection that recaptures the average market share of the last 19 years was developed. It is presented on **Table 2J** and **Exhibit 2F**. While it represents a larger percentage growth in operations, it is still a relatively small growth in overall general aviation operations.

LOCAL OPERATIONS

Table 2K and **Exhibit 2F** present the historic local general aviation operations at GCN. Over the past 19 years, local operations have comprised from 10 to 29 percent of the airport's general aviation operations with an overall average of 20 percent. The percentage has been below the average each of the last four years. The highest level of local GA operations over the period

was 3,456 in 1994, and the lowest was 613 in 2008. In the first four months of 2009, however, local operations were up 92 percent over the same period in 2008. If this increase is maintained over the entire year, local operations would exceed 1,000 again after two consecutive years below that level.

TABLE 2K
General Aviation Local Operations
Grand Canyon National Park Airport

Year	GCN Itinerant Operations	US ATCT GA Itinerant (millions)	GCN Share %
1990	3,212	17.10	0.0188%
1991	3,368	16.60	0.0203%
1992	2,609	16.31	0.0160%
1993	2,938	15.46	0.0190%
1994	3,586	15.19	0.0236%
1995	2,854	15.07	0.0189%
1996	2,121	14.48	0.0146%
1997	1,308	15.16	0.0086%
1998	1,217	15.96	0.0076%
1999	2,343	16.98	0.0138%
2000	1,769	17.03	0.0104%
2001	1,494	16.19	0.0092%
2002	1,956	16.17	0.0121%
2003	2,082	15.29	0.0136%
2004	2,371	14.96	0.0158%
2005	1,439	14.85	0.0097%
2006	1,088	14.38	0.0076%
2007	859	14.56	0.0059%
2008	613	13.92	0.0044%
2005 Master Plan			
2012	800	13.23	0.0060%
2017	1,100	13.41	0.0082%
2022	1,500	13.72	0.0109%
2007 AzSASP (low range)			
2012	900	13.23	0.0068%
2017	900	13.41	0.0067%
2030	1,000	15.09	0.0066%
2007 AzSASP (high range)			
2012	900	13.23	0.0068%
2017	1,000	13.41	0.0075%
2030	1,100	15.09	0.0073%
2008 FAA TAF			
2015	590	13.31	0.0044%
2020	595	13.59	0.0044%
2025	603	14.18	0.0043%
Terminal Plan Forecast			
2015	1,000	13.31	0.0075%
2020	1,100	13.59	0.0081%
2030	1,300	15.09	0.0086%

Like itinerant operations, local GA operations at U.S. towered airports have generally been declining over the past two decades. Since 2000, they have been declining at an annual average rate of 2.5 percent. In *FAA Aerospace Forecasts Fiscal Years 2009-2025*, the FAA projects local operations to continue a similar rate of decline through 2010, then begin to grow slowly at 0.3 percent through 2020.

Table 2K and **Exhibit 2F** present the three most recent GA local operations forecasts as presented prepared for the GCN Master Plan, the Arizona SASP, and the FAA TAF. These projections all remain within a very limited range from 600 to 1,500 annual operations. The TAF is the lowest projection and essentially forecasts local operations to remain flat around 600. The Master Plan is the high end projection with local operations forecast to reach 1,500 by 2022. The SASP is located between the other two with its high range operations projected to grow to 1,100 by 2030.

This year's increase in local operations over the first four months indicates at least a recovery to the levels of 2005. This would make the TAF projections obsolete and would match the long range forecast of the SASP. For planning purposes, a forecast was selected that is between the SASP and the Master Plan projection. It is also depicted in the table and on the exhibit. This anticipates local GA operations to continue to remain generally around the 1,000 to 1,300 level over the planning period.

OTHER AIR TAXI

Air taxi operations as reported by the ATCT include commuter passenger, commuter cargo, as well as for-hire general aviation operations. Some operations by aircraft operated under fractional ownership programs are also counted as air taxi operations. Since the airline and air tour operations have been forecast, this section reviews the growth potential for the "other air taxi" operations at GCN.

Table 2L presents the other air taxi operations for the past three years. These operations have declined significantly in the last four years. Because of the relationship to general aviation activity, other air taxi operations were projected to increase in line with that of general aviation itinerant operations. The resulting forecast is also presented on **Table 2L**.

TABLE 2L
Other Air Taxi Operations
Grand Canyon National Park Airport

Year	Other Air Taxi
Actual	
2005	10,474
2006	7,620
2007	4,718
2008	2,374
Forecast	
2015	2,900
2020	3,200
2030	3,800

MILITARY

Military activity accounts for the smallest portion of the operational

traffic at GCN. Since 1990, annual military operations have fluctuated between a high of 1,204 in 2002 and a low of 163 in 1997. Over the last four years, military operations have averaged approximately 1,000 annually. While the percentage fluctuates from year-to-year, operations are approximately equally split between itinerant and local operations.

The 2005 Master Plan projected military operations to grow from 600 to 1,900 by 2022. It is extremely difficult to project future military options without knowledge of potential changes in mission or fuel contracts. Since operations have remained relatively constant for several years, for the purposes of this Master Plan update, military operations were projected to average 1,000 per year over the planning period. **Table 2M** includes the military forecast.

TABLE 2M
Activity Forecast Summary

	Actual 2008	2015	2020	2030
AIRLINE ENPLANEMENTS				
Airline Enplanements				
Air Tour Airlines	368,372	449,000	548,000	743,000
Destination Airlines	-	52,000	114,000	270,000
Total Airline Enplanements	368,372	501,000	662,000	1,013,000
Annual Operations				
Airline				
Air Tour Airlines	97,216	111,600	125,700	154,700
Destination Airlines	-	4,000	4,600	8,200
Total Airline Operations	97,216	115,600	130,300	162,900
General Aviation				
Itinerant	3,763	4,600	5,000	6,000
Local	613	1,000	1,100	1,300
Total General Aviation Operations	4,376	5,600	6,100	7,300
Other Air Taxi Operations	2,374	2,900	3,200	3,800
Military Operations	929	1,000	1,000	1,000
Total Annual Operations	104,895	125,100	140,600	175,000
Based Aircraft				
Single Engine Piston	6	7	7	8
Multi-Engine Piston	8	10	10	11
Turboprop	0	0	1	4
Jet	0	0	0	0
Helicopter	32	35	37	39
Total Based Aircraft	46	52	55	62

Chapter Three

TERMINAL AREA FACILITY REQUIREMENTS

Grand Canyon
NATIONAL PARK AIRPORT
TERMINAL AREA PLAN

CHAPTER THREE

TERMINAL AREA FACILITY REQUIREMENTS

The next step in the terminal area planning process is to translate passenger demand into the specific types and sizes of facilities that can adequately serve the existing and projected demand levels. This chapter utilizes the forecasts outlined in the previous chapter, as well as established planning criteria, to determine facility needs related to the terminal buildings (commercial and general aviation), apron, hangars, vehicle parking and access, and support facilities.

The objective of this effort is to identify the adequacy of the existing terminal area facilities, outline what new facilities are needed, and when they may be needed to accommodate future demand. Once the facility requirements have been established, alternatives based upon these needs can be formulated and evaluated in the next chapter.

PLANNING HORIZONS

Cost-effective, efficient, and orderly terminal development should rely more upon actual demand than a time-based forecast figure. To emphasize this point, a series of planning horizon milestones have been established that take into consideration the reasonable range of the demand projections.

Over time, actual activity may be lower or higher than what the annualized forecasts portray. By planning according to activity milestones, the resultant plan can accommodate shifts or

changes in the passenger demand. As a result, the plan provides flexibility while potentially extending its useful life if demand trends slow over the period. The resultant plan provides airport officials with a financially responsible and need-based program. **Table 3A** presents the planning milestones for each activity demand category.

TABLE 3A
Aviation Demand Planning Horizons
Grand Canyon National Park Airport

	Base Year (2008)	Short Term	Intermediate Term	Long Term
Air Tour Enplanements				
Fixed Wing	151,803	202,000	274,000	409,000
Helicopter	216,869	247,000	274.000	334,000
Annual Total	368,672	449,000	548,000	743,000
Annual Destination Enplanements	0	52,000	114,000	270,000
Based Aircraft	46	52	55	62
Annual Operations				
Air Tour Airline				
Fixed Wing	19,234	22,200	28,800	37,800
Helicopter	77,982	88,400	97,000	116,800
Destination Airline	0	4,000	4,600	8,200
Other Air Taxi	2,374	2,900	3,200	3,800
GA Itinerant	3,763	5,600	6,100	7,300
GA Local	613	2,900	3,200	3,800
Military	929	1,000	1,000	1,000
Total Operations	104,895	125,100	140,600	287,900

PEAKING CHARACTERISTICS

Terminal facility needs analyses typically relates to the level of activity during a peak or design period. The periods used in developing the capacity analyses and facility requirements in this study are as follows:

- **Peak Month** - The calendar month in which traffic activity is highest.

- **Design Day** - The average day in the peak month. For airline activity, this indicator is typically based upon weekday flight schedules, discounting the reduced activity for flights that are scheduled, but not necessarily daily.

- **Design Hour** - The busiest hour within the design day or busy day.

It is important to note that only the peak month is an absolute peak within a given year. All other peak periods will be exceeded at various times during the year. However, they do represent reasonable planning standards that can be applied without overbuilding or being too restrictive.

PEAK AIR TOUR ACTIVITY

Peak activity for air tour operations and passengers is divided into fixed wing and helicopter because their landside operations are essentially segregated on the airport. The fixed wing air tour operators utilize the aircraft apron along the runway as well as the terminal facilities adjacent to the aircraft apron.

For the most part, the helicopter tour companies operate from their own facilities on the airport, east of the terminal and airport access roads. The helicopter peak projections can be used by these private operators to plan for their space requirements to meet future demand.

Fixed Wing Air Tour Design Peaks

Table 3B presents the peak activity projections for the fixed wing air tour airlines. The peak month projections were based upon the average peak month over the past five years. August is typically the peak month for fixed wing air tour activity. An average of 12.1 percent of the enplanements and 12.7 of the operations occur during the peak month. The design day is based upon the average day of the peak month, as activity during the peak month tends to be distributed relatively evenly through any given week.

Hourly activity is examined as a percentage of the daily activity. Air tour activity generally occurs over a 12-hour period each day. A peaking factor of 13 percent was applied to determine the design hour operations. Design hour passengers were based upon the number of operations during the design hour times the average passengers per operation.

Similarly, the helicopter peaking activity forecasts are shown on **Table 3C**. While August is also the peak month for helicopter air tours, the percentage of activity during the month is higher than for the fixed wing tours. Over the past five years, helicopter enplanements during the peak month averaged 15.6 percent, while helicopter tour operations averaged 15.0 percent. The average day of the peak month was also used as the design day, and peak hour operations were based upon 13 percent of the daily activity. Design hour helicopter passengers were also based upon the number of operations during the design hour times the average passengers per operation.

TABLE 3B
Peak Fixed Wing Air Tour Activity
Grand Canyon National Park Airport

	Base Year 2008	Short Term	Intermediate Term	Long Range
Enplanements				
Annual	151,803	202,100	274,000	409,000
Peak Month	21,421	24,700	33,200	49,500
Design Day	691	797	1,107	1,650
Design Hour	89	107	127	166
Total Passengers				
Design Hour	178	214	254	332
Operations				
Annual	19,232	23,200	28,800	37,800
Peak Month	2,874	3,020	3,740	4,910
Design Day	93	97	121	158
Design Hour	12	13	16	20
Departures				
Design Day	47	49	61	79
Design Hour	6	7	8	10

TABLE 3C
Peak Helicopter Air Tour Activity
Grand Canyon National Park Airport

	Base Year 2008	Short Term	Intermediate Term	Long Range
Enplanements				
Annual	216,869	247,000	274,000	334,300
Peak Month	37,170	38,300	42,500	51,800
Design Day	1,199	1,235	1,371	1,671
Design Hour	150	157	170	212
Total Passengers				
Design Hour	300	314	340	424
Operations				
Annual	77,982	88,400	97,000	116,800
Peak Month	12,830	13,260	14,550	17,520
Design Day	414	428	469	565
Design Hour	54	56	61	73
Departures				
Design Day	207	214	235	283
Design Hour	27	28	30	37

PEAK DESTINATION AIRLINE ACTIVITY

Since destination airline traffic is minimal at the present time, the base year planning horizon is replaced with an "Initial" horizon to represent the initial activity that could be expected in the first full year of an airline start-up. Peak month operations and enplanements were estimated to average 11.0 percent of the annual totals. This is reflective of air service for a year-round tourism destination. Activity will peak in the summer months, more than at a typical airport, but less than the peak at a seasonal tourist destination.

Design day activity takes into account the potential for service on a less than daily basis. Some carriers today operate with models that provide service on frequencies of two to four times a week rather than the traditional five to seven days. There is a potential for this type of service at Grand Canyon provided the airline can contract either with other airlines, a fixed base operator, or in some cases, the airport to provide ground handling and ticketing services.

Design hour activity was based upon accommodating a portion of the design day operations. This percentage will decline as daily flights increase and was estimated between 30 and 25 percent of the daily flights. Design hour passengers were based upon the number of operations during the design hour times the average passengers per operation with an elevated load factor for the peak period.

TABLE 3D
Peak Destination Airline Activity
Grand Canyon National Park Airport

	Initial	Short Term	Intermediate Term	Long Range
Enplanements				
Annual	31,000	52,000	114,000	270,000
Peak Month	3,410	5,720	12,540	29,700
Design Day	122	204	448	1,061
Design Hour	54	87	158	278
Total Passengers				
Design Hour	103	156	277	473
Operations				
Annual	3,000	4,000	4,600	8,200
Peak Month	330	440	506	902
Design Day	13	17	18	33
Design Hour	4	5	5	8
Departures				
Design Day	7	9	9	17
Design Hour	2	3	3	4

ITINERANT GENERAL AVIATION/OTHER AIR TAXI PEAKS

The peak month for general aviation itinerant operations at GCN is typically May or September, while the peak for air taxi is typically May or August. In the five years from 2004 through 2008, the peak month averaged 11.6 percent of the annual itinerant general aviation operations and 11.5 percent of annual air taxi operations.

Daily operational counts from the ATCT were utilized to determine a design day factor for itinerant general aviation/other air taxi activity. During August and September in 2008, the peak day of each week, typically Sunday, averaged 26.4 percent of the operations for the week. This equates to a design day factor of 1.85 times higher than the average day of the peak month.

The design hour for itinerant general aviation and other air taxi operations was estimated at 20 percent of the design day operations. **Table 3E** summarizes the peak activity projections for each planning horizon.

TABLE 3E
Air Taxi and Itinerant General Aviation Operational Peaks
Grand Canyon National Park Airport

	Base Year (2008)	Short Term	Intermediate Term	Long Term
AIR TAXI				
Annual	2,374	2,900	3,200	3,800
Peak Month	274	334	369	436
Design Day	17	21	23	27
Design Hour	3	4	5	5
ITINERANT GENERAL AVIATION				
Annual	3,763	4,600	5,000	6,000
Peak Month	404	536	582	699
Design Day	25	33	36	43
Design Hour	5	7	7	9

PASSENGER TERMINAL BUILDING REQUIREMENTS

Requirements for the passenger terminal building include aircraft gate positions, departures processing, arrivals processing, concourse facilities, public spaces, as well as building systems and support. This section identifies the facilities required to meet the airport's terminal needs through the planning horizons. The review of the capacity and requirements for various terminal complex functional areas was performed with the guidance of FAA Advisory Circular 150/5360-13, *Planning and Design Guidelines for Airport Terminal Facilities*, the *TSA Recommended Security Guidelines for Airport Planning, Design and Construction*, and *IATA Level of Service Standards*.

A spreadsheet model was used in the terminal analysis. The model was based on industry standards and cali-

brated for GCN based upon the existing use of facilities and the type of traffic anticipated. The model utilizes the standard queuing theory which can be defined as: passengers arriving minus passengers processed equals passengers in queue. The evaluation of individual processing elements is based on industry standards and formulas.

The model considers the level of service standards established by the International Air Transport Association (IATA). Level of service (LOS) defines the comfort and quality of the passenger experience. Some are related to crowding in queuing areas, while others define the amount of time a passenger must wait for processing. **Table 3F** outlines the basic level of service standards.

TABLE 3F
Level of Service Standards (IATA)
Grand Canyon National Park Airport

AREA PER OCCUPANT

Level of Service Standards	A	B	C+	C	C-	D	E	F
	Ft^2	Ft^2	Ft^2	Ft^2	Ft^2	Ft^2	Ft^2	Ft^2
Check-in Queue Area	19.4	17.2	16.1	15.1	14.0	12.9	10.8	-
Wait/Circulate	29.1	24.8	22.6	20.4	18.3	16.1	12.8	-
Hold Room	15.1	13.5	12.8	12.0	11.3	10.5	8.0	-
Bag Claim Area (excl. claim device)	21.5	19.4	18.3	17.2	16.1	15.1	12.9	-
Federal Inspection Services	15.1	12.9	11.8	10.8	9.7	8.6	6.5	-

A – Excellent levels of service; conditions of free flow; excellent level of comfort.
B – High level of service; condition of stable flow; very few delays; high level of comfort.
C – Good level of service; condition of stable flow; acceptable delay; good level of comfort.
D – Adequate level of service; condition of unstable flow; acceptable delays for short periods of time; adequate level of comfort.
E – Inadequate level of service; condition of unstable flow; unacceptable delays; inadequate levels of comfort.
F – Unacceptable levels of service; conditions of cross flows, system breakdown and unacceptable delays; unacceptable levels of comfort.

In general, LOS C is a typical design goal for most airports. LOS B would be a preferred goal if the budget allows it. LOS A is generally too expensive to achieve, and thus prohibitive to implement. For purposes of this analysis, an LOS C+ was used to represent a median between LOS B and C.

Because the air tour airlines and the destination airlines have some different terminal requirements, this section is divided into two areas. The first examines the fixed wing air tour airline terminal requirements. The second examines the requirements for the destination airlines. Depending upon the final recommendations, these could be served by one or separate terminal facilities. Since the hel-

icopter air tours operate from three private leaseholds, their requirements are subject to their own planning and development within those leaseholds, thus are not included here.

FIXED WING AIR TOUR TERMINAL REQUIREMENTS

The fixed wing air tour airlines primarily operate out of the existing terminal at GCN, with the exception of Grand Canyon Airlines, which does handle a portion of the fixed wing air tour activity from its FBO terminal north of the main terminal. **Table 3G** presents a functional breakdown of the existing terminal building space for comparison to the current and future demand requirements.

The functional space requirements for the air tour operators do not include security screening as their flights typically do not operate under Federal Aviation Regulation (FAR) Part 139. Since most flights are short and for air tour purposes only, baggage handling is also minimal.

As can be seen from the table, most of the functions in the terminal are being taxed beyond the desirable level of service during the design periods. This is relieved somewhat with a portion of the activity being handled at the Grand Canyon Airlines FBO terminal. As fixed wing air tour traffic increases, the spatial needs will also increase as presented on the table.

For 2008 activity levels, a 15,700 square foot terminal is needed. At the short term planning horizon, this will grow to 18,400 square feet. In the long term, a 28,600 square-foot terminal will be needed for the fixed wing aircraft activity.

DESTINATION AIRLINE TERMINAL REQUIREMENTS

The functional requirements for a terminal to serve destination airlines are more in line with the traditional passenger terminal. The review of the requirements for various functional areas of the terminal was performed to reflect the planning horizon milestones for enplanements. This included an initial level (31,000) as well as advanced milestone levels of 52,000, 114,000, and 270,000 annual enplaned passengers. **Table 3H** summarizes these requirements.

The most visible space for the airline is the ticket counter. Airline ticket counter length, counter area, and airline ticket office (ATO), TSA bag screening, and outbound baggage make-up and operations were calculated based upon design hour activity. The amount of space needed in this area could be reduced with extensive curb and/or parking lot check-in.

Public waiting lobby is typically available for passengers and visitors to comingle prior to departure as well as for greetings upon arrival. Since most of the traffic will be non-local, local "meeters and greeters" will be limited.

The processing rate at current security levels is 200 passengers per hour. A single station should be adequate through the 114,000 enplanement level, but a second station will be needed for the long term horizon level.

TABLE 3G
Fixed Wing Air Tour Terminal Facility Requirements
Grand Canyon National Park Airport

			Annual Enplanement Planning Horizons			
		Available	Current 151,803	Short 202,000	Intermediate 274,000	Long 409,000
DEPARTURES PROCESSING						
Ticket Counters						
Utilization Factor	100%		89	107	127	166
Agent Positions	#	10	6	7	8	10
Frontage	LF	86	36	42	48	60
Area	SF	513	380	440	500	630
Ticket Lobby						
Queuing Area	SF	443	480	570	680	890
Airline Ticket Office	SF	1,034	756	882	1,008	1,260
Ticket Lobby Circulation	SF	636	414	483	552	690
Public Area						
Waiting Lobby/Circulation	SF	1,498	1,562	1,864	2,225	2,901
CONCOURSE FACILITIES						
Passenger Holdrooms						
Gates	#	5	6	7	8	10
Holdroom Area	SF	1,619	2,839	3,348	3,907	4,986
Airline Operations	SF	0	3,600	3,900	4,800	6,000
Concourse Circulation						
Circulation Area	SF	0	852	1,004	1,172	1,496
PUBLIC SPACES						
Restrooms						
Area	SF	600	857	1,022	1,221	1,591
Concessions						
Food & Beverage	SF	0	493	657	891	1,329
Retail	SF	575	304	404	548	818
Support	SF	0	239	318	432	644
Rental Car						
Counter Frontage	LF	20	5	6	8	10
Counter and Office Area	SF	171	80	96	114	149
Counter Queuing Area	SF	80	43	51	61	80
Airport Administration						
Administration/Operations	SF	288	893	1,065	1,272	1,658
FUNCTIONAL AREA TOTAL						
Total Programmed Functional Area	SF	7,457	13,791	16,104	19,383	25,122
BUILDING SYSTEMS/SUPPORT						
Mechanical/HVAC	SF	253	552	644	775	1,005
General Circulation/Stairwells/Storage	SF	784	1,379	1,610	1,938	2,512
TOTAL TERMINAL						
Gross Building Area	**SF**	**8,494**	**15,721**	**18,359**	**22,096**	**28,639**

An airline gate represents an aircraft parking position adjacent to a terminal building and is used by a single aircraft for the loading and unloading of passengers and baggage. Initially, all aircraft may be ground-boarded, but as the number of flights by jets with 60 or more seats increase, it will be desirable to add loading bridges. Five of the six long term gates should ultimately be planned for loading bridges.

TABLE 3H
Destination Terminal Facility Requirements
Grand Canyon National Park Airport

		Annual Enplanement Planning Horizons			
		Initial 31,000	Short 52,000	Intermediate 114,000	Long 270,000
DEPARTURES PROCESSING					
Ticket Counters					
Utilization Factor	90%	49	78	143	251
Agent Positions	#	3	4	7	10
Frontage	LF	18	24	42	60
Area	SF	200	260	460	660
Ticket Lobby					
Queuing Area	SF	270	440	800	1,410
TSA Baggage Check	SF	360	480	840	1,200
Outbound Baggage	SF	860	1,150	2,020	2,880
Airline Ticket Office	SF	380	500	880	1,260
Ticket Lobby Circulation	SF	210	280	480	690
Public Area					
Circulation	SF	2,870	4,380	7,760	13,250
Security Stations					
Number	#	1	1	1	2
Queuing Area	SF	170	280	510	900
Station Area	SF	360	360	360	720
TSA Administration/Operations	SF	700	700	700	1,400
CONCOURSE FACILITIES					
Passenger Holdrooms					
Gates	#	2	3	4	6
Holdroom Area	SF	1,620	2,510	3,990	6,900
Airline Operations	SF	2,000	2,500	2,500	4,000
Concourse Circulation					
Circulation Area	SF	490	750	1,200	2,070
ARRIVALS PROCESSING					
Baggage Claim					
Passengers claiming bags	85%	46	74	135	237
Claim Display Frontage	LF	40	60	110	190
Claim Device Floor Area	SF	200	300	550	950
Inbound Baggage	SF	640	960	1,760	3,040
Baggage Service Office	SF	80	120	220	380
Claim Lobby					
Area Excl. Device Area	SF	1,090	1,760	3,200	5,630
Circulation Area	SF	660	1,060	1,930	3,380
PUBLIC SPACES					
Restrooms					
Area	SF	490	750	1,330	2,270
Concessions					
Food & Beverage	SF	370	620	1,370	3,240
Retail	SF	160	260	570	1,350
Support	SF	110	180	390	920
Rental Car					
Counter Frontage	LF	10	16	28	47
Counter and Office Area	SF	150	230	420	710
Counter Queuing Area	SF	80	130	220	380
Airport Administration					
Administration/Operations	SF	800	1,300	2,200	3,800
FUNCTIONAL AREA TOTAL					
Total Programmed Functional Area	SF	15,320	22,260	36,660	63,390
BUILDING SYSTEMS/SUPPORT					
Mechanical/HVAC	SF	610	890	1,470	2,540
General Circulation/Stairwells/Storage	SF	1,530	2,230	3,670	6,340
TOTAL TERMINAL					
Gross Building Area	**SF**	**17,460**	**25,380**	**41,800**	**72,270**

Departure lounge requirements depend upon the number of passengers in the departure areas during peak periods. This can also be dependent upon the size of aircraft as well. Departure lounge requirements have tended to increase since the events of 9-11 as passengers prefer to move through the security process and wait in the departure area.

Baggage claim facilities are based upon the number of arriving passengers during peak periods. As a tourist destination, most passengers are anticipated to have bags, but few meters and greeters will occupy the bag claim area with the passengers.

Public spaces include passenger and visitor-oriented amenities, concessions, and services other than those provided by the airlines. Restrooms, concessions, and rental car facilities have been shown as well as the space necessary for airport administration and operations related to the terminal. Because this is a tourist destination airport, demands for rental cars and shuttle services could be higher than normal ratios. Retail and restaurant space is shown at average levels, but may need to be expanded beyond the normal standards.

As indicated on **Table 3H**, a 17,500 square-foot terminal could accommodate the 31,000 initial enplanement milestone. A 25,400 square foot building would accommodate the short term horizon of 52,000 enplanements. For the long term horizon of 270,000 enplanements, capability to expand to 72,000 square foot should be planned for destination passengers.

GROUND ACCESS REQUIREMENTS

The passenger terminal building serves as the primary interface between air and ground transportation. Ground access to the terminal area is an important consideration as access and convenience can positively influence the overall growth of an airport. The primary components to be examined are:

- Airport and Terminal Access Roadway
- Terminal Curb Frontage
- Terminal Vehicle Parking
- Multi-Modal Considerations

AIRPORT AND TERMINAL ACCESS ROADWAY

In terminal facility planning, both on- and off-airport vehicle access is important. For the convenience of the traveler (and to provide maximum capacity), access to the terminal should include (to the extent practical) connections to the major arterial roadways near the airport.

The capacity of the airport access and terminal area roadways is the maximum number of vehicles that can pass over a given section of a lane or roadway during a given time period. It is normally preferred that a roadway operate below capacity to provide reasonable flow and minimize delay to the vehicles using it.

State Route 64 is the primary airport access road to both the airport and Grand Canyon National Park. It is a

two-lane highway south of the airport and is a four-lane roadway with a center turn lane as it passes through the commercial area of Tusayan. As it passes the airport, there are two southbound lanes and a single northbound lane. The right southbound lane generally serves as a right turn lane into the airport's two entrances. There are also left turn lanes for northbound traffic at both airport intersections. According to ADOT traffic count data, the SR 64 AADT (annual average daily traffic) was 6,235 vehicles in 2008.

As with the terminal, the means for describing the operational efficiency of a given roadway segment is defined in terms of six descriptive service levels. These levels of service (LOS) range from A to F and are defined as follows:

- **LOS A** – Free flowing traffic with minimal delays.
- **LOS B** - A stable flow of traffic, with occasional delays due to the noticeable presence of others in the traffic stream.
- **LOS C** – Still stable flow, but operations become more significantly affected by the traffic stream. Periodic delays are experienced.
- **LOS D** – Flow becomes more high density with speed and freedom to maneuver becoming severely restricted. Regular delays are experienced.
- **LOS E** – Maximum capacity operating conditions. Delays are extended and speeds are reduced to a low, relatively uniform level.
- **LOS F** – Forced flow with excessive delays. A condition where more traffic is approaching a point than can traverse the point.

Level of Service "C" is generally considered as the threshold of acceptable traffic conditions during peak periods in a generally rural area near an airport.

With the growth in visitors projected by the Park Service, the AADT on SR 64 could be expected to increase to 9,000 by the long term planning horizon. Airport-generated traffic was projected using Institute of Traffic Engineers (ITE) methodology. Based upon current and projected air tour, general aviation, and other air taxi activity, the airport would contribute 469 vehicles per day to this increase, growing from 792 to 1,261 vehicles per day. Destination airline traffic would generate 2,078 additional vehicles per day during the peak month. It was assumed that approximately half of the destination airline traffic would be newly generated airport traffic. Therefore, the AADT on the highway could increase to 10,000 by the long term planning horizon.

Primary access roads to an airport in the type of setting described above can typically provide a capacity of 700 to 800 vehicles per hour in at-grade interrupted flow conditions. With the available turn lanes, it is estimated that the highway in front of the airport has a capacity of approximately 1,600 to 1,800 vehicles per hour. This would be marginally adequate for the long term. As traffic continues to develop, it may become necessary to consider extending the four-lane roadway with center turn lane design south

from Tusayan past the airport entrances. In addition, signalization of the airport's intersections may also need to be considered by the long term.

According to the ITE model, traffic entering the airport can be expected to grow from 800 to 3,400 vehicles per day at the long term planning horizon. Peak hour traffic would grow from 120 to as much as 500 in the long term. The lanes in front of the current terminal are sufficient to handle up to 900 vehicles per hour. The combination of the two entrances should have the capability to accommodate this level of traffic. Access to the terminal or terminals will need to be evaluated based upon the final proposed concept.

TERMINAL CURB FRONTAGE

The curb element is the interface between the terminal building and the ground transportation system. The length of curb required for the loading and unloading of passengers and baggage is determined by the type and volume of ground vehicles anticipated in the peak period on the design day. A typical problem for terminal curb capacity is the length of dwell time for vehicles utilizing the curb. At airports where the curb front has not been strictly patrolled, vehicles have been known to be parked at the curb while the driver and/or riders are inside the terminal checking in, greeting arriving passengers, or awaiting baggage pickup. Since most curbs are not designed for vehicles to remain curbside for more than two to three minutes, capacity problems can ensue. Since the events of September 11, 2001, most airports police the curb front much more strictly for security reasons. This alone has reduced the curb front capacity problems at most airports.

The existing terminal building curb is approximately 315 feet in length. The mix at the curb during peak periods can include buses, shuttles, as well as individual vehicles. Taking into account this mix, **Table 3J** presents terminal curb needs through each planning horizon for the fixed wing air tour terminal operations.

TABLE 3J
Fixed Wing Air Tour
Terminal Curb and Parking Requirements
Grand Canyon National Park Airport

	Available	Current	Short Term	Inter-mediate	Long Term
Annual Enplanements		151,803	202,100	274,000	409,000
Terminal Curb Length (ft.)	315	240	290	350	460
Air Tour Parking (spaces)					
Auto Parking	125	112	134	160	209
Shuttle Parking	0	12	13	18	27
Bus Parking	34	17	20	27	40
Rental Car	20	21	24	32	48
Employee Parking	30	17	20	24	31
Total Vehicle Parking	209	179	211	261	355

The current length should be adequate through the short term horizon, but additional curbfront will be needed as activity approached 274,000 annual enplanements. For the long term planning horizon, 460 feet of terminal curb is estimated.

Table 3K provides an estimate of the curbfront that will be required for the destination airline activity horizons. While less than 200 feet of curb would be adequate through the short term, 580 feet should be planned for the long term planning horizon.

TABLE 3K
Destination Airline Terminal Curb and Parking Requirements
Grand Canyon National Park Airport

	Initial	Short Term	Inter-mediate	Long Term
Annual Enplanements	31,000	52,000	114,000	270,000
Terminal Curb Length (ft.)	110	180	330	580
Destination Parking (spaces)				
Auto Parking				
Short Term	15	23	42	71
Long Term	33	55	121	286
Total Auto Parking	48	78	163	357
Shuttle Parking	3	5	10	24
Bus Parking	1	1	2	5
Rental Car Ready/Return	20	33	72	170
Employee Parking	16	23	46	81
Total Vehicle Parking	88	40	293	637

TERMINAL VEHICLE PARKING

Vehicle parking in the passenger terminal area of the airport includes those spaces utilized by passengers, visitors, rental car agencies, and employee parking for those working in the terminal complex. Parking spaces can be classified as public, employee, and rental car.

There are a total of 209 terminal building parking spaces for patrons and employees, including 20 spaces for rental cars, and 34 spaces for buses and shuttle vans.

As an airport located in a remote tourist location, most GCN passengers are visitors to the area. Subsequently, the ratio of public parking to enplaned passengers will be significantly lower than might be expected in typical airport settings.

At the fixed wing air tour terminal, public parking requirements were based upon a ratio to peak hour passengers. These would involve persons visiting the area that drive and park at the airport to take an air tour. The other key parking factor for the air tour terminal is bus parking. Space is provided for staging buses waiting for tour passengers to arrive on a flight. The requirements for bus and shuttle parking are based upon a ratio of design day passengers that will utilize buses. Rental car requirements at the air tour terminal are limited as most air tour passengers already have other ground transportation upon arrival.

The parking requirements for the air tour terminal are outlined in **Table 3J.** The current parking will be generally adequate through the short term planning horizon. Up to 355 spaces could be needed in the long term.

The destination terminal parking requirements can be expected to have a much higher rental car requirement, as many destination passengers will be looking for vehicles to tour the area. **Table 3K** presents forecast destination airline terminal vehicle parking needs. Total parking requirements are projected at 140 for the short term planning horizon, but growing to 637 by the long term horizon, 170 of which will be rental car ready/return spaces.

MULTI-MODAL CONSIDERATIONS

The airport's proximity to the South Rim in Grand Canyon National Park has generated consideration of several multi-modal opportunities for mass transit between the two. The air/bus tour packages already offered by the operators on the airport are examples of the mass transit connection potentials.

The National Park Service's *South Rim Visitor Transportation Plan* includes among its primary objectives:

- Improve private vehicle parking as needed to meet current and future visitor demand.
- Reduce overall vehicle traffic through Grand Canyon Village in 202 by 15 to 20 percent during peak periods.
- Work with gateway communities to achieve mutual transportation goals.

The preferred alternative of the *South Rim Visitor Transportation Plan* includes increasing parking within the park but also expanding the park's shuttle bus system to four to six stops in Tusayan and the airport.

The plan calls for the development of up to 400 visitor parking spaces and a shuttle bus transfer station on Kabib National Forest Land outside the South Rim Gate. The Shuttle Bus System would also serve the lodges in Tusayan as well as the airport as a means of reducing the parking need within the park.

This plan would provide bus service to the airport and could potentially reduce other vehicle parking needs. It also has the potential for increasing parking needs at the airport, particularly during overflow periods in the park.

While included in the current plan, other modes of transportation between the airport and the park have been considered, including a rail spur and a monorail system. Both would require a route within the airport for their rail line as well as a terminus near the passenger terminal.

Additional parking would also be required to meet the needs of non-air visitors utilizing either rail mode to access the park. While it is difficult to quantify space requirements without more details, these remain alternate modes that should be given consideration within the terminal area plan.

GENERAL AVIATION FACILITIES

General aviation (GA) facilities are those necessary for handling general aviation and other air taxi aircraft and passengers while on the ground. This section is devoted to identifying future GA facility needs during the planning period for the following types of facilities normally associated with general aviation terminal areas:

- Hangars
- Aircraft Parking Apron
- General Aviation Terminal Services
- General Aviation Parking

HANGARS

The demand for hangar facilities typically depends on the number and type of aircraft expected to be based at the airport. Hangar facilities are generally classified as T-hangars, or conventional hangars. Conventional hangars can include individual box hangars or larger, multi-aircraft hangars. These different types of hangars offer varying levels of privacy, security, and protection from the elements.

Typical utilization of hangar space varies across the country as a function of local climate conditions, airport security, and owner preferences. The larger, more sophisticated and more expensive aircraft all tend to be stored in hangars. Owners of these types of aircraft normally desire hangar space to protect their investment. General aviation based aircraft at Grand Canyon National Park Airport is limited, with most of the based aircraft involved in air tour operations. The current general aviation based aircraft are on the parking apron. The National Park Service has the only true storage hangar on the airport, a 3,600 square-foot hangar south of the new ARFF building. At GCN, hangar space for overnight itinerant aircraft, especially turbine aircraft, may add some demand.

The final step in the process of determining hangar requirements involves estimating the area necessary to accommodate the required hangar space. A varying space requirement based upon based and itinerant aircraft activity to be hangared was applied.

A fixed base operator (FBO) hangar would include space for maintenance and overnight transient aircraft storage. Requirements for this hangar were estimated again based upon based aircraft, as well as itinerant GA and air taxi activity. The estimated hangar requirements are presented in **Table 3L**.

TABLE 3L
General Aviation Requirements
Grand Canyon National Park Airport

		Planning Horizons			
	Available	Current	Short Term	Inter-Mediate	Long Term
Fixed Wing Based Aircraft					
Single Engine Piston		6	7	7	8
Multi-Engine Piston		8	10	10	11
Turboprop		0	0	1	4
Jet		0	0	0	0
Total Based Aircraft		14	17	18	23
Hangar Space Requirements					
Conventional Hangar Space (s.f.)	3,600	4,800	5,900	7,400	12,500
Service Hangar Space (s.f.)	10,000	8,500	9,300	9,500	10,800
Total Hangar Space	13,600	13,300	15,200	16,900	23,300
Aircraft Parking Positions					
Based GA Aircraft		2	2	2	2
Transient GA/Air Taxi Parking		19	25	26	31
Corporate Jet Parking		2	2	3	4
Total Parking Positions	60	23	29	31	37
Total Apron Area (s.y.)	65,600	18,300	22,500	25,700	31,700
GA Design Hour Passengers					
Design Hour Itinerant Operations		8	11	12	14
Passengers per Operation		2.1	2.2	2.3	2.5
Design Hour Passengers		18	24	27	35
Terminal Services Building(s) (s.f.)	5,473	1,600	2,200	2,400	3,200
General Aviation Parking Spaces	NA	14	19	22	28

GENERAL AVIATION TERMINAL SERVICES

The general aviation terminal space is based upon the number of persons per aircraft during the design hour. Building space requirements were then estimated at 90 square feet per design hour passenger. There is currently 5,473 square feet of space in the Grand Canyon Airlines terminal. This area is also currently shared with the airlines' air tour operations. Because most general aviation activity is transient general aviation parking was estimated at 0.8 spaces per busy day operation. These requirements are also outlined on **Table 3L**.

GENERAL AVIATION PARKING AREA

Parking apron is utilized both by transient and based aircraft. The number of spaces required was estimated considering busy day activity by general aviation and other air taxi. Space planning criterion was related to the types of transient aircraft to be parked.

The results of this analysis are also presented in **Table 3L**. The 14,600 square-yard general aviation ramp at the north end of the terminal currently has 21 tie-down spaces. There is an additional 51,000 square yards of apron south of the terminal that is used by transient GA and air taxi air-

craft that do not tie-down or need access to the FBO. The combined 65,600 square yards is adequate for the planning periods, but space may need to be reorganized for better access to terminal services.

SUMMARY

The intent of this chapter has been to outline the terminal facilities required to meet the demands projected for Grand Canyon National Park Airport. A summary of the terminal area requirements is presented on **Exhibit 3A**. Following the facility requirements determination, the next step is to develop a direction for development to best address the potential needs. The remainder of the Terminal Area Plan will be devoted to conceiving a direction, its schedule, and its cost.

AVAILABLE		PLANNING HORIZONS CURRENT	SHORT TERM	INTERMEDIATE	LONG TERM
AIR TOUR TERMINAL					
Aircraft Gates:	5	6	7	8	10
Building Area (sf):	8,500	15,700	18,400	22,100	28,600
Curb Length (ft):	315	240	290	350	460
Vehicle Parking (spaces):	209	179	211	261	355
DESTINATION TERMINAL					
Aircraft Gates:	N/A	2	3	4	6
Building Area (sf):	N/A	17,500	25,400	41,800	72,300
Curb Length (ft):	N/A	110	180	330	580
Vehicle Parking (spaces):	N/A	88	140	293	637

AVAILABLE		PLANNING HORIZONS CURRENT	SHORT TERM	INTERMEDIATE	LONG TERM
GENERAL AVIATION					
Terminal Services Building (sf):	5,473	1,600	2,200	2,400	3,200
Aircraft Parking Apron (sy):	65,600	18,300	22,500	25,700	31,700
Conventional Hangars (sf):	3,600	4,800	5,900	7,400	12,500
Service (FBO) Hangars (sf):	10,000	8,500	9,300	9,500	10,800
Auto Parking (spaces):	N/A	14	19	22	28

Exhibit 3A
TERMINAL AREA
REQUIREMENTS SUMMARY

Chapter Four

ALTERNATIVES

Grand Canyon
NATIONAL PARK AIRPORT
TERMINAL AREA PLAN

CHAPTER FOUR

ALTERNATIVES

In the terminal planning process for Grand Canyon National Park Airport (GCN), it is important to review development potential and constraints at the airport. The purpose of this chapter is to consider the actual physical facilities which are needed to accommodate projected demand and meet the program requirements as defined in *Chapter Three - Terminal Area Facility Requirements*.

A series of terminal area development scenarios are considered for the airport. In each of these scenarios, different physical facility layouts are presented for the purpose of discussion and evaluation. The ultimate goal is to develop the underlying rationale which supports the final terminal area recommendations. Through this process, an evaluation is made while considering local goals, physical constraints, and federal airport design standards, where appropriate.

Any development proposed by a master plan evolves from an analysis of projected needs. Though the needs were determined by the best methodology available, it cannot be assumed that future events will not change these needs. The master planning process attempts to develop a viable concept for meeting the needs caused by projected demands through the planning period.

The number of potential alternatives which can be considered is endless. Therefore, some judgment must be applied to identify the alternatives which have the greatest potential for implementation. The alternatives presented in the chapter have been developed to meet the overall program

objectives for the terminal area in a balanced manner. Through coordination with the Planning Advisory Committees (PAC), the public, and the Arizona Department of Transportation (ADOT), the alternatives (or a combination thereof) will be refined and modified as necessary to shape the recommended development program. Therefore, the alternatives presented in this chapter were considered a beginning point for formulating the terminal plan development program, and input was necessary to define the resultant program.

MASTER PLAN REVIEW

Prior to presenting airport development alternatives, it is helpful to review some of the previous planning efforts and the subsequent development now in place. In particular, the airport master plan for GCN was completed in 2005. The master plan examined the future development needs of the entire airport, including both the airfield and the terminal area.

The plan evaluated three terminal building concepts to ultimately accommodate the 60,000 square-foot facility. These included two alternatives that relocated the terminal to a new site southeast of the existing terminal and one that involved the expansion of the existing terminal. The three were linear concepts with the first terminal designed to be a new, standalone centralized terminal. The second new terminal involved the development of four attached modular departure lounge structures. The alternative to expand the existing terminal also involved modular additions.

Although the modular expansion of the existing terminal was indicated as the preferred alternative in the alternatives analysis, the recommendations called for the development of a new terminal "along the southernmost portion of the terminal area complex, located adjacent to the aircraft parking apron." The plan also recommended a new operations and airport rescue and firefighting (ARFF) facility south of the terminal site. The ARFF facility was under construction at the time of this Terminal Area Plan with completion scheduled in 2010.

Exhibit 4A depicts the Terminal Area Plan Drawing from the master plan. The hatched area was recommended for terminal building development. In addition, 60 acres were also recommended for acquisition from the United States Forest Service (USFS) to accommodate future airport and federal employee housing, as well as potential long-range railroad and auto parking facilities.

Instead of revisiting the alternative locations for the terminal, the Terminal Area Plan will focus on alternatives for the development of the terminal building in the area proposed by the master plan. Consideration will be given to the potential reuses of the existing terminal.

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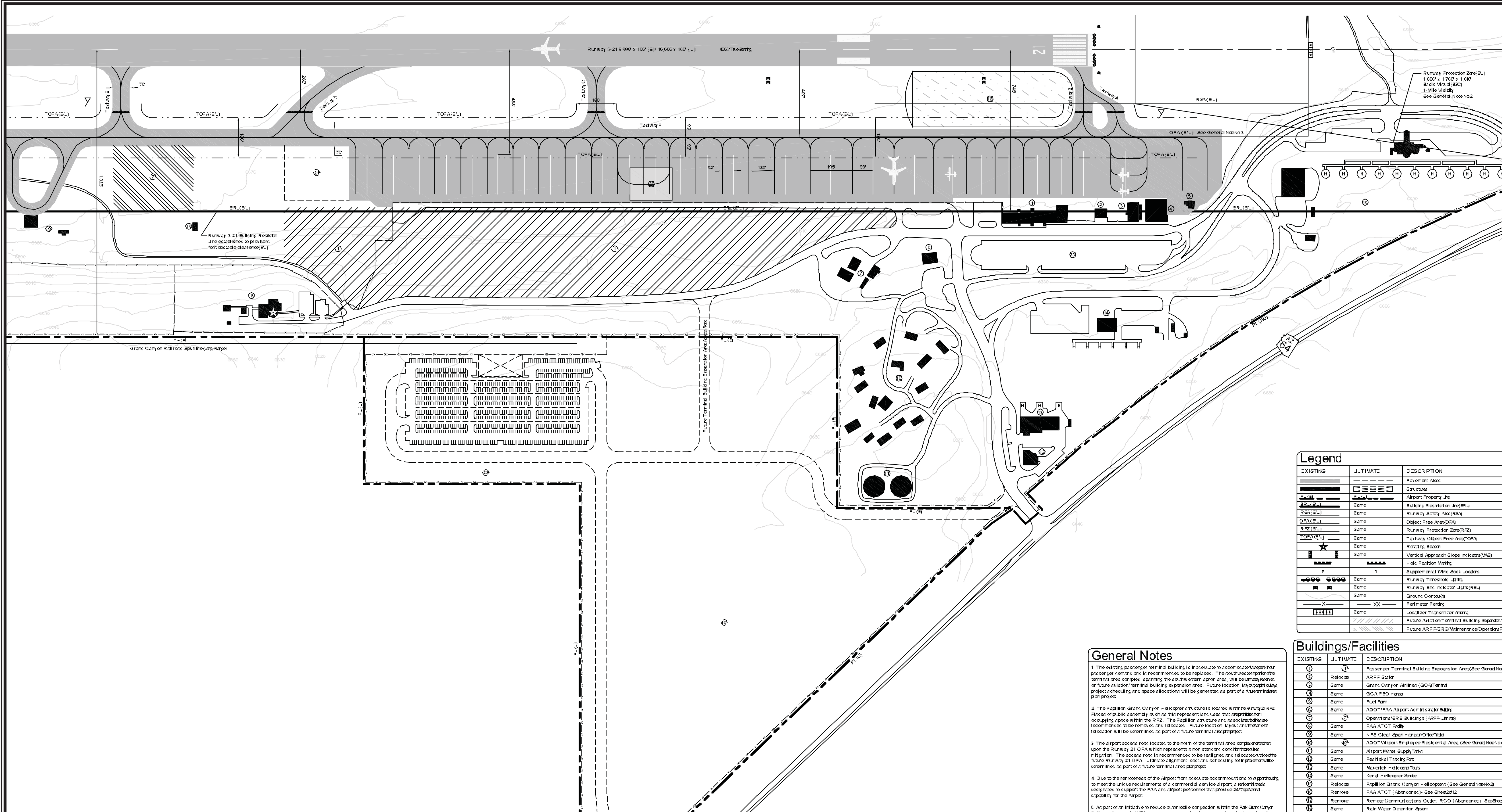

Legend

EXISTING	ULTIMATE	DESCRIPTION
		Pavement Areas
		Structures
P.L.(E)	P.L.(U)	Airport Property Line
BRL(E/U)	Same	Building Restriction Line(BRL)
RSA(E/U)	Same	Runway Safety Area(RSA)
OFA(E/U)	Same	Object Free Area(OFA)
RPZ(E/U)	Same	Runway Protection Zone(RPZ)
TOFA(E/U)	Same	Taxiway Object Free Area(TOFA)
	Same	Rotating Beacon
	Same	Vertical Approach Slope Indicators(VASI)
		Hold Position Marking
		Supplemental Wind Sock Locations
	Same	Runway Threshold Lighting
	Same	Runway End Indicator Lights(REIL)
	Same	Ground Contour(s)
X	XX	Perimeter Fencing
	Same	Localizer Transmitter Antenna
		Future Aviation/Terminal Building Expansion Area
		Future ARFF/SRE/Maintenance/Operations Facility

Buildings/Facilities

EXISTING	ULTIMATE	DESCRIPTION
1	1	Passenger Terminal Building Expansion Area (See General Note No 1)
2	Relocate	ARFF Station
3	Same	Grand Canyon Airlines (GCA) Terminal
4	Same	GCA FBO Hangar
5	Same	Fuel Farm
6	Same	ADOT/FAA Airport Administration Building
7	7	Operations/SRE Buildings (ARFF-Ultimate)
8	Same	FAA ATCT Facility
9	Same	NPS Clear Span Hangar/Office Trailer
10	10	ADOT/Airport Employee Residential Area (See General Note No 4)
11	Same	Airport Water Supply Tanks
12	Same	Peshlakai Trading Post
13	Same	Maverick Helicopter Tours
14	Same	Kenai Helicopter Service
15	Relocate	Papillion Grand Canyon Helicopters (See General Note No 2)
16	Remove	FAA ATCT (Abandoned) - See Sheet 2 of 12
17	Remove	Remote Communications Outlet - RCO (Abandoned) - See Sheet 2 of 12
18	Same	Rain Water Detention System
19	Same	Airfield Lighting Electrical Vault
20	Same	Aircraft De-Icing Pad
	21	Terminal Area Apron Expansion
	22	Railroad Depot/Staging Area (See General Note No 5)
23		Passenger Terminal Building Auto Parking Area

General Notes

1. The existing passenger terminal building is inadequate to accommodate future peak hour passenger demand and is recommended to be replaced. The southwestern portion of the terminal area complex, spanning the southwestern apron area, will be ultimately reserved for future aviation/terminal building expansion area. Future location, layout, capital outlays, project scheduling and space allocations will be generated as part of a future terminal area plan project.

2. The Papillion Grand Canyon Helicopter structure is located within the Runway 21 RPZ. Places of public assembly such as this represent land uses that are prohibited from occupying space within the RPZ. The Papillion structure and associated facilities are recommended to be removed and relocated. Future location, layout and timeframe for relocation will be determined as part of a future terminal area plan project.

3. The airport access road located to the north of the terminal area complex encroaches upon the Runway 21 OFA which represents a non standard condition that requires mitigation. The access road is recommended to be realigned and relocated outside of the future Runway 21 OFA. Ultimate alignment, cost and scheduling for improvement will be determined as part of a future terminal area plan project.

4. Due to the remoteness of the Airport from adequate accommodations to support housing to meet the unique requirements of a commercial service airport, a residential area is designated to support the FAA and airport personnel that provide 24/7 operational capability for the Airport.

5. As part of an initiative to reduce automobile congestion within the Park, Grand Canyon Railroad, located in Williams, proposed a regional transportation plan that would provide railroad access to the airport, as well as shuttle bus surface transportation to/from the Grand Canyon Village to manage vehicular flow during peak tourism periods. Approximately 25 acres of NPS land located to the southwest of terminal area complex would be acquired to accommodate auto parking facilities, a railroad staging area and depot, as well as a rail spurline in the event that this long-range transportation plan would be successfully implemented.

Terminal Area Design Criteria

TERMINAL AREA STANDARD	AIRPLANE DESIGN GROUP (ADG) GROUP II	GROUP III
Runway ℄ to Parallel Taxiway ℄ Separation	240'	400'
Taxiway ℄ to Fixed or Movable Object	65.5'	93'
Taxiway ℄ to Parallel Taxiway ℄ Separation	105'	152'
Taxiway Object Free Area Width	131'	186'
Taxiway Safety Area Width	79'	118'
Taxiway Wingtip Clearance	26'	34'
Taxiway Width	35'	50'
Taxilane Object Free Area Width	115'	162'
Taxilane ℄ to Parallel Taxilane ℄ Separation	97'	140'
Taxilane ℄ to Fixed or Movable Object	57.5'	81'

North Point

Magnetic Variation:
12° 51' E (April, 2005)
Annual Rate of Change
0° 6' W

NORTH
MAGNETIC

Scale

200 100 0 200
Distance In Feet

BUCHER, WILLIS & RATLIFF CORPORATION
ENGINEERS | PLANNERS | ARCHITECTS

Kimley-Horn and Associates, Inc.

Planned By: MAW	Drawn By: MAW	Reviewed By: BCW

FAA AIP Project No. 03-04-0019-17&18

BWR Project No. 2003-07401

Arizona Department of Transportation
Aeronautics Division

Grand Canyon National Park Airport

Terminal Area Drawing

ADOT

Sheet 8 of 11

Sept. 22, 2005

Exhibit 4A
TERMINAL AREA DRAWING
2005 MASTER PLAN

TERMINAL BUILDING ALTERNATIVE SCHEMES

The proposed terminal building site is located along the active flight line closer to midfield of the runway than the current terminal building. This location also provides better separation between the terminal building, and its potential security requirements, and the general aviation areas on the airport. Currently, general aviation uses ramp on either side of the terminal. With the anticipated addition of destination flights, a more secure passenger terminal area will be desirable.

The proposed area begins at the elevation of the parking ramp, and then slopes upward to the east. Overall, the site rises over 40 feet to the east property line. There is a shelf of lower slope that begins approximately 150 feet east of the ramp, providing lesser relief for approximately 400 feet. The terrain then rises once more to the existing roadway and the property line. This shelf provides some opportunities for a two-level terminal concept that takes advantage of the relief.

Three alternative terminal building designs were considered. All are designed to service the proposed demand. These are discussed below.

SCHEME A

The Scheme A terminal floor plan conceptual design is based on the intermediate square footage projections outlined in *Chapter Three - Terminal Facility Requirements,* of this report. The plan incorporates air tour and destination airline operations into one centralized terminal facility. As presented in the elevation view of **Exhibit 4B**, passengers enter the terminal from the curbside vehicular drop-off area beneath an expansive cantilevered roof canopy that both defines the main public entry to the terminal and protects passengers from the weather. The vestibule on the interior side of the protected canopy opens onto a lobby space that affords easy access to retail space, as well as the destination and air tour airline ticket counters/queuing areas.

The main level of the facility also includes space for administrative support offices, concessions/retail space, a feature restaurant, baggage claim, TSA/ security, restrooms, as well as hold rooms with loading bridges designed to serve larger jet aircraft. The lower level of the terminal includes hold rooms for ground loaded aircraft, retail/food and beverage space, restrooms, TSA administration, TSA baggage check, inbound and outbound baggage, airline operations, and mechanical/electrical rooms.

The upper and lower levels of Scheme A are presented on **Exhibits 4C** and **4D**, respectively. The Scheme A floor plan takes into consideration the possibility that future security requirements may necessitate that air tour passengers pass through TSA screening prior to entering their designated hold rooms. As a potential solution to meet this requirement, the Scheme A floor plan concept considers a centralized TSA screening operation with all air tour and destination passengers

proceeding through TSA security prior to entering their designated hold room. In development of the Scheme A floor plan, the following positive and negative considerations were evaluated:

- **(+)** Split level floor plan concept allows for flexibility of passenger loading.
- **(+)** Greater flexibility of air tour and destination airline hold room designation.
- **(+)** Cost avoidance through utilization of centralized vertical circulation serving all lower and main level hold rooms.
- **(+)** Less complex way-finding through centralized vertical circulation.
- **(-)** Restaurant space isolated on secure side of terminal disallowing access to the general public.
- **(-)** TSA security operations becomes prominent feature viewed from main entry.
- **(-)** Screening operation impedes views to airfield and circulation.

SCHEME B

The Scheme B terminal floor plan conceptual design is also based on the intermediate square foot-age projections outlined in *Chapter Three - Terminal Facility Requirements,* of this report. This plan also incorporates air tour and destination airline operations into one centralized terminal facility. The elevation view of **Exhibit 4B** generally applies to this scheme as well.

Scheme B, as presented on **Exhibits 4E** and **4F**, considers TSA requirements as they currently exist allowing for the separation of destination and air tour passengers into secure and non-secure hold rooms, respectively. The Scheme B plan isolates security screening operations off the central axis of the main lobby which creates a definitive designation between the secure and non-secure hold room areas on both the main and lower levels of the terminal. In development of the Scheme B floor plan, the following positive and negative considerations were evaluated:

- **(+)** Split level floor plan concept allows for flexibility of passenger loading.
- **(+)** Restaurant space located in non-secure area of terminal to allow access to general public.
- **(+)** Screening operations are non-obtrusive to the main entry and lobby.
- **(+)** Additional square footage available for non-secure retail space adjacent to ticketing and lobby.
- **(-)** Less flexibility of air tour and destination airline hold room assignments.
- **(-)** Added cost for duplicity of vertical circulation elements required to serve secure and non-secure hold rooms.
- **(-)** More complex way-finding with multiple vertical circulation elements.

SCHEME C

The Scheme C terminal floor plan concept design is based on the intermediate term square footage project re-

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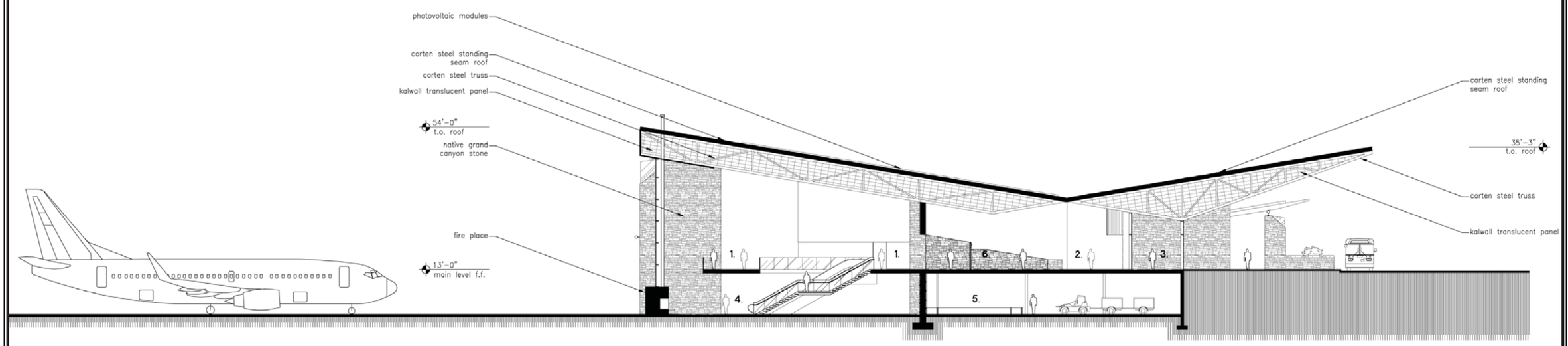


TERMINAL SECTION A-A

0 4' 8' 16' 32'
SCALE

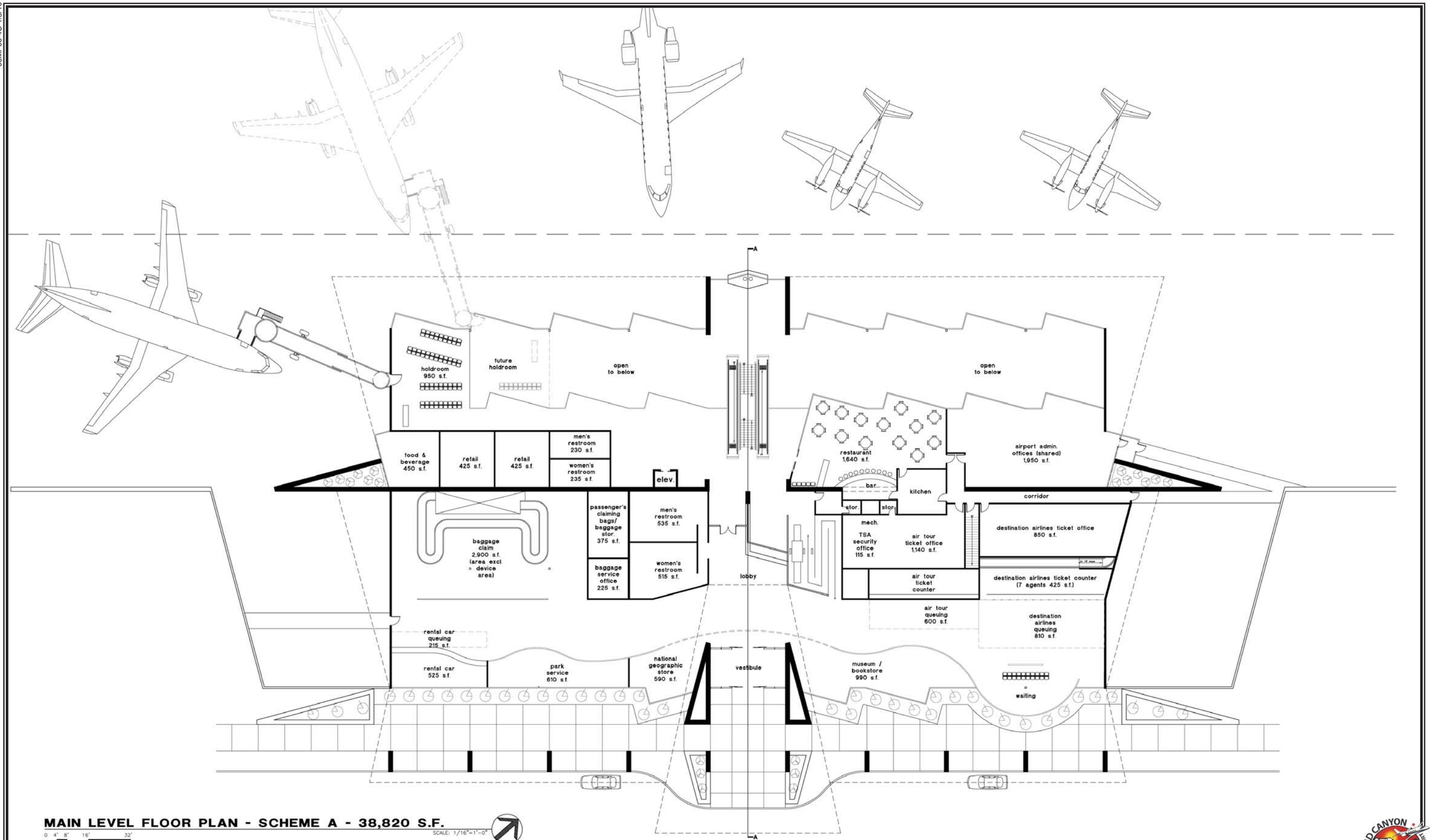
SCALE: 1/16"=1'-0"

SPACE KEY

1. SECURED LOBBY
2. UNSECURED LOBBY
3. VESTIBULE
4. SECURED HOLDROOM
5. IN-BOUND BAGGAGE
6. TSA SECURITY CHECK

Exhibit 4B
CONCEPTUAL ELEVATION VIEW
(ALL SCHEMES)

08MP08-4C-1/5/10



MAIN LEVEL FLOOR PLAN - SCHEME A - 38,820 S.F.

0 4' 8' 16' 32'
SCALE

SCALE: 1/16"=1'-0"

Exhibit 4C
SCHEME - A
UPPER LEVEL FLOOR PLAN

08MP08-4D-1/5/10

holdroom
4,050 s.f.

holdroom
4,050 s.f.

men's
restroom
230 s.f.

food &
beverage
450 s.f.

retail
425 s.f.

retail
425 s.f.

women's
restroom
235 s.f.

jan./
stor.

elev.

elev.
equip.

stor.

women's
restroom
250 s.f.

men's
restroom
250 s.f.

TSA
administration
700 s.f.

TSA
baggage
check
880 s.f.

elec.
room
570 s.f.

mech.
room
2,510 s.f.

inbound
baggage

airline ops.
(destination
& tour)
7,020 s.f.

outbound
baggage

A

A

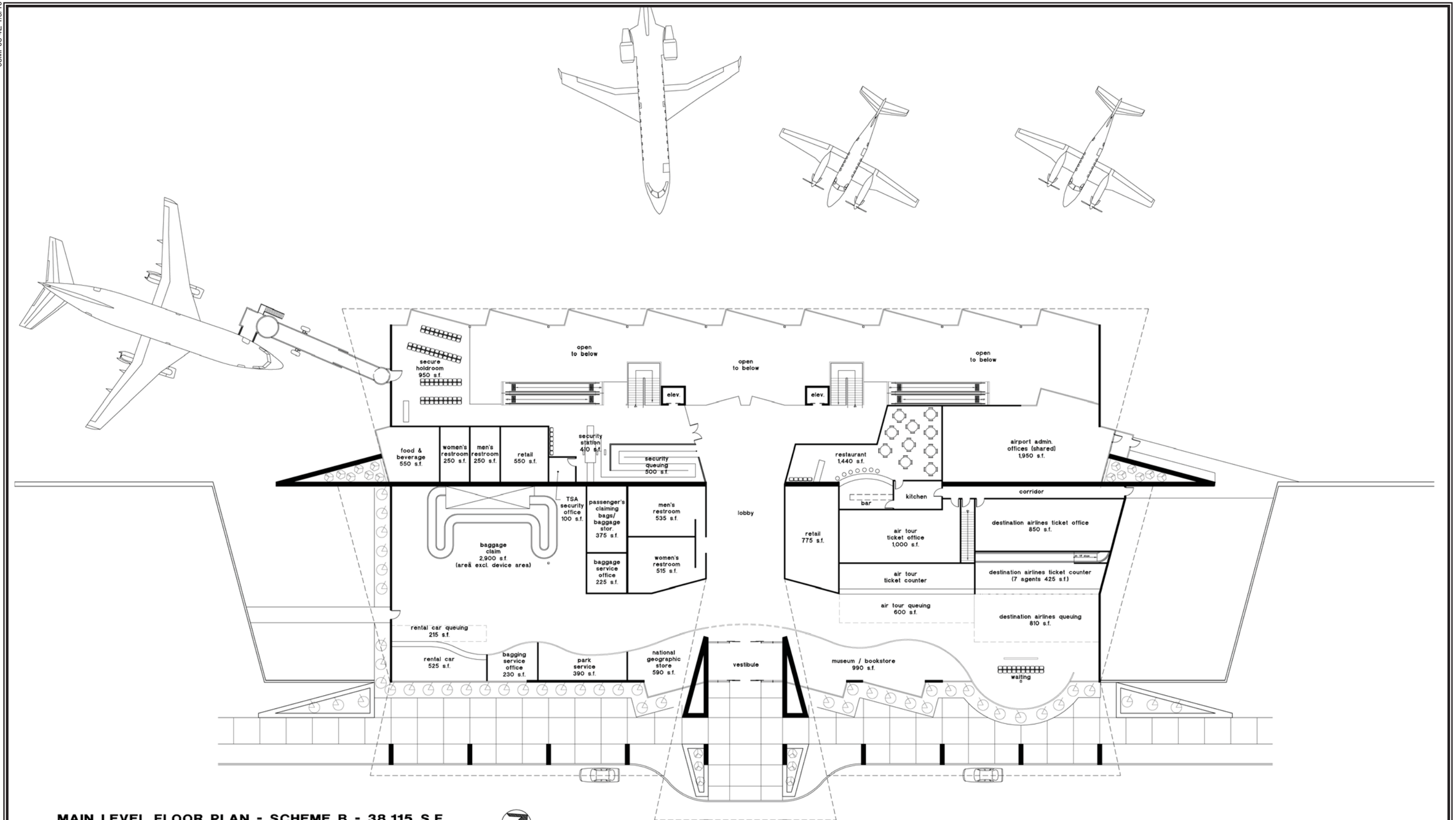
LOWER LEVEL FLOOR PLAN - SCHEME A - 38,500 S.F.

0 4' 8' 16' 32'
SCALE

SCALE: 1/16"=1'-0"

Exhibit 4D
SCHEME - A
LOWER LEVEL FLOOR PLAN

08MP08-4E-1/5/10



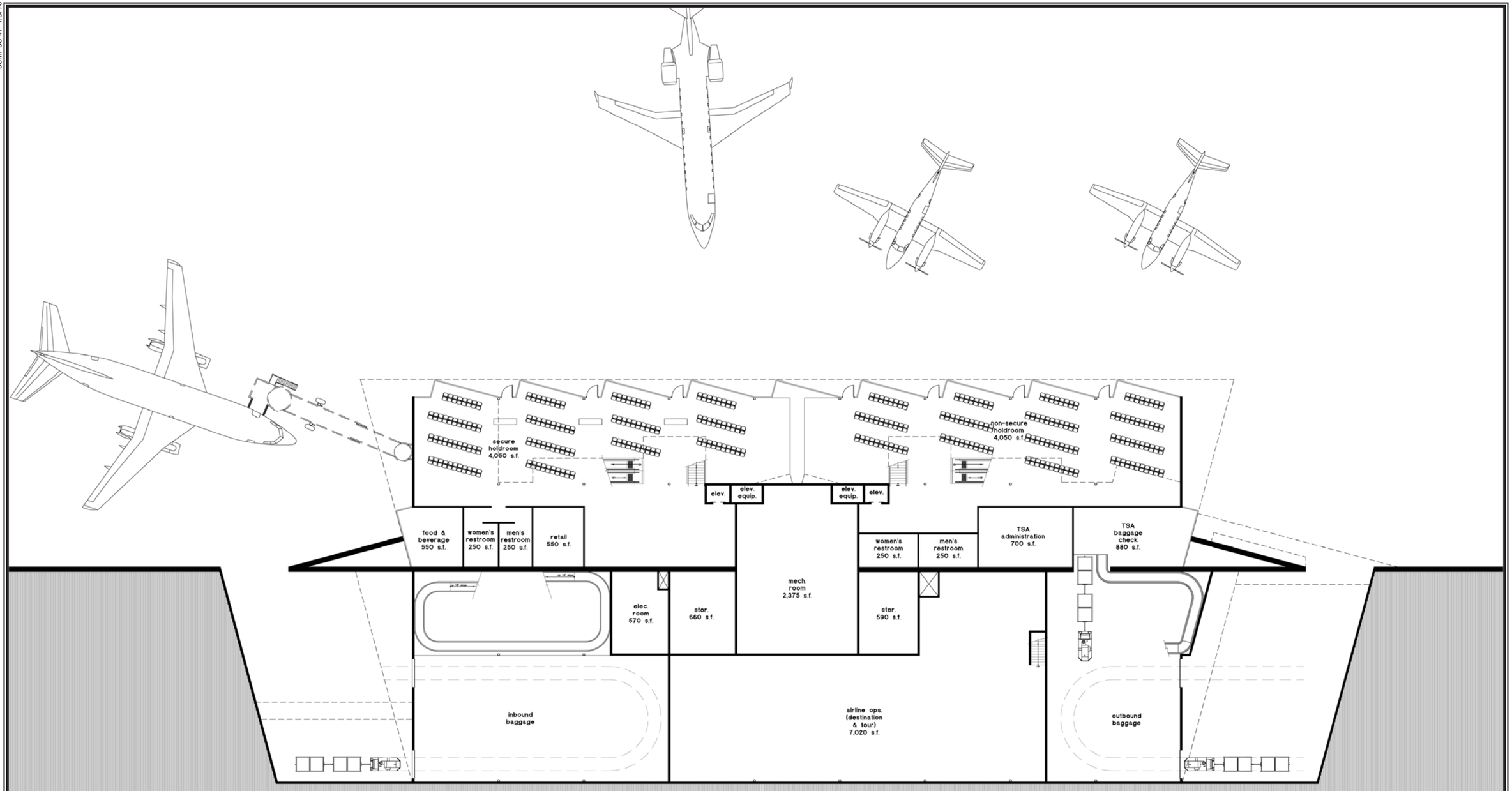
MAIN LEVEL FLOOR PLAN - SCHEME B - 38,115 S.F.

0 4' 8' 16' 32'
SCALE

SCALE: 1/16"=1'-0"

Exhibit 4E
SCHEME - B
UPPER LEVEL FLOOR PLAN

08MP08-4F-1/5/10



LOWER LEVEL FLOOR PLAN - SCHEME B - 37,840 S.F.

SCALE: 1/16"=1'-0"

0 4' 8' 16' 32'
SCALE

GRAND CANYON NATIONAL PARK AIRPORT

Exhibit 4F
SCHEME - B
LOWER LEVEL FLOOR PLAN

quirements outlined in *Chapter Three*. As depicted on **Exhibits 4G** and **4H**, Scheme C considers a terminal facility designed to accommodate destination airline operations only. The Scheme C concept assumes that air tour airlines would continue to operate out of the existing terminal and/or other existing facilities. The spatial relationships of the Scheme C plan are similar to the split level concept of Schemes A and B, but at a reduced scale, excluding the feature restaurant space.

The Scheme C floor plan is designed to allow for future expansion to the east and west along the flight line. It would accommodate additional destination airline demand. Adjustments would be necessary to relocate air tour operations from their existing facilities under this alternative. In the development of Scheme C, the following positive and negative considerations were evaluated:

- **(+)** Split level floor plan concept allows for flexibility of passenger loading.
- **(+)** Reduced initial capital investment for Phase 1 terminal build out.
- **(+)** Reduced parking, site, and infrastructure costs.
- **(+)** Cost avoidance through utilization of centralized vertical circulation serving all lower and main level hold rooms.
- **(-)** Separating air tour operations from main terminal reduces total passenger revenue generating retail and concession opportunities.
- **(-)** Existing terminal supporting current air tour operations is antiquated with ADA and various other deficiencies.

KIVA POD SHELTERS

The Kiva Pod concept was explored as a means to provide shelter, restroom facilities, and limited concessions for air tour passengers without the expense of constructing additional hold rooms inside a centralized terminal facility. The Kiva Pod concept is designed to take advantage of the expansive area available for aircraft parking along the existing apron. As shown on **Exhibit 4J**, the Kiva Pod shelters would be located northeast of the terminal at approximately two hundred and fifty feet on center along the flight line. They could be accessed by an electric vehicle that transports air tour passengers from the main terminal building. In development of the Kiva Pods floor plan, the following positive and negative considerations were evaluated:

- **(+)** Utilizes existing apron space to maximize aircraft parking flexibility
- **(+)** Reduced initial building cost required to serve air tour operations
- **(+)** Ease of expansion
- **(-)** Separates air tour hold rooms from main terminal facility

TERMINAL AREA ALTERNATIVES

Besides the terminal building, there are several other functions to be ac-

commodated in the terminal area. These include general aviation facilities, other aviation support facilities, as well as access and parking. The interrelationship of these functions is important in defining a long range terminal area layout for the airport. To a certain extent, landside uses need to be grouped with similar uses that are compatible; other functions should be separated or at least have well-defined boundaries for purposes of security, safety, and/or efficient operations. Finally, each landside use must be planned with airfield access, as well as ground access, that is suitable for its function.

While significant growth in general aviation in not foreseen, the plan should allow a location for an additional fixed base operator (FBO) to serve general aviation. Another consideration is the re-use or removal of the existing terminal building.

Parking and access is also a major consideration. The new terminal will need to have a parking lot that meets the requirements outlined in the previous chapter, as well as a terminal road and circulation. Bus parking and staging must also be considered. Vehicle access from the airport's two entrances is also a factor. Finally, the plan should consider long range opportunities for multi-modal access to the terminal from either a future monorail that would extend through Tusayan and into the park, or a rail line that would connect with the current rail into the park.

The following three alternatives examine a variety of options for providing the other key terminal area uses.

TERMINAL AREA ALTERNATIVE 1

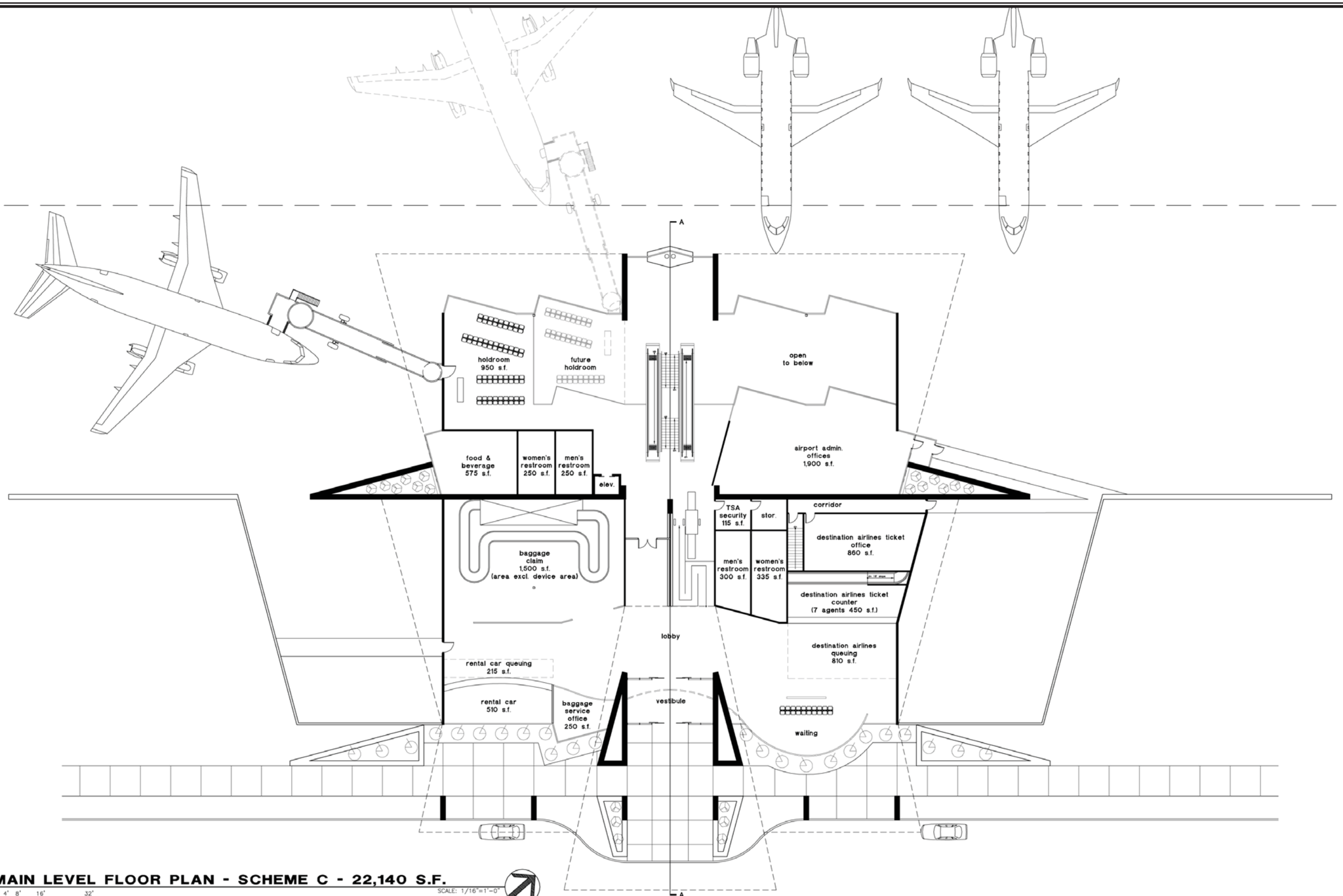
Alternative 1 considers removal of the existing terminal after a new terminal is developed and replacing it with general aviation hangars. As shown on **Exhibit 4K**, the current site is large enough to accommodate up to three 150-foot x 150-foot hangars. These could be used to house an FBO, small airline maintenance, or to store aircraft.

The existing parking lot would continue to serve general aviation, while a portion could be used for staging tour buses prior to moving to the terminal to pick up passengers.

Access to the new terminal would utilize the existing on-airport road system as well as a direct access to Highway 64 through the national forest lands east of the airport. This would feed into a loop system around a surface parking lot designed to accommodate all terminal parking needs as well as some monorail parking. As a result, the parking lot would extend slightly into USFS property east of the airport.

The monorail would run from the parking lot northeast between the helicopter facilities and the existing terminal parking, then on into Tusayan and the park.

08MP08-4G-1/5/10



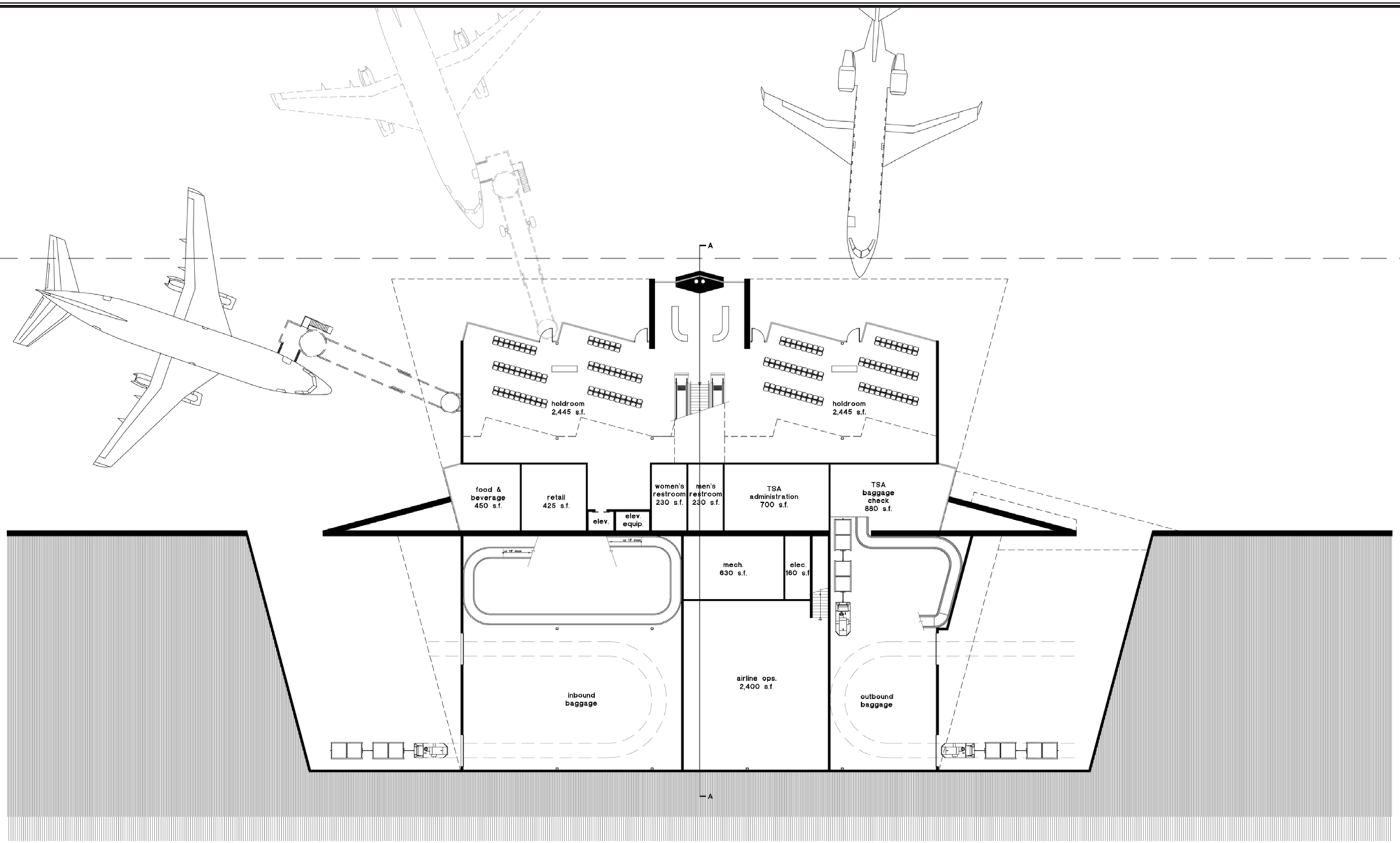
MAIN LEVEL FLOOR PLAN - SCHEME C - 22,140 S.F.

SCALE: 1/16"=1'-0"

0 4' 8' 16' 32'
SCALE

Exhibit 4G
SCHEME - C
UPPER LEVEL FLOOR PLAN

08MP08-4H-1/5/10



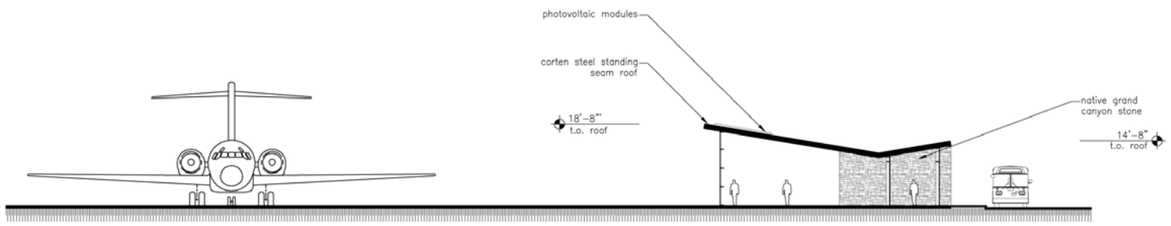
LOWER LEVEL FLOOR PLAN - SCHEME C - 21,690 S.F.

0 4' 8' 16' 32'
SCALE

SCALE: 1/16"=1'-0"

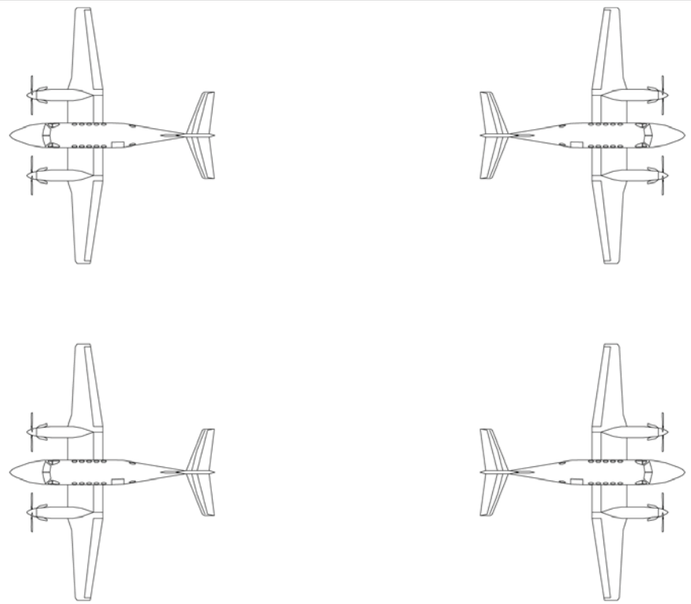
Exhibit 4H
SCHEME - C
LOWER LEVEL FLOOR PLAN

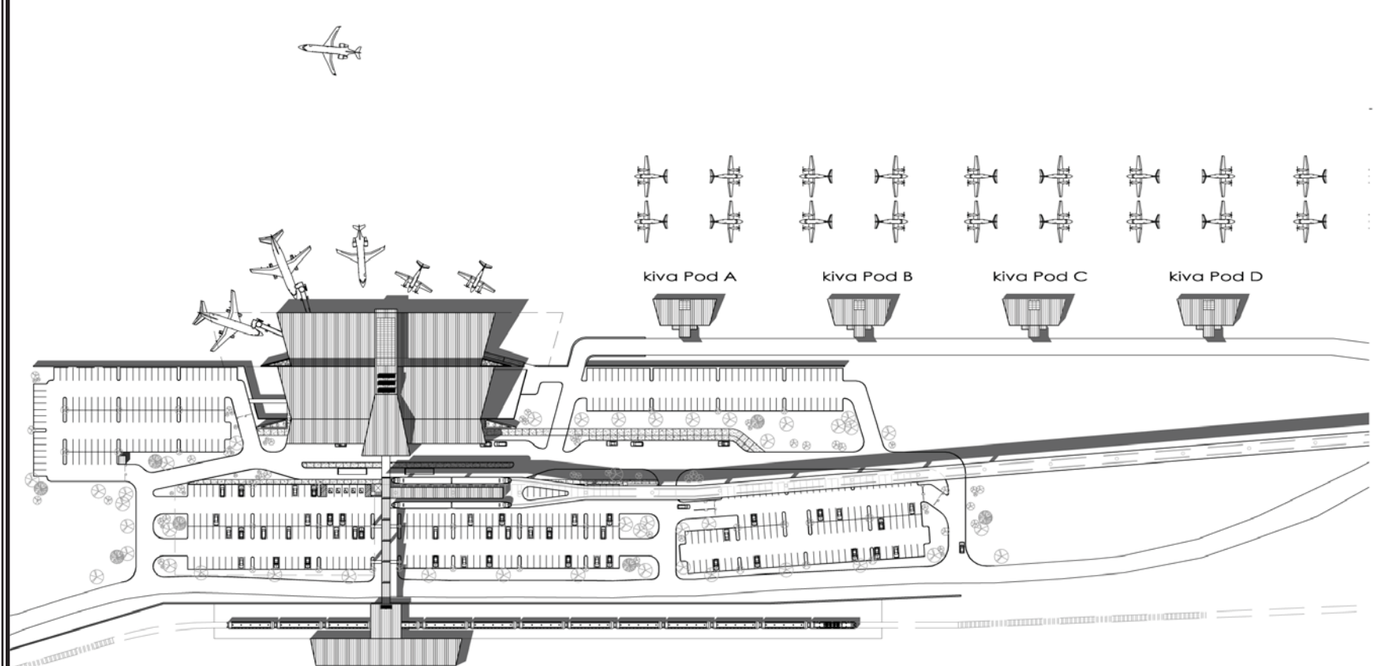
08MP08-4J-1/5/10



KIVA POD SECTION B-B

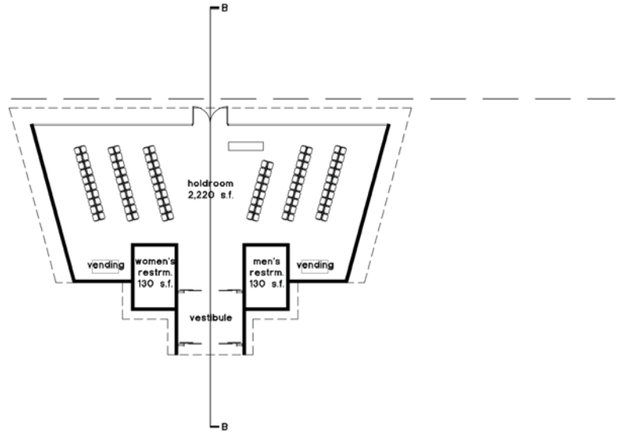
SCALE: 1/16"=1'-0"





KIVA POD SITE PLAN

SCALE: 1" = 100'



KIVA POD PLAN

SCALE: 1/16"=1'-0"

Exhibit 4J
KIVA POD SHELTERS

08MP08-4K-12/15/09

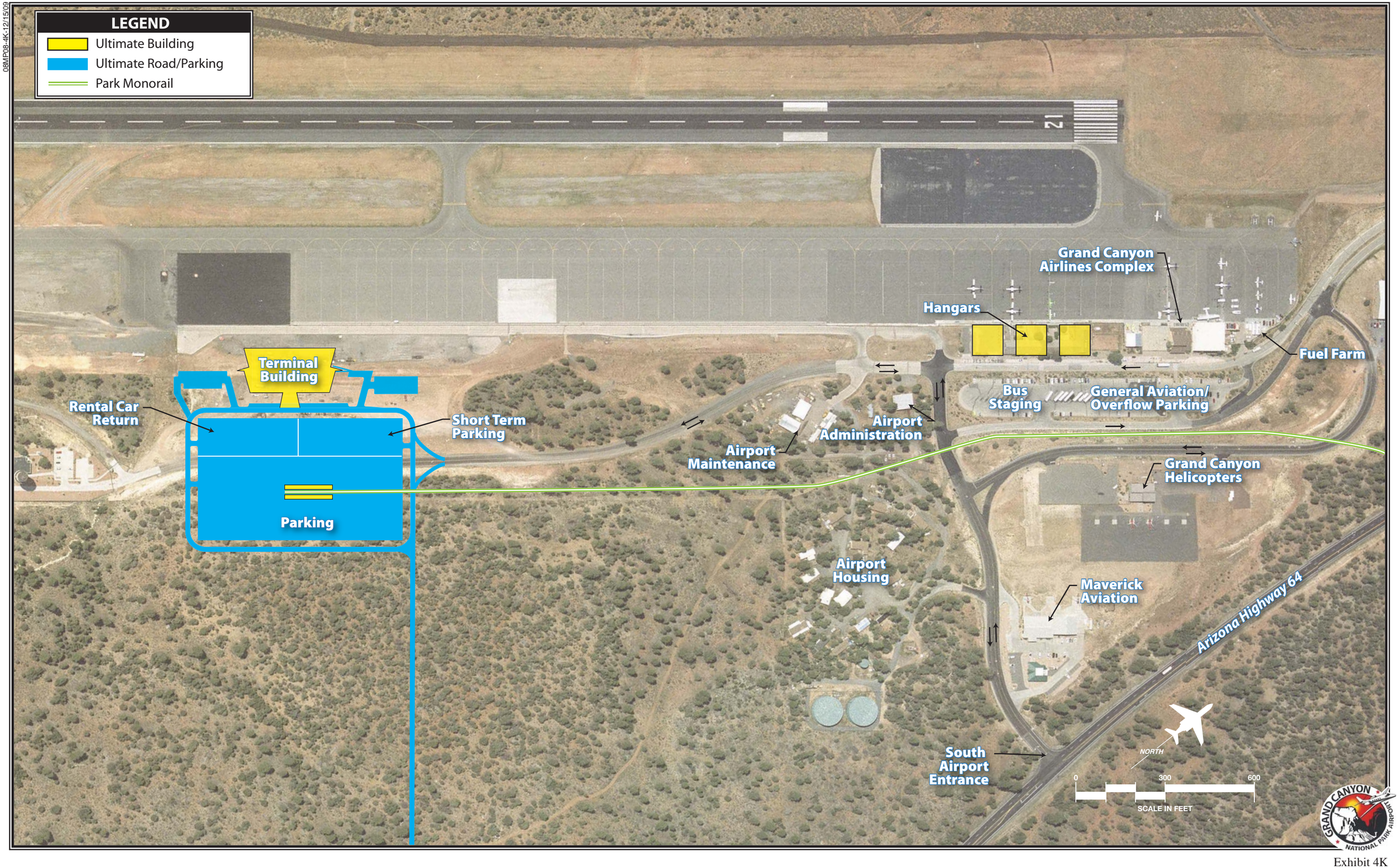


Exhibit 4K
ALTERNATIVE 1

TERMINAL AREA ALTERNATIVE 2

Alternative 2 is depicted on **Exhibit 4L**. This alternative essentially complements Terminal Building Scheme C where the air tour terminal would remain in its current location, with an expanded building. A general aviation hangar would be planned further southwest between the air tour terminal and the destination terminal. The parking lot in front of the existing terminal building would continue to be used as it currently is.

The new terminal would be able to operate with a smaller parking lot which could be expanded vertically if needed in the future to maintain a smaller footprint. The existing access system would be utilized. The new terminal would not have a true loop system but would include a one-way route in front of the terminal. The terminal roadway would have a separate entrance and exit to the current road that serves the control tower and the ARFF/operations building.

Under this alternative, the monorail could be developed into the front of the parking lot just across the street from the new terminal.

TERMINAL AREA ALTERNATIVE 3

The third terminal area alternative is depicted on **Exhibit 4M** and maintains the existing passenger terminal building to serve as a general aviation terminal and/or as a ground transportation dispatch center. A general aviation hangar could be developed just south of the existing terminal as an FBO facility. The existing parking lot would be utilized by general aviation as well as bus staging. A second large hangar is planned to the southeast to serve as an aircraft maintenance hangar. This could serve a small airline or general aviation uses.

This alternative depicts a more direct access route to the terminal that remains on airport property. A loop road is provided at the terminal. Adequate surface parking is provided on airport property to meet the needs at the terminal as well.

This alternative provides for a monorail station that would jointly serve the airport as well as remote parking for Grand Canyon National Park. The remote parking and the monorail would be located on USFS property within the Kabib National Forest. This parking would have its own access route to Highway 64. While traffic would be separated, an overhead walkway could be provided to the terminal building for visitors to view the airport and visit the restaurant and shops.

SUMMARY

The terminal building schemes and terminal area alternatives were presented to and reviewed with ADOT and the PAC for their input and comment. This input was taken into account in the development of a recommended plan. As will be seen in the next chapter, the resultant plan adopts features from several different alternatives.

08MP08-4L-12/15/09

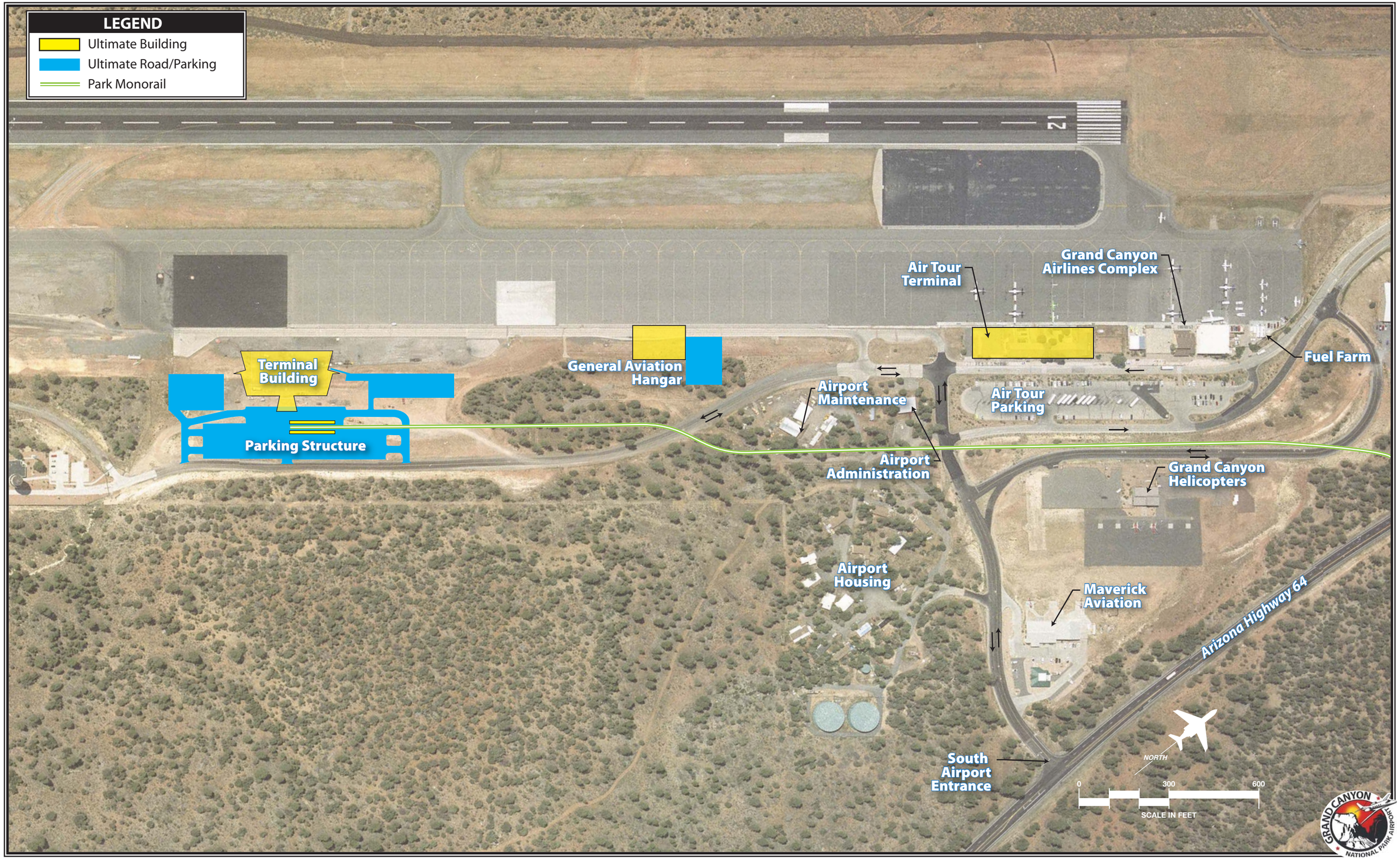


Exhibit 4L
ALTERNATIVE 2

08MP08-4M-12/27/09

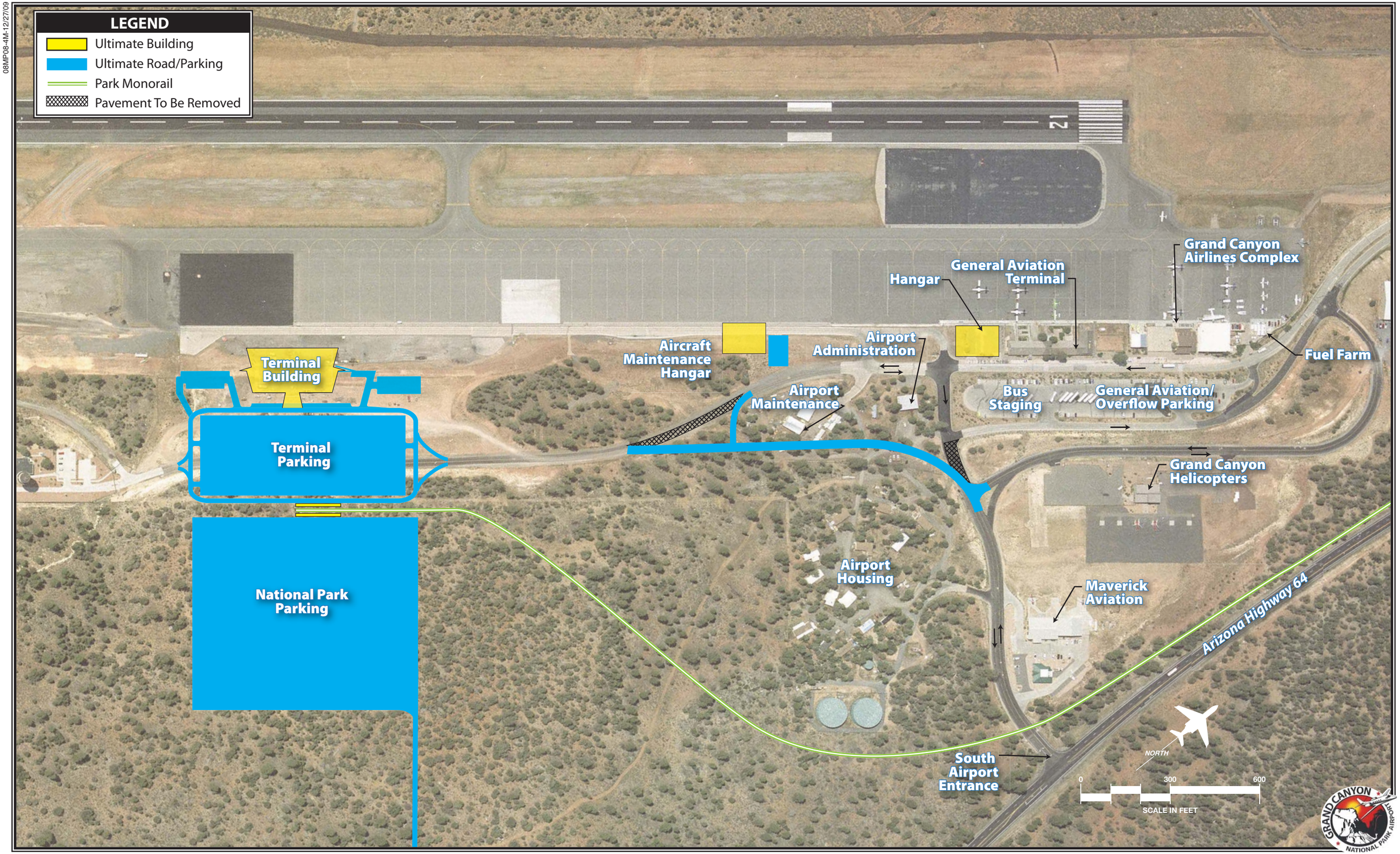


Exhibit 4M
ALTERNATIVE 3

Chapter Five

RECOMMENDED PLAN

Grand Canyon
NATIONAL PARK AIRPORT
TERMINAL AREA PLAN

CHAPTER FIVE

RECOMMENDED PLAN

The previous chapter outlined the alternatives process undertaken that has evolved into a recommended concept for future terminal area development. This chapter further refines and defines the recommended development that is designed to meet projected air tour and destination demands up to as much as one million annual enplanements.

The recommended plan includes a new terminal building, with adjacent access and parking, and the ability to accommodate both monorail and rail access should others decide to develop these transportation modes to access the Grand Canyon National Park (GCN) in the future. Space is also planned for additional general aviation development as well as an aircraft maintenance facility, should the need arise. The sections below further discuss the recommended plan beginning with the focal point, the passenger terminal building.

TERMINAL BUILDING

The recommended terminal building plan combines aspects of all three alternatives for flexibility to respond to actual demand. This will allow phasing of the project and implementation of security screening as needs may change in the future. The following describes the plan:

SITE DESIGN

As depicted on **Exhibit 5A**, the new Grand Canyon National Park Airport

terminal site layout locates the new terminal building along the flight line and in close proximity to midfield of the active runway. It is directly north of the existing elevated air traffic control tower (ATCT) and northeast along the flight line from the recently constructed Operations/ARFF facility. This location serves to provide greater separation between general aviation and commercial service uses for security and functional purposes. It also makes better use of the expansive parking apron that is available. As shown, the destination airline aircraft are grouped around the main building while air tour aircraft can be parked northeast along the ramp, with an electric vehicle access route taking passengers from the terminal to standalone "kiva pod" departure lounges to await their small fixed wing tour flights.

The new terminal building expansion axis is developed parallel with the active runway and is designed to expand in linear fashion as future out-year expansion needs arise. The new terminal building would be located further to the south of tour helicopter flight operations and further south of the existing outdated terminal building.

Exhibit 5B depicts a larger scale version of the terminal building site plan, while **Exhibit 5C** presents a cross section of the site. The natural slope of the existing topography facilitates a two-level terminal design solution with outgoing and incoming baggage handling in the lower level of the new terminal building. Future monorail passenger operations, and even a future railroad spur expansion, are accommodated in the terminal site design for passenger/tourist convenience. It is understood that these two elements will be dependent upon development by other entities, but the site plan demonstrates the ability of the terminal to adapt to these potential multi-modal opportunities.

The parking needs of the planning period can be accommodated first with surface parking, and ultimately with a future vertical structure that would serve to minimize the parking footprint. Three major transportation elements of air, rail, and monorail have the potential to come together in dramatic fashion at the new Grand Canyon National Park Airport terminal building. Although the master plan incorporates numerous transportation elements, the design allows for the development of the terminal and primary vehicular circulation as a standalone component that would not be adversely affected if the monorail and rail stations never come to fruition.

ARCHITECTURE

The overall design intent for the new terminal is to create a modern, flexible, and efficient terminal building that provides a dramatic and unique passenger experience, while being sensitive to the architectural character of the newly built existing Operations/ARFF facility and the surrounding natural environment of the Kaibab National Forest and Grand Canyon

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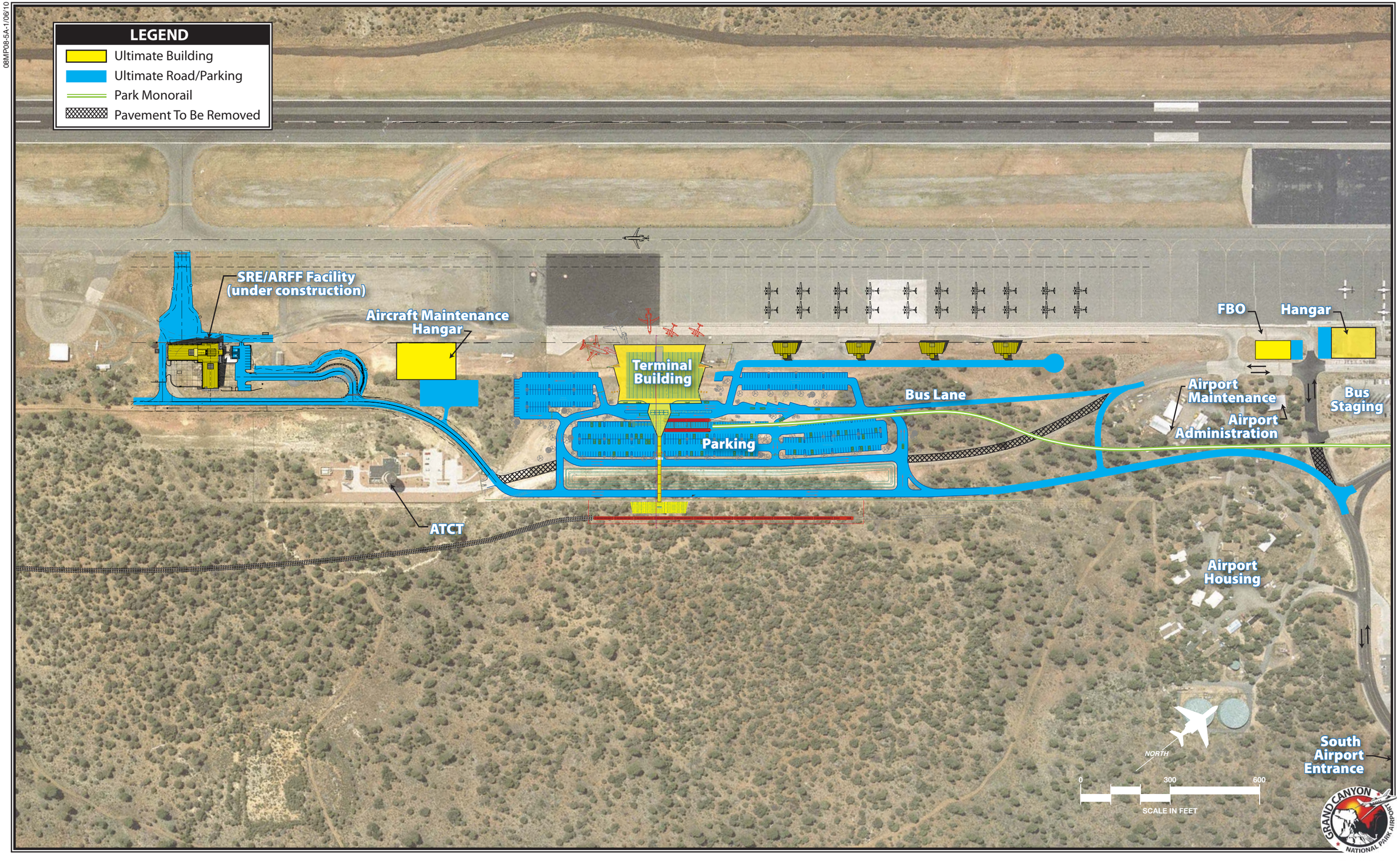
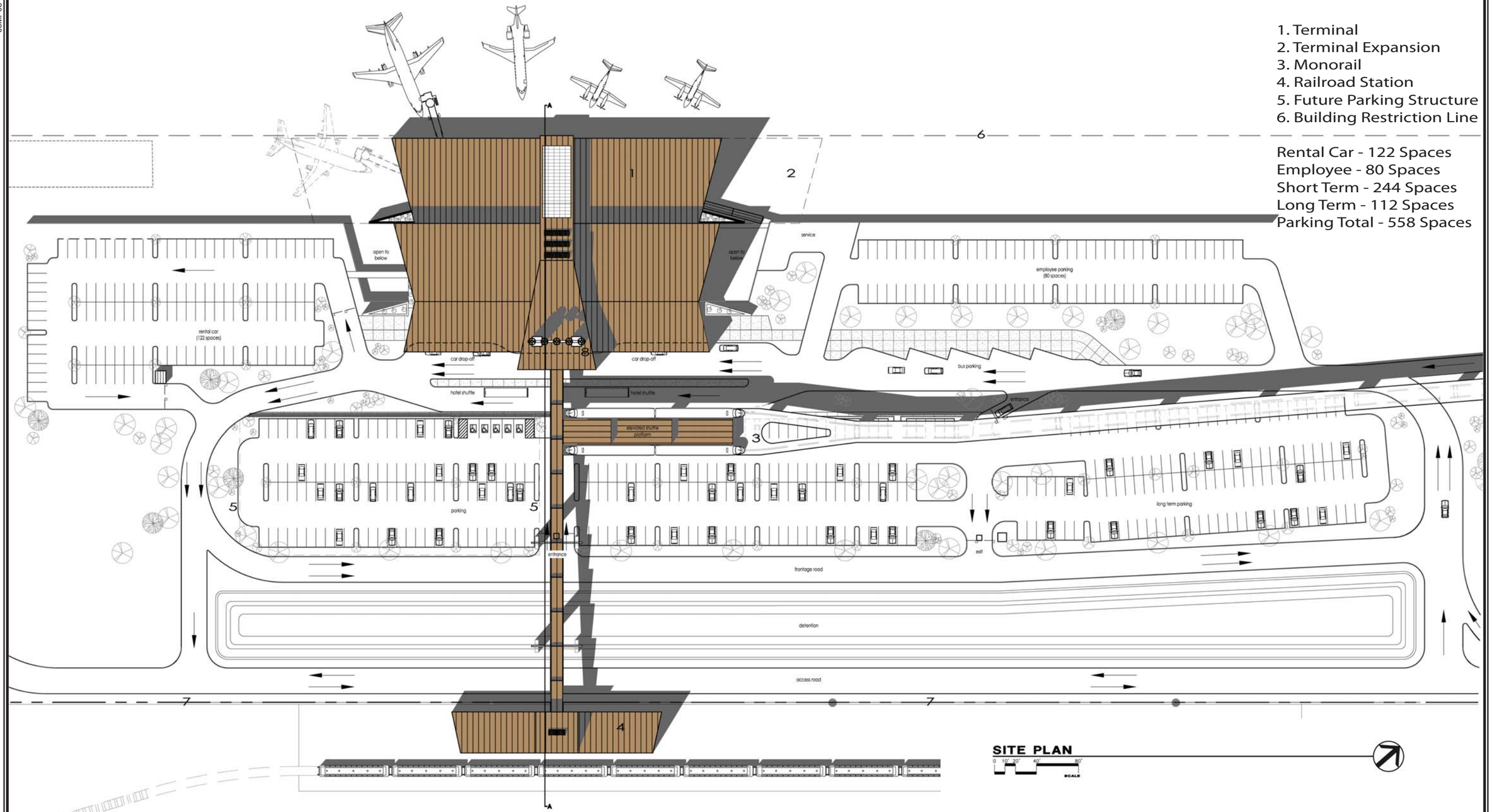


Exhibit 5A
SOUTH TERMINAL
AREA CONCEPT

08MP08-5B-1/6/10

1. Terminal
2. Terminal Expansion
3. Monorail
4. Railroad Station
5. Future Parking Structure
6. Building Restriction Line

Rental Car - 122 Spaces
Employee - 80 Spaces
Short Term - 244 Spaces
Long Term - 112 Spaces
Parking Total - 558 Spaces



SITE PLAN

0 10' 20' 40' 80'
SCALE

Exhibit 5B
TERMINAL BUILDING SITE PLAN

08MP08-5C-1/6/10

SPACE KEY

1. ENTRANCE
2. UNSECURED LOBBY
3. VESTIBULE
4. SECURED HOLDROOM
5. IN-BOUND BAGGAGE
6. TSA SECURITY CHECK
7. MONORAIL STATION
8. PARKING
9. FRONTAGE ROAD
10. DETENTION
11. ACCESS ROAD
12. PEDESTRIAN BRIDGE
13. TRAIN STATION
14. WIND TURBINES

SITE SECTION A-A PHASE III

0 5' 10' 20' 40'
SCALE

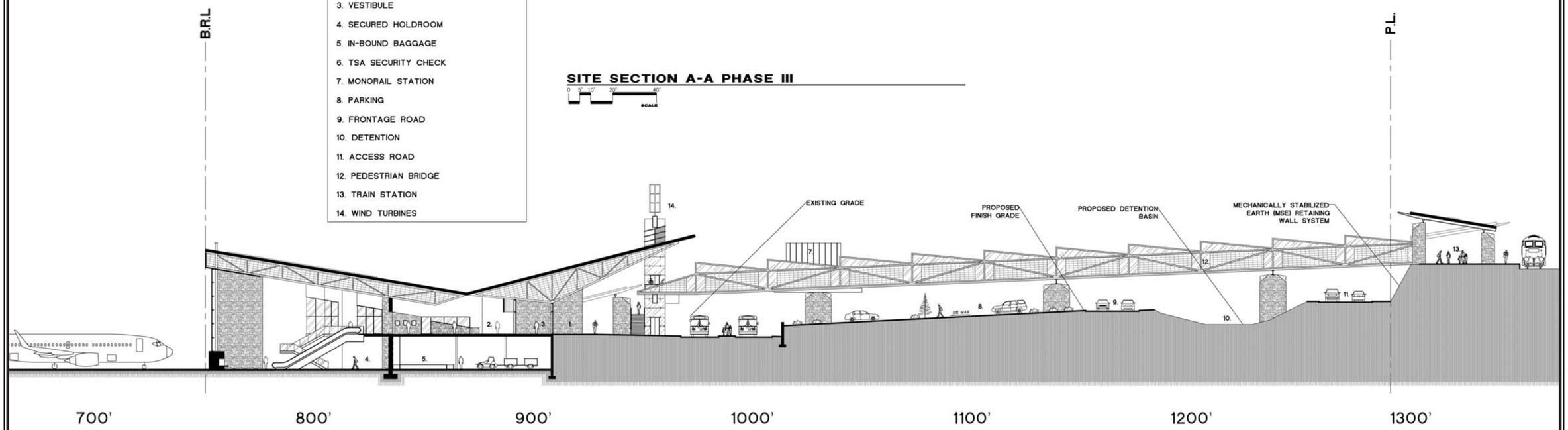


Exhibit 5C
TERMINAL BUILDING &
SITE CROSS-SECTION

National Park area. Airport campus architecture with common materials and design concept is the focus of the sustainable architecture proposed for the new GCN terminal. With the goal of achieving LEED certification, the "green terminal building" will incorporate numerous sustainable building strategies including: solar photo voltaics, solar hot water, natural daylight harvesting, water harvesting, sustainable site strategies, low flow plumbing fixtures, low emitting and recycled materials, and wind energy opportunities.

A deliberate 30-foot column grid "square" facilitates optimum repetitive construction techniques and allows future expansion in an orderly way. Expansive vistas are maximized by the tall vertical glass curtain wall along the hold areas/flight line which provide dramatic views mainly to the north–northwest and out to the airfield for a great aviation experience of arriving and departing aircraft. Corten rusting steel, natural masonry, insulated glass, insulated energy conserving semi-transparent Kalwal, and natural regional stone make up the main palette of materials for the new terminal building. The form and spatial qualities of retail and food and beverage spaces metaphorically relate to the organic form of the Grand Canyon and Colorado River. A destination feature restaurant space open to both air travel passengers and the general public will provide a truly inspiring experience for both passengers and the general public. The restaurant overlooks the dramatic passenger hold areas and has expansive views to the airfield. The lower level hold rooms incorporate a central axis fireplace at the focus of stairs and escalators contributing to the unique airport experience. **Exhibits 5D** and **5E** display a variety of schematic views of the terminal building and the site architecture.

TERMINAL FLOOR PLAN

The terminal building is designed so that it can be built in phases. The main and lower levels for Phase I are presented on **Exhibits 5F** and **5G**, respectively. The initial building would encompass 41,005 square feet with 19,180 square feet on the main level and 21,825 square feet on the lower level. This would be adequate to accommodate the short term planning horizon of at least 500,000 annual enplanements (450,000 air tour and 50,000 destination passengers).

As travelers enter the building on the main level, ticketing is to the right and baggage claim is to the left. Restrooms are also located next to the ticketing area. Straight ahead is an open view through the building to airside glass and the fireplace. Along the front wall of the building are waiting areas, rental car counters, and a baggage service office.

On the left side of the grand entryway is the security checkpoint leading to the secure departure gates. First and second level departure areas are available as well as an elevator and stairs to traverse the two levels. A small vending area is included on the

second level as well as restrooms on both levels.

Passengers and visitors alike can walk through the hallway to the escalators to enjoy the view. They will find a restaurant and bar to the right overlooking the lower level. The non-secure lower level can be accessed by escalator, elevator, or stairs. A non-secure departure lounge is located on the lower level primarily for air tour airlines. Air tour passengers may be led to the ramp to their aircraft or to an electric vehicle that will transfer them down the flight line to a weatherized "kiva pod" prior to their flight.

The lower level also includes TSA (Transportation Security Administration) offices and checked baggage inspection facilities, as well as bag make-up and an inbound baggage drop. The building mechanical and airline operations space is also located on the lower floor.

The Phase II plan is depicted on **Exhibits 5H** and **5J**. Under Phase II, the terminal would be increased to 72,741 square feet with the building extended to the north and south. This would accommodate at least the intermediate planning horizon level of approximately 665,000 annual enplanements, including 550,000 air tour enplanements and 115,000 destination enplanements.

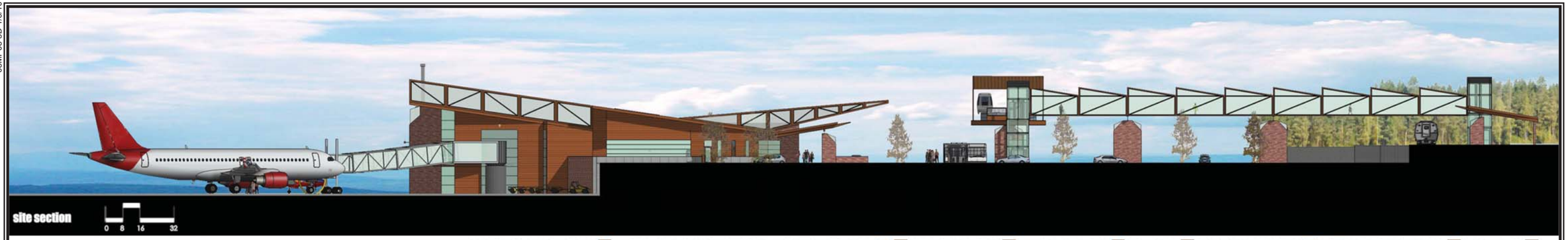
The extensions essentially allow for increased space for all the basic functions. It also increases the space available for retail and other concessions. Should traffic increase beyond the intermediate planning horizon, the building can be further expanded as depicted by the dashed lines on **Exhibit 5B** to accommodate the long range planning horizon of at least 1.0 million annual enplanements. Should the monorail or train station be developed, a skywalk feature for pedestrian access over the parking lot and all terminal roadways can be built in. The following section further discusses the terminal access and parking.

TERMINAL BUILDING ACCESS AND PARKING

The terminal building site plan on **Exhibit 5B** depicts a large scale view of the parking plan and terminal access road system. As presented, the parking plan provides 558 total parking spaces as surface parking. The main lot across the terminal road from the terminal would provide up to 356 vehicle spaces. A rental car ready/return lot is located on the south side of the terminal which is designed for up to 122 spaces. The employee lot on the north side has 80 spaces.

This would be adequate to serve the combination terminal through the intermediate planning horizon. Should activity exceed that level, a parking structure is planned for the main lot in front of the terminal that would meet the long range planning horizon of 1.0 million annual enplanements. At the same time, the footprint of the parking lot would not be increased.

08MP08-5D-1/6/10



grand canyon national park airport terminal

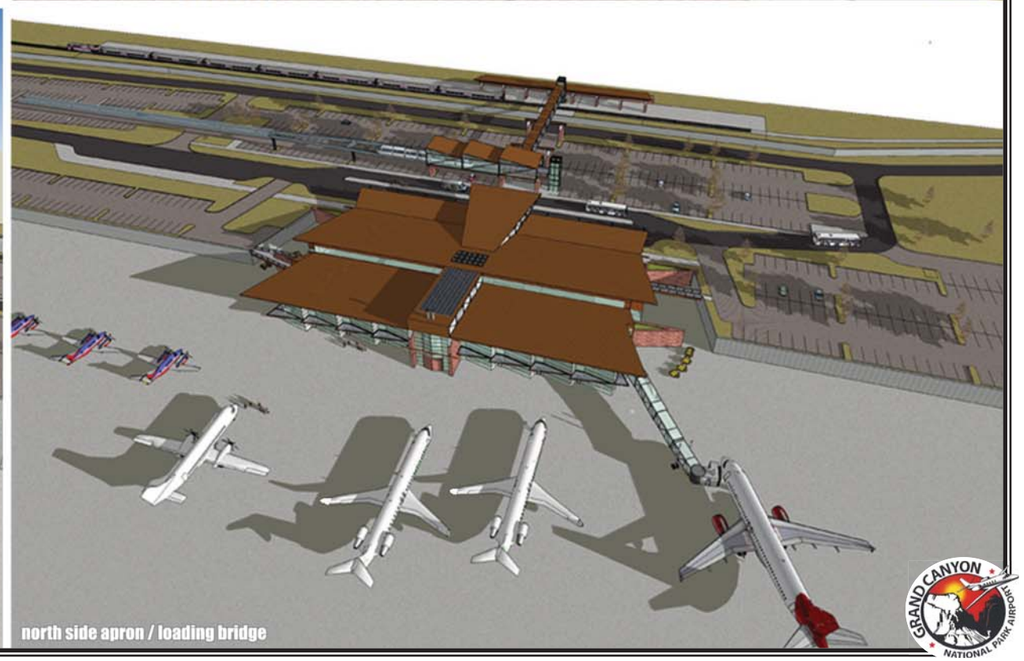
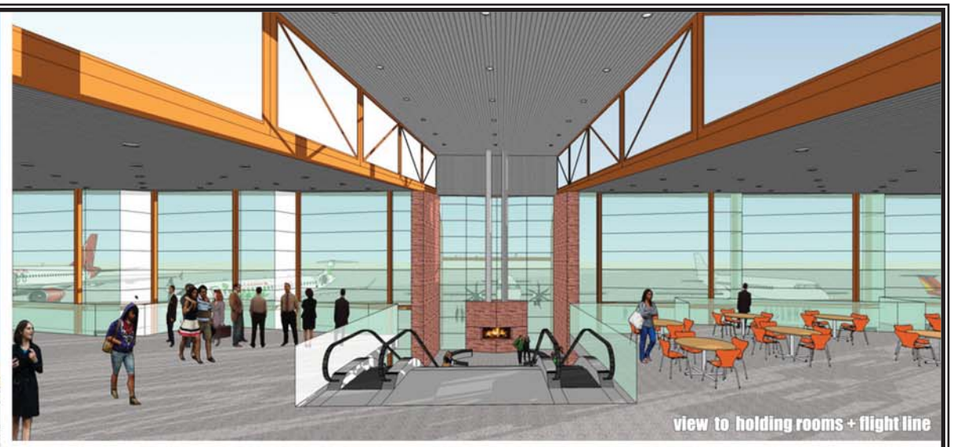


Exhibit 5D
TERMINAL SITE EXTERIOR ARCHITEXTURE

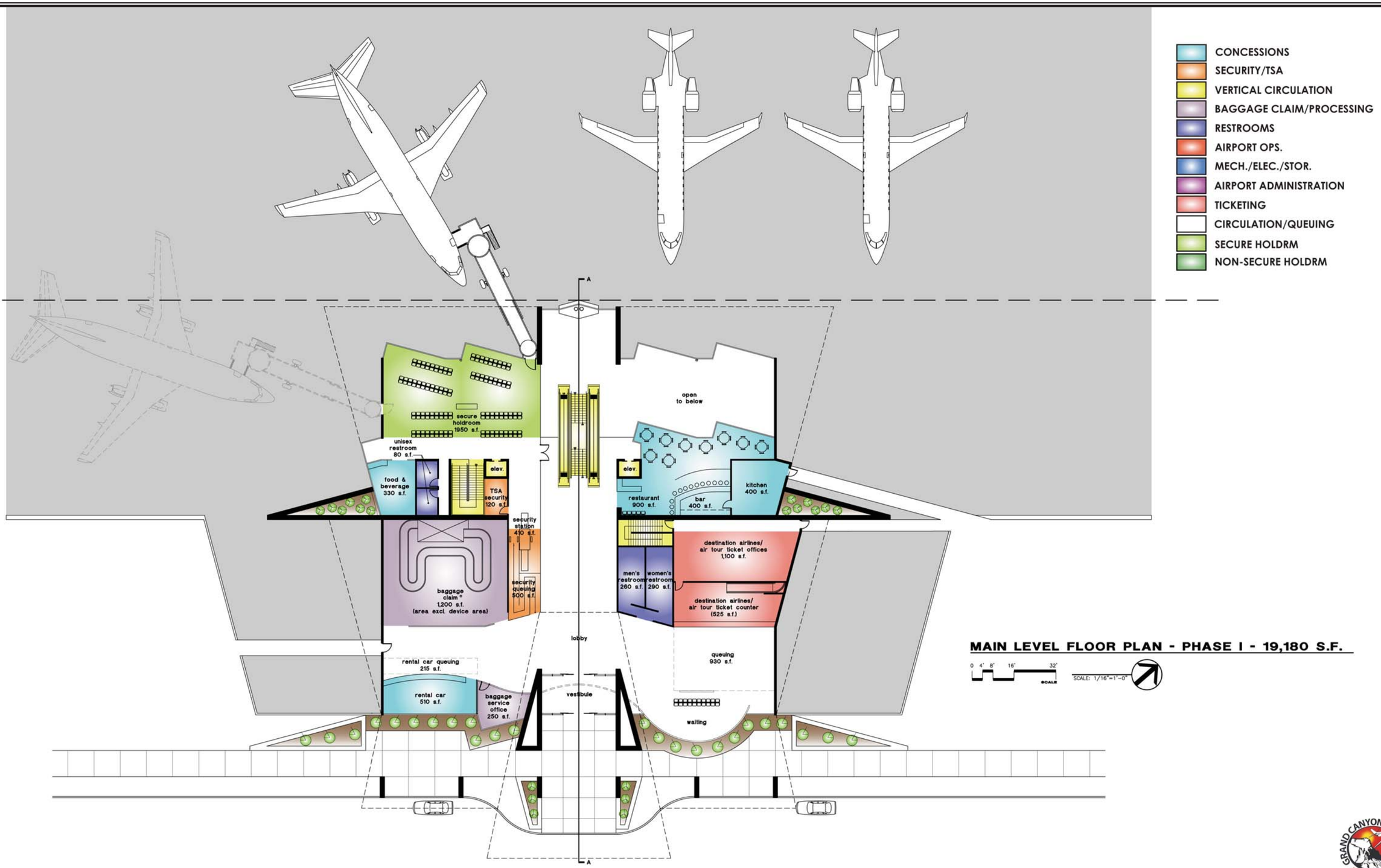
08MP08-5E-1/6/10



grand canyon national park airport terminal

Exhibit 5E
TERMINAL SITE INTERIOR ARCHITEXTURE

08MP08-5F-1/8/10



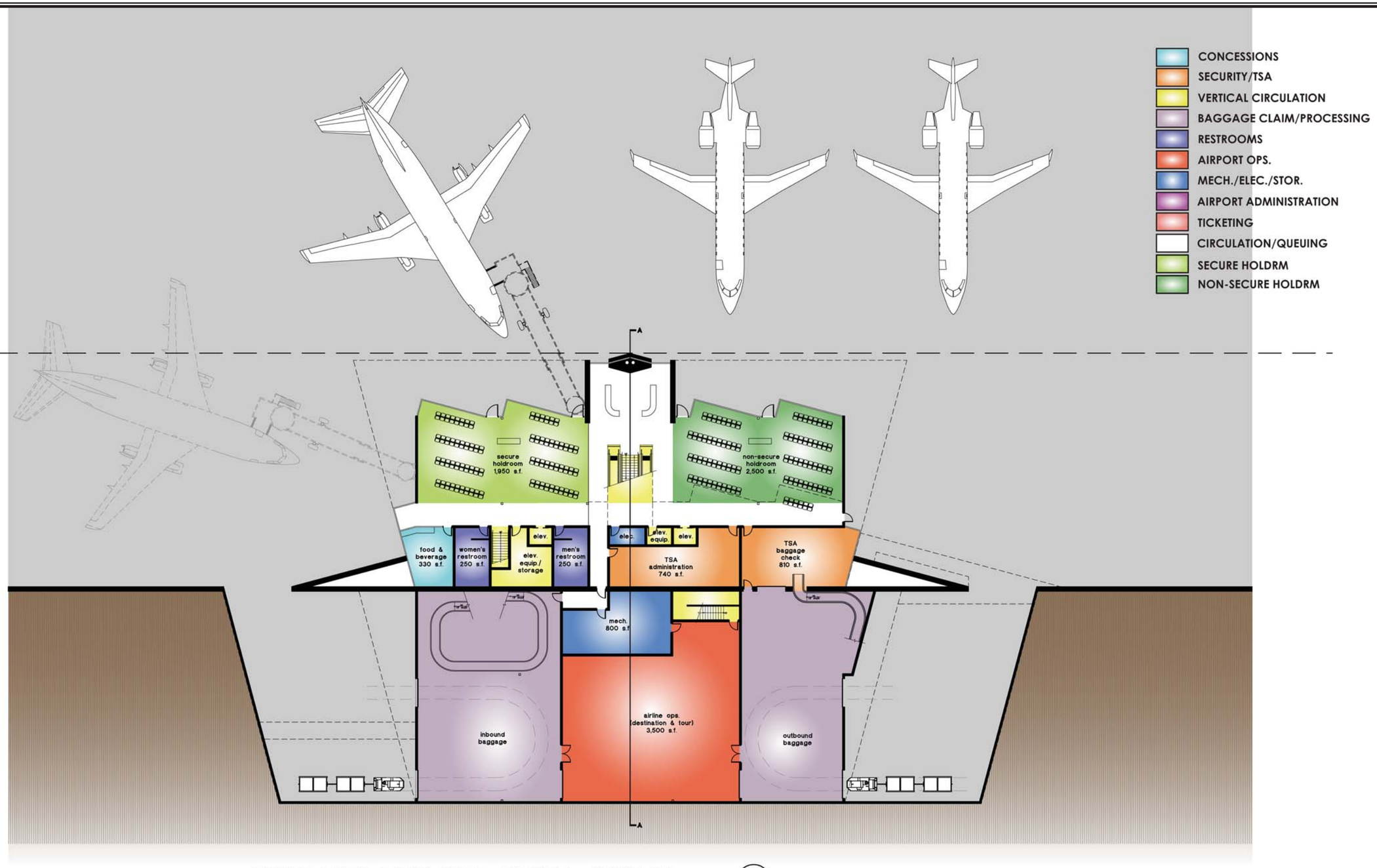
MAIN LEVEL FLOOR PLAN - PHASE I - 19,180 S.F.

0 4' 8' 16' 32'
SCALE

SCALE: 1/16"=1'-0"

Exhibit 5F
PHASE I MAIN LEVEL FLOOR PLAN

08MP08-5G-1/8/10



LOWER LEVEL FLOOR PLAN - PHASE I - 21,825 S.F.

SCALE: 1/16"=1'-0"

0 4' 8' 16' 32'
SCALE

Exhibit 5G
PHASE I LOWER LEVEL FLOOR PLAN

08MP08-SH-1/8/10

CONCESSIONS
SECURITY/TSA
VERTICAL CIRCULATION
BAGGAGE CLAIM/PROCESSING
RESTROOMS
AIRPORT OPS.
MECH./ELEC./STOR.
AIRPORT ADMINISTRATION
TICKETING
CIRCULATION/QUEUING
SECURE HOLDRM
NON-SECURE HOLDRM

secure holdroom 2,410 s.f.
secure holdroom 1950 s.f.
unisex restroom/ changing room 80 s.f.
food & beverage 550 s.f.
women's restroom 250 s.f.
men's restroom 250 s.f.
retail 645 s.f.
elev.
TSA security 120 s.f.
passenger's claiming bags/ baggage stor. 375 s.f.
baggage service office 225 s.f.
baggage claim 2,900 s.f. (area excl. device area)
security station
security queuing 250 s.f.
rental car queuing 215 s.f.
rental car 525 s.f.
retail 230 s.f.
park service 390 s.f.
national geographic store 590 s.f.
lobby
vestibule
open to below
elev.
restaurant 900 s.f.
bar 400 s.f.
kitchen 400 s.f.
airport admin. offices (shared) 1,950 s.f.
corridor
men's restroom 300 s.f.
women's restroom 335 s.f.
air tour ticket office 1,440 s.f.
air tour ticket counter
destination airlines/ air tour ticket offices 800 s.f.
destination airlines/ air tour ticket counter (420 s.f.)
air tour queuing 655 s.f.
queuing 800 s.f.
museum / bookstore 990 s.f.
waiting

MAIN LEVEL FLOOR PLAN - PHASE II - 34,285 S.F.

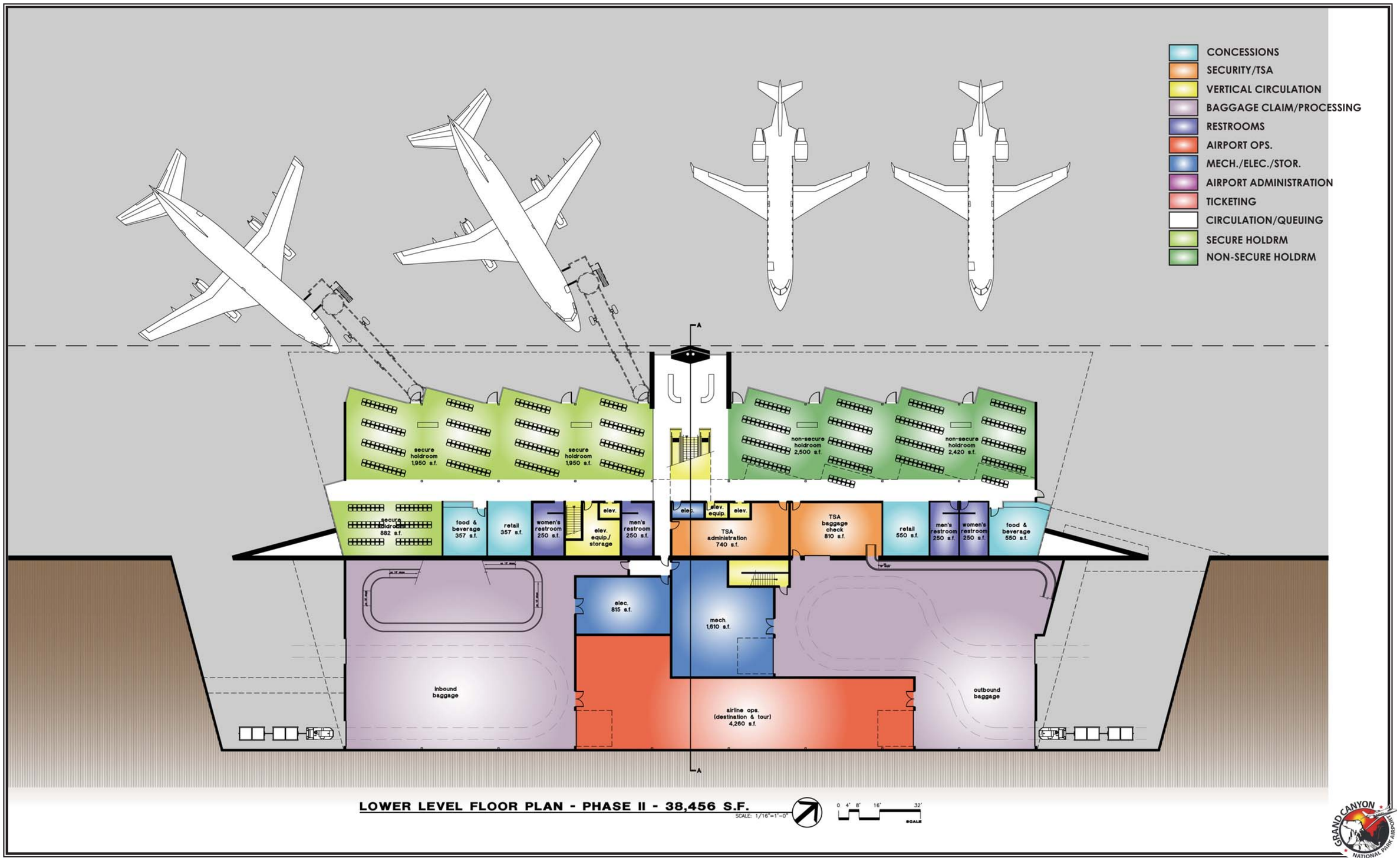
SCALE: 1/16"=1'-0"

0 4' 8' 16'

GRAND CANYON NATIONAL PARK AIRPORT

Exhibit 5H
PHASE II MAIN LEVEL FLOOR PLAN

08MP08-5J-1/8/10



LOWER LEVEL FLOOR PLAN - PHASE II - 38,456 S.F.

SCALE: 1/16"=1'-0"

0 4' 8' 16' 32'
SCALE

Exhibit 5J
PHASE II LOWER LEVEL FLOOR PLAN

As demonstrated on **Exhibit 5K,** terminal access can be developed in stages in concert with the parking lot. The lots directly in front of the terminal would be developed first, along with the rental car lot and possibly a portion of the employee lot. The initial terminal access would utilize the current roadway that provides access to the ATCT and the Operations/ARFF facility. A one-way road would be developed from the roadway that would run past the terminal in a counterclockwise direction before intersecting again with the through road.

As traffic increases, an internal loop road could be developed and the through road relocated further to the east near the property line. In addition, a bus lane could be developed that would provide a more direct route for buses coming from the staging area in the existing terminal parking lot.

TERMINAL AREA PLAN

Exhibits 5A and **5L** present the terminal building plans in concert with the rest of the terminal area south (**Exhibit 5A**) and north (**Exhibit 5L**). South of the terminal areas is the new Operations/ARFF facility, as well as a location recommended for an aircraft maintenance hangar. This hangar could serve as a single airline maintenance facility, or as a contract facility for both airlines and general aviation aircraft.

To the north of the new terminal building, the focus will become general aviation and ground transportation staging. The parking lot and the existing terminal could be converted to serve these uses. A second FBO and hangar are also planned immediately south of the old terminal.

The resulting flight line would become more evenly spaced along the apron beginning with general aviation services along the north portion, commercial service in the mid-portion, followed by aircraft maintenance, and airfield support. At the far south end would remain the National Park Service hangar.

Exhibit 5L also depicts the proposed revisions to the on-airport roadway system. The north entrance and access system remains the same through the existing terminal area. As commercial service traffic to the new terminal increases, the south entrance roadway would be realigned to provide more direct access to the new terminal. This design allows a terminal loop to be developed, but also allows two-way access to remain from the south entrance to all other areas within the terminal area. Subsequently, anyone entering the airport at the north entrance will still be able to access the entire terminal area as well.

Under the plan, the helicopter air tour lease areas remain fully intact with full access to the road system, including the new terminal.

TERMINAL DEVELOPMENT COSTS

Table 5A outlines the Phase I cost estimate for the terminal building, its access, and parking. **Table 5B** outlines the Phase II costs. The costs do not include the monorail, the railroad, or the other facilities. It is anticipated that these would be either developed privately, by other government agencies, and/or under leases with the airport.

Phase I development for the new terminal is estimated at $18.77 million. Phase II expansion costs are estimated at $15.47 million for a combined cost of $34.24 million.

The cost estimates are in 2009 dollars and include all site improvements, the terminal building, and airport-owned equipment and furnishing for the buildings, as well as anticipated professional design and construction inspection fees.

08MP08-5K-12/15/09

LEGEND

- Short Term Development
- Long Term Development
- Park Monorail
- Pavement To Be Removed

Terminal Building

Parking

Bus Lane

NORTH

0 150 300

SCALE IN FEET

GRAND CANYON NATIONAL PARK AIRPORT

Exhibit 5K
NORTH TERMINAL
DEVELOPMENT STAGING

08MP08-5L-12/15/09

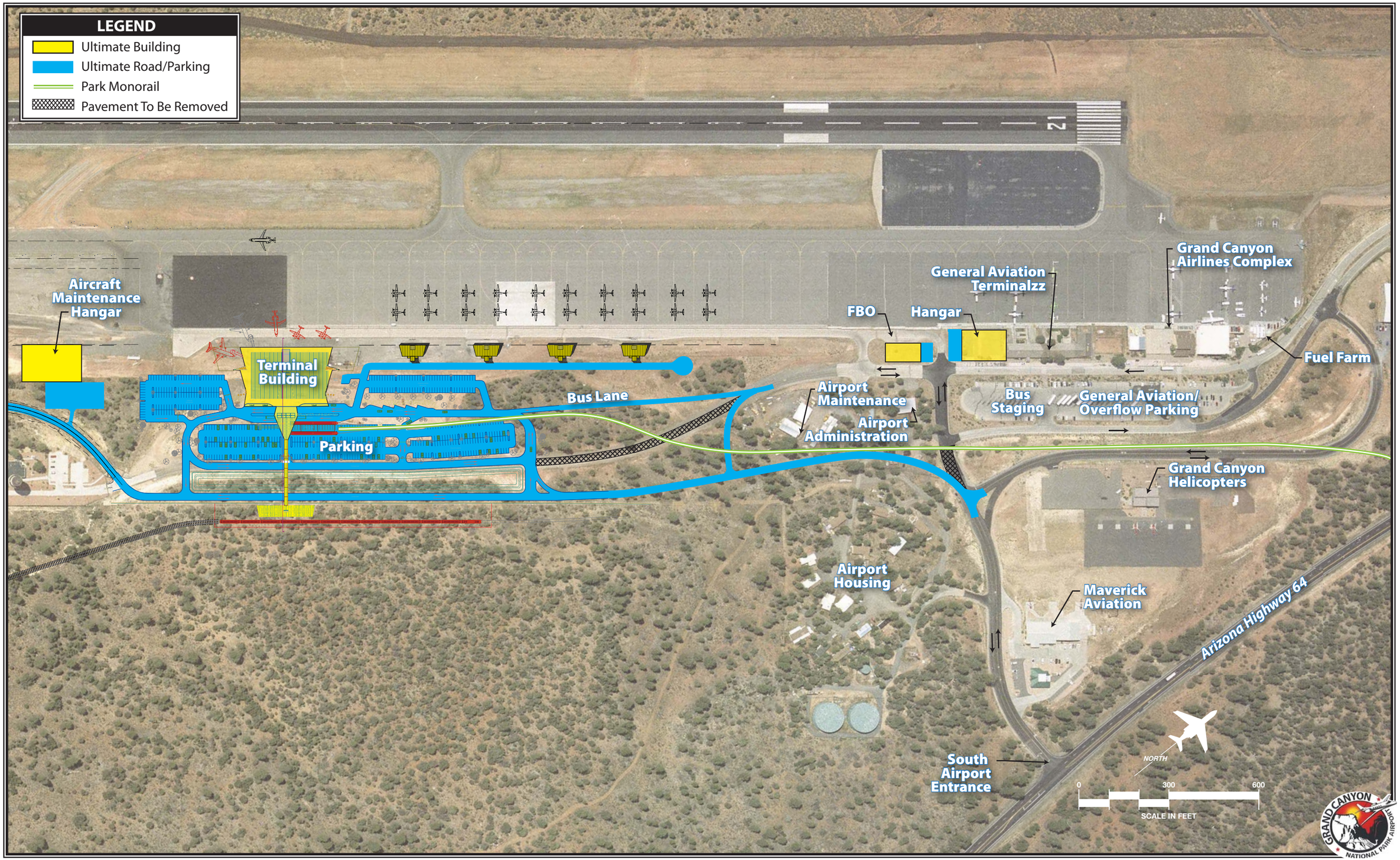


Exhibit 5L
NORTH TERMINAL
AREA CONCEPT

TABLE 5A
Phase I Terminal Cost Estimate

No.	Item	Unit	Quantity	Unit Price	Total
A	**Site Improvements**				
1	Traffic Control and Barricading	LS	1.00	$25,000.00	$25,000.00
2	Stormwater Pollution Prevention	LS	1.00	30,000.00	30,000.00
3	Miscellaneous Removals and Other Work	LS	1.00	37,500.00	37,500.00
4	Miscellaneous Drainage	LS	1.00	37,500.00	37,500.00
5	Unclassified Excavation (Hard Dig)	CY	150,000.00	15.00	2,250,000.00
6	Clearing and Grubbing	AC	11.00	900.00	9,900.00
7	Subgrade Preparation	SY	39,000.00	4.00	156,000.00
8	6" Aggregate Base Course (MAG Spec)	SY	18,000.00	13.00	234,000.00
9	3" Asphaltic Concrete (MAG Mix)	SY	18,000.00	20.00	360,000.00
10	Bituminous Prime Coat	SY	18,000.00	1.00	18,000.00
11	Soil Sterilant	SY	18,000.00	2.00	36,000.00
12	Catch Basin	EA	14.00	5,000.00	70,000.00
13	24" Storm Drain Pipe	LF	1,675.00	100.00	167,500.00
14	36" Storm Drain Pipe	LF	800.00	150.00	120,000.00
15	Concrete Curb	LF	8,900.00	19.00	169,100.00
16	Pavement Marking	LS	1.00	12,500.00	12,500.00
17	Handicapped Marking	EA	10.00	1,000.00	10,000.00
18	Handicap Ramp	EA	4.00	4,000.00	16,000.00
19	New Waterline	LS	1.00	125,000.00	125,000.00
20	New Sewer Line	LS	1.00	200,000.00	200,000.00
21	New Electric Service	LS	1.00	150,000.00	150,000.00
	Subtotal				$4,234,000.00
B	**Terminal Improvements**				
1	Terminal	SF	41,005.00	$250.00	$10,251,250.00
	Subtotal				$10,251,250.00
C	**Terminal Equipment and Furnishings**				
1	Signage	LS	1.00	$125,000.00	$125,000.00
2	Baggage Make-up	LS	1.00	20,000.00	20,000.00
3	Baggage Claim	LS	1.00	300,000.00	300,000.00
4	Loading Bridge	EA	1.00	350,000.00	350,000.00
5	FIDS (Flight Information Display System)	LS	1.00	130,000.00	130,000.00
6	Security	LS	1.00	200,000.00	200,000.00
7	Furniture	LS	1.00	130,000.00	130,000.00
8	Contingency	10%			125,500.00
	Subtotal				$1,380,500.00
D	**Professional Fees**				
1	A/E	12%			$1,903,890.00
2	Geotechnical Investigation	LS	1.00	$40,000.00	40,000.00
3	Testing & Inspections	LS	1.00	60,000.00	60,000.00
4	Construction Management (Terminal)	6%			697,905.00
5	Construction Management (Site Improvements)		1.00	200,000.00	200,000.00
	Subtotal				$2,901,795.00
E	**Totals**				
A	Site Improvements				$4,234,000.00
B	Terminal Improvements				10,251,250.00
C	Terminal Equipment and Furnishings				1,380,500.00
D	Fees				2,901,795.00
	Total Phase I				**$18,767,545.00**

TABLE 5B
Phase II Terminal Cost Estimate

No.	Item	Unit	Quantity	Unit Price	Total
A	**Site Improvements**				
1	Traffic Control and Barricading	LS	1.00	$25,000.00	$25,000.00
2	Stormwater Pollution Prevention	LS	1.00	60,000.00	60,000.00
3	Miscellaneous Removals and Other Work	LS	1.00	37,500.00	37,500.00
4	Miscellaneous Drainage	LS	1.00	37,500.00	37,500.00
5	Unclassified Excavation (Hard Dig)	CY	50,000.00	15.00	750,000.00
6	Clearing and Grubbing	AC	9.00	900.00	8,100.00
7	Subgrade Preparation	SY	39,000.00	4.00	156,000.00
8	6" Aggregate Base Course (MAG Spec)	SY	22,000.00	13.00	286,000.00
9	3" Asphaltic Concrete (MAG Mix)	SY	22,000.00	20.00	440,000.00
10	Bituminous Prime Coat	SY	22,000.00	1.00	22,000.00
11	Soil Sterilant	SY	22,000.00	2.00	44,000.00
12	Catch Basin	EA	8.00	5,000.00	40,000.00
13	24" Storm Drain Pipe	LF	3,325.00	100.00	332,500.00
14	36" Storm Drain Pipe	LF	200.00	150.00	30,000.00
15	Concrete Curb	LF	20,000.00	19.00	380,000.00
16	Pavement Marking	LS	1.00	25,000.00	25,000.00
17	Handicapped Marking	EA	10.00	1,000.00	10,000.00
18	Handicapped Ramp	EA	4.00	4,000.00	16,000.00
19	New Waterline	LS	1.00	---	---
20	New Sewer Line	LS	1.00	---	---
21	New Electric Service	LS	1.00	150,000.00	150,000.00
22	Mechanically Stabilized Retaining Wall	LF	300.00	1,000.00	300,000.00
	Subtotal				$3,149,600.00
B	**Terminal Improvements**				
1	Terminal	SF	31,736.00	$275.00	$8,727,400.00
	Subtotal				$8,727,400.00
C	**Terminal Equipment and Furnishings**				
1	Signage	LS	1.00	$75,000.00	$75,000.00
2	Baggage Make-up	LS	1.00	20,000.00	20,000.00
3	Baggage Claim	LS	1.00	175,000.00	175,000.00
4	Loading Bridge	EA	1.00	350,000.00	350,000.00
5	FIDS (Flight Information Display System)	LS	1.00	60,000.00	60,000.00
6	Security	LS	1.00	200,000.00	200,000.00
7	Furniture	LS	1.00	100,000.00	100,000.00
8	Contingency	10%			98,000.00
	Subtotal				$1,078,000.00
D	**Professional Fees**				
1	A/E	12%			$1,554,600.00
2	Geotechnical Investigation	LS	1.00	$40,000.00	15,000.00
3	Testing & Inspections	LS	1.00	60,000.00	60,000.00
4	Construction Management (Terminal)	6%			588,324.00
5	Construction Management (Site Improvements)	LS	1.00	300,000.00	300,000.00
	Subtotal				$2,517,924.00
E	**Totals**				
A	Site Improvements				$3,149,600.00
B	Terminal Improvements				8,727,400.00
C	Terminal Equipment and Furnishings				1,078,000.00
D	Fees				2,517,924.00
	Total Phase II				**$15,472.924.00**
	Grand Total (Phase I and II)				**$34,240,469.00**

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