Mammoth Yosemite Airport
Terminal Area Development Plan

Prepared for
Town of Mammoth Lakes, California

Prepared by:
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April 2017

MAMMOTH YOSEMITE AIRPORT
TERMINAL AIRPORT DEVELOPMENT PLAN
TOWN OF MAMMOTH LAKES, MONO COUNTY, CALIFORNIA

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CHAPTER 1. INTRODUCTION

1-1 General

Mammoth Yosemite Airport (MMH) is located in the Sierra Nevada mountain range east of the divide in a moderately broad valley. It is located 7 miles east of the Town of Mammoth Lakes (Town) adjacent to U.S. Highway 395. Up until 2008 the airport served the general aviation fleet with mostly itinerant operations bringing in visitors to enjoy the recreation facilities in and around Mammoth Lakes including the Mammoth Mountain Ski Area (MMSA), Devils Postpile National Monument, fishing, boating, hiking, biking, mountain recreation, festivals, and other arts and cultural events. It is near the east entrance to Yosemite National Park, the Inyo National Forest, and several wilderness areas. Some modest commercial airline service was provided prior to 2008. Beginning in December of 2008, scheduled commercial airline service has been provided to MMH.

1-2 History

World War II through 1965: MMH was originally constructed by the United States (U.S.) Army for use as an auxiliary landing strip during World War II. The original dimensions of the landing strip were less than 4,000 feet in length by 30 feet in width. Mono County acquired part of the airfield from the U.S. Army after the war and renamed it Long Valley Field. The runway was an unpaved dirt strip and the airport was a seasonal facility closed by winter snows until it was paved in 1959. The airport was operated as an unattended landing strip until the early 1960s.

1965 to 1978: In 1965 the runway was relocated 300 feet to the north on USFS land to accommodate the future widening of U.S. Highway 395, which runs adjacent to the airport. Also at this time the runway was extended to 5,000 feet and widened to 100 feet. The airport was renamed Mammoth Lakes Airport and private interests operated the airfield. Mammoth Sky Lodge Corporation, then the airport operator, extended the runway to 6,500 feet in 1971. A terminal building and an airport office, currently used as an FBO office and pilots' lounge, were constructed in 1972. During this time the airport became formally known as Mammoth-June Lakes Airport. In 1973 Sierra Pacific Airlines initiated service using Convair 440 aircraft and served Mammoth Lakes until 1980.

1978 to 1992: Mono County entered into an agreement with Mammoth Sky Lodge Corporation to acquire all airport property in 1978 from the USFS; however, the acquisition of the airport was not consummated until 1980. Mono County reestablished public operation of the airport in 1980. Mono County began an airfield improvement program in 1983. Using funds received under the Airport Improvement Program (AIP) a new runway, 7,000 feet by 100 feet, was constructed.

<u>1992 to 1995</u>: The Town of Mammoth Lakes acquired the airport from Mono County in September 1992. United Express operated flights from Mammoth Lakes to Fresno, using 19-seat Jetstream 31 turboprop aircraft for the winter seasons of 1993 and 1994. Service reliability problems associated with overbooking and the 19-seat Jetstream aircraft led to passenger dissatisfaction, causing United Express to discontinue service. Additionally, Trans World Express terminated flight operations in 1995 due to reorganization of its major code share partner, Trans World Airlines. This reorganization of Trans World Airlines was required under Chapter 11 of the Federal Bankruptcy Code.

<u>1997 to 2008</u>: In 1997 new airport development was proposed for the airfield. Previous plans for the crosswind runway and supporting taxiways and golf course were abandoned. An extension of the current Runway 9-27 from 7,000 to 9,000 feet was proposed, as was the construction of a hotel/condominium complex.

The new airport development, reviewed in the 1997 EIR, included both airside and landside developments by a private developer. Airside improvements included the proposed building of up to 94 private and public use hangars, an aviation fuel storage complex, and facilities for the operation of a fixed base operator (FBO). Landside development consisted of a hotel and residential condominium complex, retail development, a restaurant complex, and a recreational vehicle park. Eventually 94 hangars and the airport water system were constructed but, for a variety of reasons, the bulk of the development was never constructed. Eventually, the developer sued the Town for breach of contract and prevailed. A settlement was reached in September of 2012, which dissolved the development agreement and returned development rights back to the airport.

In the late 1990's the Town and American Airlines proposed a large development project for MMH. The project included a longer and wider runway, a new terminal building, and related infrastructure to support Boeing 757 service from Dallas and Chicago and was based on a forecast of 330,000 annual passenger enplanements after 20 years. This project was enjoined in Federal Court in 2003. This project was abandoned, and the injunction was lifted in May of 2016 which will allow new development at the airport.

In the years prior to the lifting of the injunction the Town worked to initiate commercial service at the airport. In 2005 an Environmental Impact Statement (EIS) was prepared to accommodate the Town's scaled-back vision for the airport. The EIS provided for regional commercial air service using aircraft of 80 seats or less, 8 flights daily in the winter, and summer service, all to regional markets. The EIS also approved the remodel of an existing airport structure, which is now the interim terminal building.

In 2000 the Town changed the name of the airport to Mammoth Yosemite Airport.

2008 – Present: In 2008 the entire runway/taxiway complex at the airport was reconstructed.

Air service began in December of 2008 with one flight from Los Angeles International Airport (LAX) flown by Alaska Airlines using the 76 seat Bombardier Q400 (Q400). In 2010 United Airlines using the 70 seat Bombardier CRJ700 began service from San Francisco International Airport (SFO). Summer air service started in 2010 with Alaska Airlines from LAX. In the winter of 2016-17 the airport had up to four flights a day from LAX, SFO, and San Diego International Airport (SAN) with Alaska Airlines and United Airlines serving the airport. In 2016 the airport had 22,253 enplanements. The existing terminal is inadequate to meet current demand. The terminal experiences weekly and daily peaking of operations, which the existing terminal is not capable of adequately serving.

Air service at MMH would not be possible without a revenue guarantee program (RGP). The RGP at MMH is funded with a Tourism Business Improvement District (TBID) in which business are assessed a small fee for the purpose of marketing the Town and providing the revenue guarantee to the airlines.. The TBID is managed by Mammoth Lakes Tourism (MLT) which is part of the local Air Alliance. The Town and MMSA are the other two members of the Air Alliance and together provide airport: operational funding (Town), revenue guarantee funding (MLT), airline contracts, and financial backing (MMSA). The Air Alliance is discussed in greater detail in the Aviation Activity Forecasts (Appendix A).

With daily flights and peaking, passenger overcrowding in the existing interim terminal building is a major problem. Issues include passengers waiting at the security boarding gate and outside the building with minimal waiting areas away from inclement weather. Flight delays at other airports can exacerbate the capacity problems both in the terminal area and the commercial ramp area. Issues include crowding of the ticket counters, TSA security checkpoints, hold rooms, rest rooms, baggage handling facilities, and space on the ramp for aircraft parking.

With six flights daily and the peaking of commercial operations required to attract the skiers, daily passenger overcrowding in the existing interim terminal building is a major problem, particularly during the winter ski season. All sections of the existing terminal are overcrowded. The hold room size was such a major problem that the Airport erected a temporary sprung structure as a temporary hold room, and the hold room capacity is still inadequate.

1-3 Need for Study

MMH is used by itinerant general aviation aircraft ranging in size from the small single-engine and twin-engine aircraft to large turbojet aircraft such as the Gulfstream GV. These aircraft are used to bring visitors to the Town to enjoy the recreation facilities and venues available in the area. This general aviation activity is expected to continue and increase over time. Airline service began in December of 2008 and immediately outgrew the temporary terminal building.

1-4 Existing Facilities

When the recent commercial operations began in 2008, there were no appropriate terminal facilities at the airport to handle these operations. At that time various constraints would not allow the construction of a new terminal and it was required that the terminal be constructed inside an existing building such that there would be no increase in the footprint of the building. The only suitable building available was the existing maintenance garage which had a floor area of 5,060 square feet. In 2008 the temporary commercial airline terminal was constructed within the walls of this building.

Because the temporary terminal was of insufficient size to accommodate passengers for more than one flight at a time a temporary terminal annex (sprung structure) of 2,250 square feet was added in 2011. This facility is not connected to the terminal and is outside of the secure passenger holding area. Passengers of flights not ready for boarding are held here and when called for boarding must still pass through the TSA screening area.

1-5 Required Action

To accommodate existing and forecast traffic it is necessary to construct a larger commercial terminal facility at the airport. It is not economically or operationally feasible to expand the existing temporary terminal. It is recommended that an entirely new terminal facility be constructed at an appropriate site on the airport. The new terminal facilities will include a new terminal building, commercial aircraft parking apron, a deicing apron, access roads, automobile parking facilities, maintenance facilities, and airport offices. The facilities need to be sized to accommodate forecast traffic for the next 10 years and have the capability of expanding to accommodate possible growth outside the planning period with minimal interference with airport operations.

A detailed Terminal Area Development study and plan has been developed and the results of this study are included in this report. This study and report was conducted by the Mammoth Yosemite Airport Terminal Design Team consisting of Reinard W. Brandley, Consulting Airport Engineer, and the Van Sant Group, Architects. Terry Van Sant is the principal for the Van Sant Group working on this project and Reinard W. Brandley is the principal for Brandley Engineering. The Aviation Activity Forecasts (Appendix A) was prepared by Mead & Hunt.

CHAPTER 2. AVIATION FORECASTS

Detailed Aviation Activity Forecasts were prepared by Mead and Hunt and have been approved by FAA for forecast aviation activity at Mammoth Yosemite Airport. These forecasts are important to establish and justify the proposed development. The detailed Aviation Activity Forecasts are included as Appendix A to this report.

A Summary of Forecasts included in the Mead and Hunt report are reproduced as Tables 2-1, 2-2, 2-3, and 2-4. Based on these forecasts, Mead and Hunt recommended that the initial terminal development include three hardstand positions and three holding rooms (see Appendix A). The proposed development includes three hardstands and three holding rooms.

Table 2-1
Peak Month Enplanements (Mead & Hunt Table 5)

Month	2015	2014	2013	2012	2011
January	4,299	4,540	5,766	4,336	4,211
February	3,841	4,017	5,657	4,865	3,653
March	4,622	4,735	5,652	4,897	4,161
April	1,663	2,741	3,025	3,821	3,379
May	749	1,031	1,149	1,061	1,051
June	975	1,022	1,117	931	1,165
July	1,226	1,330	1,259	1,277	1,189
August	1,228	1,294	1,378	1,478	1,419
September	1,015	1,002	1,171	851	1,004
October	712	717	579	566	807
November	773	827	799	562	882
December	2,401	2,636	3,306	2,601	3,275
TOTAL	23,504	25,892	30,858	27,246	26,196
Peak Month % Annual	**19.7%**	**18.3%**	**18.7%**	**18.0%**	**16.1%**
5-year Average	**18.7%**				

Table 2-2
Winter-Spring 2015-2016 Peak Day Flight Schedule (Mead & Hunt Table 6)

	Time*	Origin / Destination	Aircraft Type	Seats
Arrival	924	LAX	Bombardier Q-400	76
Departure	1050	LAX	Bombardier Q-400	76
Arrival	1638	SFO	Bombardier CRJ700	70
Arrival	1710	LAX	Bombardier Q-400	76
Departure	1715	SFO	Bombardier CRJ700	70
Departure	1745	LAX	Bombardier Q-400	76
Arrival	1811	SAN	Bombardier Q-400	76
Departure	1845	SAN	Bombardier Q-400	76

* Time is expressed as a 24-hour clock

Source: Schedule - Airport

Table 2-3
Forecast Peak Hour Passengers (Mead & Hunt Table 7)

Year	Peak Month Enplanements + Deplanements	Average Day Peak Month Enplanements + Deplanements	Peak Hour Passengers		
			Enplanements	Deplanements	Total
2021	8,833	285	89	81	171
2026	9,284	299	94	131	204

Source: Mead & Hunt

Table 2-4
Summary of Forecasts (Mead & Hunt Table 9)

	2016	2021	2026
Passenger Enplanements			
Air Carrier	22,253	23,388	24,581
Commuter	0	0	0
TOTAL	22,253	23,388	24,581
Operations			
Itinerant			
Air Carrier	990	1,040	1,094
Commuter/Air taxi	1,634	1,753	1,814
Total Commercial Operations	2,624	2,793	2,908
General Aviation	4,017	4,309	4,460
Military	32	35	35
Local			
General Aviation	143	155	161
Military	0	0	0
TOTAL OPERATIONS	6,816	7,292	7,564
Instrument Operations	3,699	4,594	4,765
Peak Hour Operations	8	8	9
Cargo (enplaned+deplaned pounds)	0	0	0
Based Aircraft			
Single Engine (Nonjet)	4	4	4
Multi Engine (Nonjet)	3	3	3
Jet Engine	0	0	0
Helicopter	0	0	0
Other	0	0	0
TOTAL	**7**	**7**	**7**

CHAPTER 3. PURPOSE AND NEED

The purpose of this study is to evaluate and prepare recommendations for the required new commercial terminal development at Mammoth Yosemite Airport. The following factors were included in the study:

- Terminal Area Location
- Terminal Area Size and Configuration
- Terminal Building Configuration and Size
- Aircraft Parking Apron
- Aircraft Deicing Facilities
- Automobile Parking
- Access and Service Roads
- Terminal Area Support Facilities, Baggage Handling, Delivery and Maintenance Access
- Maintenance Facilities

CHAPTER 4. SITE SELECTION

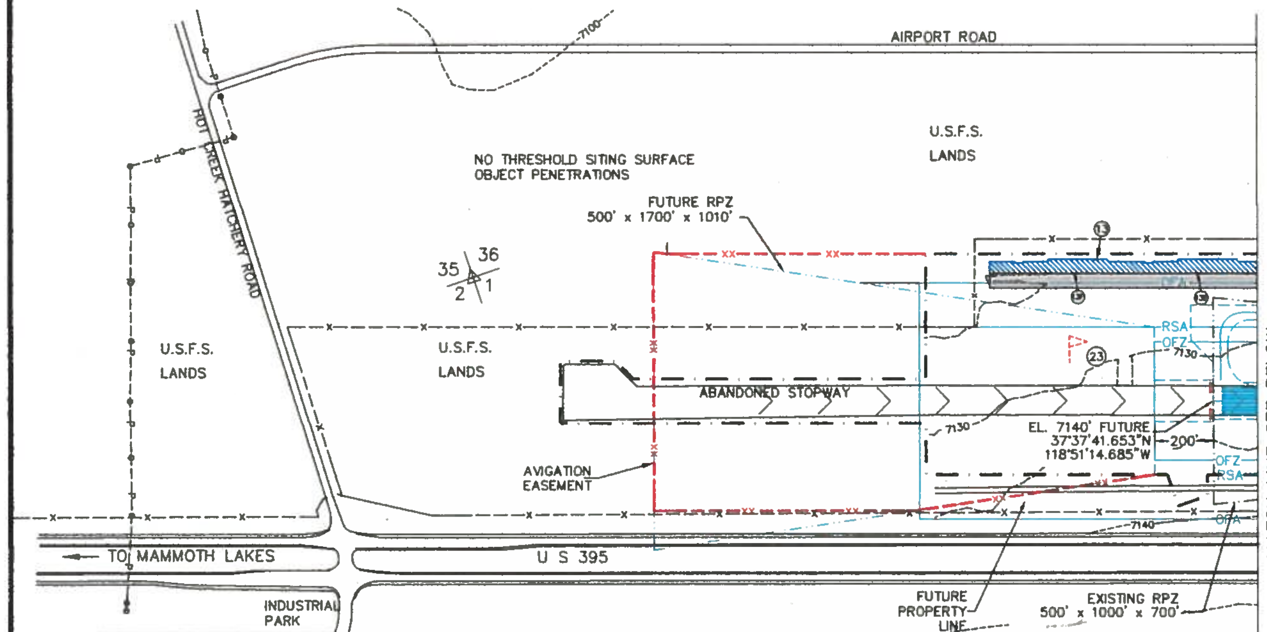
There are many constraints to the location available for terminal area development on the airport without major disruption to existing facilities. The airport is further constrained from growth for development of terminal facilities by the location of U.S. Highway 395 on the entire south side of the airport, the location of Doe Ridge on the northeast side of the airport, and the existence of U.S. Forest Service land surrounding the airport. As a result, it was determined that the only area available for a major terminal development would be that area between the existing temporary terminal building and Doe Ridge to the east. This location would accommodate the new facility and keep all development on airport property.

Two terminal area sites on the existing airport site were considered as shown on Plate No. 4-1. These sites are designated Terminal Area Site "A" and Terminal Area Site "B". Terminal Area Site "A" proposes locating the outer edge of the commercial terminal apron parallel with the south edge of the existing tie down apron, which is at the building restriction line and OFA of the runway. This location provides good access to the taxiways and runway. If at some time in the future it is required to modify the runway/taxiway configuration to conform to all ARC C III standards, then the proposed location of Terminal Area Site "A" would conflict with those changes and the terminal would, therefore, need to be relocated.

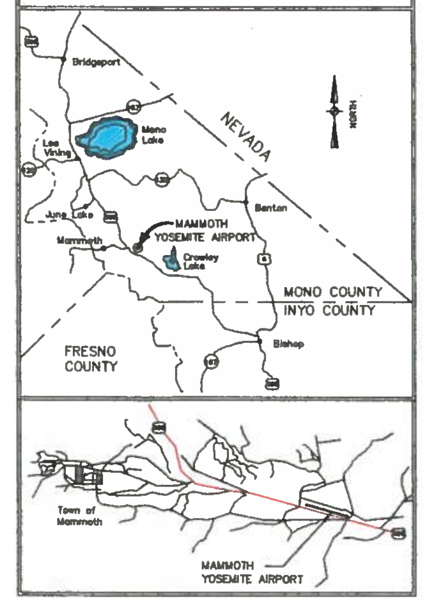
Terminal Area Site "B" moves the terminal to the northwest of Site "A", which provides room for any airfield modification as necessary, and the terminal building itself is located adjacent to the current and future access roads. This location also provides good access to the taxiway and runways. Automobile parking facilities on the airport property would be limited to parking on both sides of the terminal, as well as the existing airport parking lots. The access road only serves the airport and, therefore, it is appropriate to have the terminal building facing the access road. If necessary, there is significant land north of the Terminal Area on U.S. Forest Service land that could be acquired and used for future expanded automobile parking facilities.

The selected preferred site is Terminal Site "B". All additional studies were conducted using the Site "B" development area.

A detailed layout showing the proposed Terminal Area Site "B" development is presented on Plate 4-2. On this drawing the proposed terminal building is shown located so as not to preclude future expansion, except for future automobile parking north of the access road if necessary. The sizing and location of these facilities were developed from the detailed terminal area studies presented in the following chapters of this report. In this plan, space is available to double the length of the concourse and the capacity of the aircraft parking apron. Area is also available to double the size of the terminal. With the acquisition of USFS land located north of the proposed Terminal Building, provision can be made for major increases in the size of the automobile parking lot.



LOCATION MAP



BUILDING INVENTORY

No.	FACILITY	TOP ELEV.	No.	FACILITY	TOP ELEV.
1	EXISTING TEMPORARY TERMINAL BUILDING & BEACON FUTURE ADMINISTRATION BUILDING	7144.4	18	WATER STORAGE PUMP HOUSE	7119.4
2	AIRPORT OFFICE	7122.2	19	EXISTING STREET LIGHT	7086.3
3	ELECTRICAL & TELEPHONE VAULT	7120.3	20	EXISTING CHURCH STEEPLE	7074.8
4	EXISTING PILOTS LOUNGE	7121.9	21	P.A.P.I.	
5	EXISTING FBO OFFICE	7125.8	22	WIND CONE AND SEGMENTED CIRCLE	
6	AIRCRAFT HANGARS A1 THRU A6	7138.9	23	SUPPLEMENTAL WIND CONES	
7	AIRCRAFT HANGARS B1 THRU B6	7136.8	24	DOE RIDGE OBSTRUCTION LIGHT	
8	AIRCRAFT HANGARS C1 THRU C6	7140.0	25	REIL	
9	AIRCRAFT HANGARS D1 THRU D5	7142.3	26	TERMINAL APRON	
10	AIRCRAFT HANGARS E1 THRU E4	7141.6	27	TIEDOWN APRON	
11	AIRCRAFT HANGARS F1 THRU F4	7158.1	28	AWOS TOWER	
12	AIRCRAFT HANGARS G1 THRU G6	7145.7	29	FUEL STORAGE TANKS	
13	WEST EXECUTIVE HANGARS		30	AV. GAS STORAGE, SELF SERVICE	
13A	HANGAR 3 THRU 6	7153.4	31	WELL #99-1 GRND. ELEV. 7095.4'	
13B	HANGAR 15 THRU 16	7154.4	32	WELL #99-2 GRND. ELEV. 7094'	
13C	HANGAR 25 THRU 28	7154.0	33	AIRPORT WELL	
13D	HANGAR 38 THRU 39	7153.8	34	FUTURE TERMINAL BUILDING SITE	
13E	HANGAR 50 THRU 53	7153.7	35	FUTURE TERMINAL APRON	
13F	HANGAR 62 THRU 65	7151.5	36	FUTURE DEICING RAMP	
14	EAST CORPORATE HANGARS		37	FUTURE AUTOMOBILE PARKING	
14A	CORPORATE HANGAR 1	7134.9	38	FUTURE RENTAL CAR PARKING LOT	
14B	CORPORATE HANGAR 5	7131.1	39	FUTURE SEWAGE TREATMENT PLANT AND LEACHING FIELD	
14C	CORPORATE HANGAR 10	7128.0	40	FUTURE APRON & PARKING LOT STORM WATER LEACHING FIELD	
14D	CORPORATE HANGAR 15	7123.2	41	FUTURE ARFF / SNOW EQUIPMENT BUILDING	
15	EXISTING POWER POLE WITH OBSTRUCTION LIGHT	7157.0	42	FUTURE AIRCRAFT HANGARS	
16	EXISTING TELEPHONE POLE WITH OBSTRUCTION LIGHT	7096.0	43	FUTURE AWOS	
17	WATER STORAGE TANK	7123.6	44	AVIATION DEVELOPMENT AREA (HANGARS & FBO BUILDINGS)	

DECLARED DISTANCES

RUNWAY 9 – 27

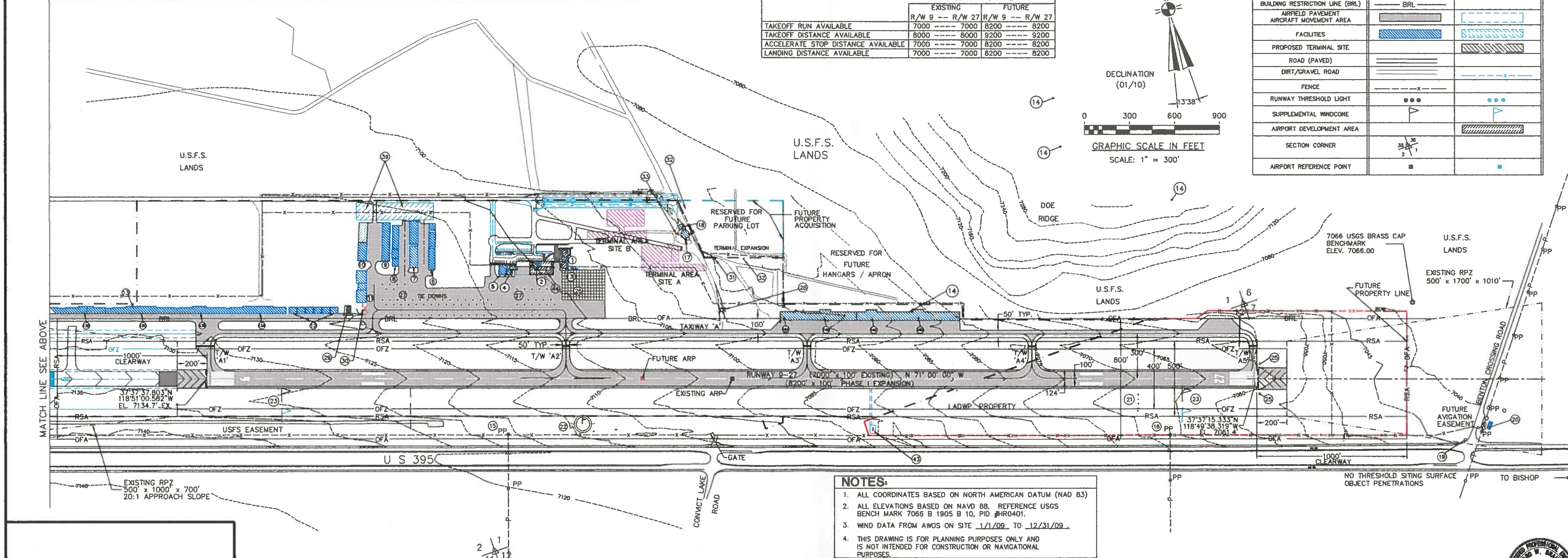
	EXISTING R/W 9	EXISTING R/W 27	FUTURE R/W 9	FUTURE R/W 27
TAKEOFF RUN AVAILABLE	7000	7000	8200	8200
TAKEOFF DISTANCE AVAILABLE	8000	8000	9200	9200
ACCELERATE STOP DISTANCE AVAILABLE	7000	7000	8200	8200
LANDING DISTANCE AVAILABLE	7000	7000	8200	8200

LEGEND

	EXISTING	FUTURE (0-5 YRS)
GROUND CONTOUR	7078	
AIRPORT PROPERTY LINE		xx
RUNWAY SAFETY AREA (RSA)	RSA	RSA
RUNWAY OBJECT FREE AREA (OFA)	OFA	OFA
RUNWAY OBJECT FREE ZONE (OFZ)	OFZ	OFZ
BUILDING RESTRICTION LINE (BRL)	BRL	
AIRFIELD PAVEMENT AIRCRAFT MOVEMENT AREA		
FACILITIES		
PROPOSED TERMINAL SITE		
ROAD (PAVED)		
DIRT/GRAVEL ROAD		
FENCE	x	x
RUNWAY THRESHOLD LIGHT		
SUPPLEMENTAL WINDCONE		
AIRPORT DEVELOPMENT AREA		
SECTION CORNER	35 36 2 1	
AIRPORT REFERENCE POINT		

TRUE
MAGNETIC
DECLINATION (01/10)
13°38'

0 300 600 900
GRAPHIC SCALE IN FEET
SCALE: 1" = 300'



NOTES:

1. ALL COORDINATES BASED ON NORTH AMERICAN DATUM (NAD 83)
2. ALL ELEVATIONS BASED ON NAVD 88. REFERENCE USGS BENCH MARK 7066 B 1905 B 10, PID #HR0401.
3. WIND DATA FROM AWOS ON SITE 1/1/09 TO 12/31/09.
4. THIS DRAWING IS FOR PLANNING PURPOSES ONLY AND IS NOT INTENDED FOR CONSTRUCTION OR NAVIGATIONAL PURPOSES.

DATE

FAA DISCLAIMER

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APPROVED DATE
AIRPORT MANAGER – WILLIAM B. MANNING

Reinard W. Brandley
CONSULTING AIRPORT ENGINEER
8125 King Road, Suite 201 • Loomis, California 95650 • (916) 652-4725

COUNTY OF MONO
STATE OF CALIFORNIA

MAMMOTH YOSEMITE AIRPORT

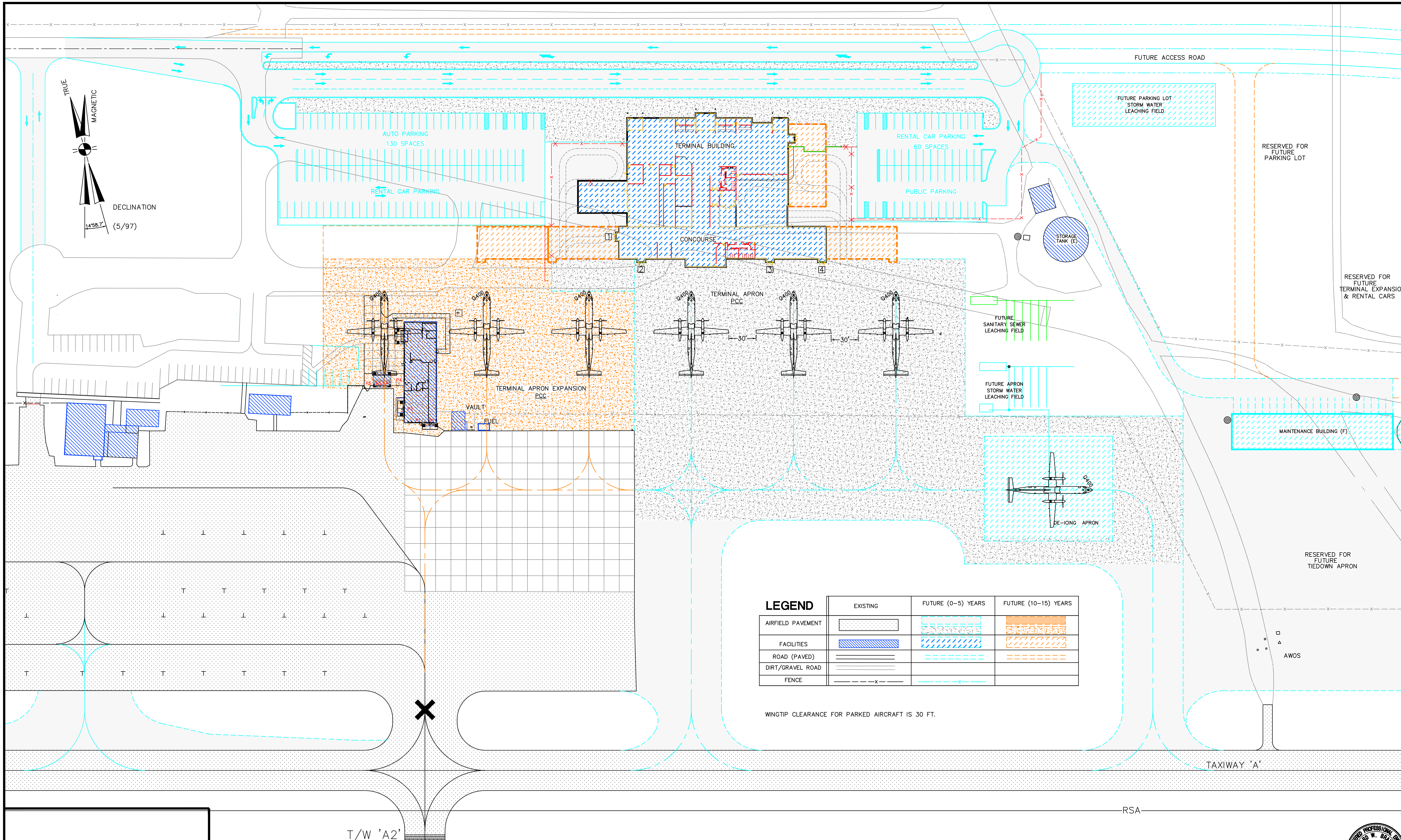
MAMMOTH LAKES, CALIFORNIA

TERMINAL SITE LOCATION PLAN

NO.	REVISIONS	BY	APR	DATE

REGISTERED PROFESSIONAL ENGINEER REINARD W. BRANDLEY No. C 8044 Exp. 9-30-2016 CIVIL STATE OF CALIFORNIA

DATE JAN. 29, 2015
SHEET NUMBER
PLATE No. 4-1



DATE

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APPROVED DATE
AIRPORT MANAGER – WILLIAM B. MANNING

Reinard W. Brandley
CONSULTING AIRPORT ENGINEER
6125 King Road, Suite 201 * Loomis, California 95650 * (916) 652-4725

STATE OF CALIFORNIA

MAMMOTH YOSEMITE AIRPORT

MAMMOTH LAKES, CALIFORNIA

TERMINAL AREA SITE PLAN

NO.	REVISIONS	BY	APR	DATE

REGISTERED PROFESSIONAL ENGINEER
REINARD W. BRANDLEY
No. C 8044
Exp. 12-31-2018
CIVIL
STATE OF CALIFORNIA

DATE APRIL 18, 2017

SHEET NUMBER
PLATE No. 4–2

CHAPTER 5. TERMINAL BUILDING

The terminal building studies and requirements were prepared by the Architectural firm of the Van Sant Group. The results of their studies are included in this chapter. Also included in this chapter is Table No. 5-1, which shows the probable architectural design and construction costs for the terminal building. Table No. 5-2 shows terminal facility requirements. Plate 5-1 shows the proposed terminal building floor plan. Plate 5-2 shows typical elevations of the proposed terminal building.

5-1 Terminal Building Requirements

The commercial passenger terminal at Mammoth Yosemite Airport represents a starting point for terminal planning. This minimum facility program is needed to support the current and anticipated levels of passenger activity. This program, in conjunction with specific terminal configurations, will need to be adjusted to accommodate actual building footprints. The gross terminal area derived herein may vary as a result of actual configuration. For example, the amount of secure and non-secure circulation may vary from the program due to the terminal configuration, whereas the amount of commercial space is relatively independent of the concepts. Certain configuration assumptions have been included and are discussed in the appropriate sections.

Based on the Peak Hour Passengers and Design Aircraft, the Terminal has been sized to meet the MMH required level of service, which includes the relative comfort, convenience and ease of use of the Terminal Building at Mammoth Yosemite Airport.

The current design aircraft is the Q400, which is operated by Alaska Airlines. This aircraft has 76 seats and a crew of 3. The total passenger and crew of 79, rounded to 80, will be used as peak hour passengers for this terminal design study.

In addition to the FAA guidelines for Terminal Building Facilities design (AC 150/5360-9), the terminal spaces need to meet the airline industry accepted standards, local and federal governing building codes for occupant load and life safety local fire code requirements.

The current building codes establish the Occupancy Classification for the type of use in the Terminal Building as A-3, Assembly use. In addition specific spaces within the terminal have different occupant loads that are related to life safety concerns and associated issues, such as emergency egress from the building in an emergency situation, based on the occupant load.

The minimum floor area allowable by the governing codes per occupant in Airport Terminals is the following:

Space	***SF per occupant***
Baggage Claim	20
Concourse	100
Waiting Areas	15

The Terminal Facility Requirements designed and listed in Table 5-2 reflect the utilization of the FAA AC, and governing building code requirements in conjunction with the peak hour passengers.

5-1.1 Aircraft Gates/Hold Rooms

The Airport will need to accommodate the ever-changing airline industry, and the differing aircraft serving markets such as Mammoth Yosemite Airport. The need to provide space that can meet the varying capacity requirements of different aircraft is paramount to the success of the terminal facility. The design aircraft for terminal planning of the new facility is the bombardier Q400, an Airport Reference Code (ARC) C III aircraft (approach speed 121-140 Knots, wing span 70' – 117"), which can accommodate 70 - 76 passengers. This aircraft will meet the needs of the terminal for maximum efficiency and utilization of the space.

Departure Lounges (Holdrooms) are based on the mix of aircraft and the average seating capacity of the ARC CIII aircraft. Hold room sizing for the Terminal Building was determined by the following in accordance with the International Building Code, 2015 Edition:

80 passengers per Hold Room x 15 sf/occupant = 1,200 sf
1200 sf x 3 Hold Rooms = 3,600 sf

The egress area at the end of the circulation corridor for emergency exit for the occupants in the Concourse (shown on the plan as double doors and the number **1**), is 314 square feet of the total and is shown in Table 5-2.

Based on the 80 passengers per hold room, it is anticipated that 60 seats will be provided for each of the three hold rooms. The airlines will be asked for their Airport Ticket Office (ATO), Hold Room and Baggage Claim requirements at the appropriate time throughout the process.

The initial enplaning holdrooms should provide for the accommodation of three aircraft at the terminal at the same time. This would require a minimum square footage of 3,600 square feet, (3,914 sf if the egress area at the end of the circulation corridor is included). The configuration should reflect this area.

5-1.2 Commercial Airline Space

Commercial airline space includes both exclusive leased areas (for example, offices, operations and miscellaneous support), and joint use space (such as baggage claim).

Commercial Airline Ticket Counter (ATO Counter) length is typically based on the number of enplaning passengers to be processed in a peak hour. It is therefore incumbent in the space program to provide ample space for the proposed two airlines, and expansion capability for future entrants to the market. This would provide two positions (5' wide each) for each airline, which includes two ticketing positions and a bag well in each 5-foot counter position. The depth for each position is approximately 8 feet to the back wall. This space will accommodate the location of TDS baggage screening equipment behind the ticket counters. A queue space of 10-foot minimum should be included in front of each ticket counter position.

Airline Offices include the ATO offices and other airline administrative spaces. The ATO offices are usually located directly behind or adjacent to the ATO counter and provide support to the ticket agents. These spaces are normally 25' deep along the length of the counter. In a commuter terminal airline operations support spaces are generally located in the same ATO space, and usually include parts storage, break room, and crew support.

Baggage Make-up includes either manual or automated make-up units, the cart container staging areas and maneuvering space for the carts. Normal cart make-up containers include a minimum of two containers and the tug. All space should be covered at a minimum and provide weather related protection, if possible. The space should be at close proximity to the ATO operations space to maximize utilization of airline personnel. All baggage related elements should include accommodations for ski equipment and over-sized elements.

Baggage Service Offices are typically required at major commercial hub operations, therefore are not included in the terminal. Airlines serving MMH will provide this service at their ticket counters.

Baggage Claim requirements are based on the peak demand of deplaning passengers and checked baggage per passenger ratios. The requirements of this facility will be accommodated with approximately 120 lineal feet of claim device. Two units should be adequate, with the capability to add an additional unit as the number of passengers increases. Ski equipment should include a separate slide area.

Baggage Claim sizing was determined by the following:

Total passengers/aircraft = 80
80 passengers x 20 sf/person =1600 sf

This represents 1,600 square feet of the area listed in Table 5-2. The baggage conveyors comprise 511 square feet, after the reduction of 105 square feet due to circulation space adjacent to the baggage claim area.

Baggage Claim Off-load Areas includes the lanes and maneuvering areas, which are required to accommodate the baggage train of two carts. Circulation area is also included in this area, like the baggage make-up area and should provide cover and minimum weather protection from the elements.

5-1.3 Concessions

Rental Car Counters provide an important service to the passengers and revenue to the Airport. Adequate space should be provided for all companies serving the terminal. These include counter space and office area. A common standard of 10 lineal feet of counter would be adequate, with ancillary office space of 75-80 square feet.

Ground Transportation Services also provide needed service to the terminal passengers. Adequate counter and office space should be included for their use. These areas can serve as extra space for charters, special events accommodation and other uses, if required.

Food and Beverage Services should accommodate a restaurant and should be located on the secure side of the terminal. Seating should be adequate for approximately 50 patrons. Kitchen space should be derived as a result of the desired menu service and include adequate storage space as well as delivery access from the non-secured side of the terminal roadway system.

News/Gifts/Lease Space category includes newsstands, gift, retail and specialty shops, business services and other miscellaneous services. There should be adequate locations on the secured side for these functions. A minimum area of 200-300 square feet should be provided, preferably adjacent to the food service to maximize the potential for cross-utilization of personnel.

Other Services consist of miscellaneous revenue producing areas, including automated teller machines, insurance and related customer services. Advertising should be included as an area and location specific space. Freestanding and those utilizing walls are desirable. Telephones should be included on both the secure and non-secure sides of the facility.

Concession Support consists of storage areas, preparation areas, employee lockers, loading and delivery areas, and administrative offices. Most support spaces should be integrated into the back of the office area adjacent to the customer serving spaces, rather than in remote locations.

5-1.4 Public Spaces

Public spaces, include most of the non-revenue producing areas of the terminal including queuing areas, seating and waiting area, and circulation corridors. Some of the areas are functions of passenger volumes, whereas others are functions of specific facility requirements.

Ticket Lobby includes ticket queuing area, cross circulation, entrance vestibules and general circulation at the main entrance to the building. The minimum distance from the face of the ticket counter to any obstruction should be 40'- 45' for a terminal of the required size. This includes queuing depth of 20'- 25' and the remainder in cross circulation.

Public Seating areas include general (non-secure) waiting areas near the ticket lobby, baggage claim areas and concessions. Programmed square footage should include seating for approximately 15% of the peak hour passengers, in these areas. This represents approximately 40 seats and 600 square feet.

Rental Car Counter Queuing should be 10' deep in area facing the counters. Additional area should accommodate cross-circulation adjacent to the queuing space.

Restrooms should have an adequate number of fixtures to accommodate the peak hour passengers utilizing the facility. Restrooms will be required on both the non-secure and secure side areas of the terminal. The number of fixtures should be designed to meet the local codes and ordinances. The American with Disabilities Act (ADA) requires that restroom facilities be provided.

Secure Circulation will accommodate the processing of passengers through the TSA Security Checkpoint. The present terminal provides one lane of security, however it would be wise to provide room for two lanes in the new facility initially, and expansion for an additional lane, to accommodate expansion. Exit corridor from the holdrooms for deplaning passengers should be 16’ wide, and prohibit wrong way access from the non-secure side.

Based on the peak hour Passengers, the Security Screening Checkpoint was derived in conjunction with TSA input and includes two lanes for passenger screening baggage and the long neck wanding station for secondary screening. Queuing space, document checking, private screening and post screening seating area are included.

The future of screening is very dynamic and rapidly changing and TSA recommends as much flexibility and potential expansion as possible. The initial design includes:

Queuing	412 SF
Screening area	1,168 SF
Post Screening	264 SF
Secure Circulation	450 SF

Other Public Circulation includes all corridors and architectural spaces that tie the functional elements of the terminal together. The terminal configuration will accommodate the inclusion of necessary additional space based on the layout.

5-1.5 Other Areas

An Information Counter, including skier information, should be located near the main entrance(s).

Mechanical/Electrical/Utility areas should be provided throughout the facility, as required and should comprise approximately 8-10 % of the terminal gross area. All systems, mechanical, electrical, plumbing and communication should be designed for expansion.

Janitorial/Storage areas should be included in the facility and located adjacent to mechanical/electrical areas, and be supplemented with additional spaces outside the main terminal area.

Airport Administration/Operations is presently located in another building and is assumed to be similar in size to existing administration space in the present location. This will probably be located on the second floor of the new terminal.

5-1.6 Expansion

It is important to note the environmental documentation anticipated as the next step in implementation of the ten year Airport Capital Improvement Program will be based on projects included in the approved ALP. While it is certainly prudent to consider the possibility of future expansion so as to not preclude the possibility without undue hardship, those projects proposed are to be designed solely for the ten-year projection. No significant design is to be included toward the possibility of future expansion. Only consideration of that possibility may be included.

The new terminal building should be designed to meet the program needs of the Airport for at least ten years after it is opened, and also provide the opportunity to be expanded, should the market dictate. The fluid nature of the commercial airline industry and the need to respond to the inherent changes it creates require the Airport to be responsive to the market potential of the terminal. The new facility should be able to be expanded with minimal interruption to the existing operations of the terminal. Critical areas of the building, which may require expansion should be located away from critical built-in program areas. Sensitivity to the placement of expandable areas should be a major criterion of the actual layout.

5-2 Design Narrative

5-2.1 Architectural Design

The architectural plan and space design layout of the New Terminal Building reflects the clear concise symmetry of the linear terminal configuration. The layout of the Landside functions of Ticketing and Bag Claim allow the building users to experience each function separate from the other, thereby permitting a smaller scale building use for both enplaning and deplaning passengers.

The center spine of the building is the Security Checkpoint and deplaning passenger exit way, which connect the landside and airside functions, for the passengers. This central connection is expressed in the aesthetic design of the building as the Main Entry Façade element. The expression includes a gable element, with large expanse of glass, which illuminates the entryway. In addition, the façade includes vertical polished black granite, with stained wood columns, accenting the entry on both sides. The entryways to Bag Claim and Ticketing, are also emphasized in the façade, in a slightly smaller fashion. In addition to the stone and wood columns, the façade has a native stone base, with stucco above, and accent panels of stained horizontal wood siding, further recalling the horizontal expression of the building design. Windows are provided at all appropriate locations to accent the views from all sides of the building. Interior finishes include colors and finishes similar to the exterior palette, and utilize maintenance free materials, where appropriate. The overall palette presents warm colors, in various materials and finishes.

The overall aesthetic expression is one of a horizontal expression, which reflects the site, and presents a building, which is less than 35 feet in height, at the highest point. The overall horizontal expression in both form and proportion reflects this harmony with the site.

The fenestration of the linear concourse, which comprises the Holdrooms, repeats the same use of materials, and also continues the horizontal expression of the building. The function associated with the Food Service/Lounge areas is emphasized with a gable roof element, similar to the landside main entry, with stone and wood accents, highlighted with vaulted glass. This element further dramatizes the expansive view of the Mammoth mountain range, and will be a featured area for passengers.

The entire building design and layout will not preclude future expansion of all major areas of the building, as the need arises, with minimal interruption to the operations. In that regard, the building core, including restrooms, mechanical, electrical have been designed so as to not preclude possible expansion of holdroom and lobby spaces. This will be invaluable as the need arises to expand the building, when increases in air service warrant additional space, and allow for that to occur, without interruption. Also, TSA checkpoint and associated office space is expandable without interruption of any adjoining spaces. The need to provide expansion space for the security checkpoint is important at all increasing service terminals, as the need to process the passengers remains very fluid, with new machinery and protocols changing constantly.

The materials and colors utilized afford low maintenance and express the simplicity and detail necessary to convey a positive public image of the building to the users and an overall pride for the residents in the Mammoth Lakes region.

5-2.2 Structural Design

The selected structural system will be designed to utilize the most economical, durable and functional type of construction and compliment the architectural design. Structural steel frame with wood sub framing will probably be utilized. The exposed columns at the facades will be heavy timber members, with appropriate anchors. Primary consideration will be given to the bay spacing (spans) and the bearing properties of the supporting soil strata to efficiently size the structural system members. Where required, structural design will not preclude future expansion.

All lateral forces on the structure, such as seismic and wind forces, will be analyzed in accordance with local governing building codes. It is important to note that Mammoth is an active seismic and volcanic area, and structural design will accommodate these forces. Lateral bracing, where required, will be integrated into the design, to compliment the aesthetic. Moment frames will also be studied in future phases of the design, to provide lateral stability.

The roof trusses will be designed to reflect the desired open effect, and will be scissor type. They will reflect the desired spacing and have minimal impact on the space utilization of the building.

The construction of the exterior walls will be designed for maximum economy and ease of construction, and match the aesthetic value. Wood framing for the walls will be utilized, where possible, with concrete masonry used to ease maintenance and where desired to reduce wear.

Foundations will be designed to reflect the existing soils, and be based on recommendations made during subsurface soils investigations and laboratory testing, which will be done in future phases. Preliminary discussions indicate that either spread footings on compacted sub-fill or drilled piers will be the two preferred alternatives for the foundation system

5-2.3 Utilities Design

Utilities Design required for the Building will be designed by the Building Engineers in conjunction with the Site Utilities design for the New Terminal Site. Building load data will be derived in future phases of design, and given to Site Engineer for inclusion in master site utility design. A defined utility corridor, established away from possible future expansion(s), will be the point where the Building design engineers will bring the various utilities into the building. It is desirable to have the utility corridor completely encompass the terminal site; to accommodate the double feed of desired utilities. The Airport Engineer will obtain water for the building, from on-site wells, located east of the terminal site, adequately sized to provide the required domestic and fire protection pressure of the facility. Also, the sewer system will be accommodated by the Airport, with the construction of a new on-site package sewage disposal plant, to serve the needs of the terminal, other airport facilities and the fixed base operators' commercial development. The package plant would treat the sewage, with effluent disposed of by underground leach lines.

5-2.4 Building Systems

Electrical Design – The building should be fed underground with power from a nearby substation. The preferred enclosure would be an underground vault, with conduit encased in concrete, within 600 to 1,000 feet apart. From there, loop feeds to pad mounted transformers, near the building, would be utilized, for secondary service. There will be at least two transformers; one each for the main terminal and concourse, with power supplied of 277/480V, three-phase, four-wire from the main supply to the building. Final total load will be determined in the next design phase and submitted to the providing utility (Southern California Edison). Transformers will be located on concrete pads, and secured from the public. The building will provide a secure (non-public) electric room for step down panels and other appropriate distribution to all areas within the facility. The room should be designed for expansion of service needs, which may arise. A provision for emergency power for critical components of the building would be desirable.

The airlines will require 400 Hz power at each gate for aircraft service needs, and need to have tenant panels for their own power needs, associated with their operations.

Lighting for the building will be provided based on NEC standards, and include the use of energy-efficient fixtures throughout the facility. Light levels will meet the required foot-candles for the areas and their associated tasks. Public area light fixtures will be designed to compliment the aesthetic values of the spaces. It is essential to limit the replacement lamps, wherever possible, to assist in the replacement of bulbs, while still meeting the required light levels. Lighting for the apron area will be included in the site work, designed by the Airfield Engineer.

Mechanical Design – The primary energy source for the heating of the building will be propane gas. Cooling energy will be provided by electricity. Mechanical equipment will be included in the central mechanical room, including the major air handling units and central control system. All distribution will include concealed ductwork, with multiple zones throughout the facility. Energy conserving variable air volume systems with independent perimeter heating will be used where architectural and functional conditions permit. Supplementary mechanical units will be used where necessary.

All equipment will include the state-of-the-art filtration to assist in the removal of dust and odors generated by the high occupancy rate of the building. In addition, fresh air will be obtained away from the airfield side, so as not to include the fumes associated with the airside. The desired effect of an energy conserving and pollution-free air circulation system is paramount in the design.

A control system with full energy management and preventative maintenance capabilities will be included in the main mechanical room. This computer-based system will allow for monitoring the system in remote areas, for load analysis and optimum utilization of the heating and cooling systems.

Plumbing Design – A conventional soil/waste and vent system will be designed to serve the needs of all plumbing fixtures throughout the facility. All public toilet room fixtures will be provided with automatic infrared sensors for control and use.

Domestic water supply to all concessionaires will be sub-metered to control and monitor usage. Tempered water supply to public lavatories will be provided at 95 degrees F. The main distribution system will be recirculated to minimize temperature loss. A central hot water heater (gas) for each of the two restroom cores (terminal and concourse) will supply the required hot water for each. The system will include shutoff capabilities to groups of fixtures to prevent water supply interruptions to public toilet rooms and concessionaires, for ease of maintenance. Where advantageous, individual hot water heaters of the electric instantaneous type may be utilized for remote locations.

Tenants requiring hot water will be required to provide their own domestic hot water heating equipment.

All tenants utilizing water and gas can be separately sub-metered. Fixtures throughout the building will be low water usage type, with lavatories of the timed, regulated-flow type.

Backflow preventers will be installed on all service and fire lines entering the building. Metering of all domestic service lines will be required. All sewer and waste shall conform to those standards in place at the Airport, and in conformance with the Town of Mammoth Lakes.

Fire Protection – A fire alarm and detection system will be provided, including all detectors and manual pull stations. The individual specific requirements of respective areas, in conjunction with local governing codes, will determine the location of sprinkler flow alarms and valve monitoring. Alarm systems will be directly transmitted to the local fire department, in addition to the local fire annunciator panel.

The fire protection will consist of wet- and dry-pipe, automatic closed head sprinkler systems, for all required areas. Sprinkler systems will be hydraulically designed with maximum square feet of sprinkler area as required by codes. Automatic sprinkler risers will include a fire alarm flow switch.

Communications – All communication systems required for terminals will be included in the Project. Telephone service for the building users and tenants will be included, with the main service panel located in the electric/communication room on the secured side of the building. Private lines will be provided for the airlines and other tenants. Public phones will be provided in the main terminal and concourse, including ADA required volume control, text-type, and assertive listening telephones. Telephone service will be brought into the terminal from the closest available source.

A wireless local area network (wlan) will be provided throughout the terminal, with protection services available for users. The individual tenants will be responsible for their own wi-fi.

A public address system, utilizing the telephone system, with secure controlled access for all parties, will be provided. Speakers for the system will be included in the building and located strategically throughout the facility. In addition, a joint use flight information display system (FIDS) will be provided at strategic locations.

The flight information provided will include arrivals and departures for all carriers at Mammoth Yosemite Airport.

A security monitoring camera system, implemented by the Airport, will provide monitoring of gate holdrooms, bag claim, access points, security, and other secured areas of the terminal and other site related areas. Monitors for the system will be located in the Airport Administration security offices. The system will also be expandable.

5-2.5 Estimate of Probable Design and Construction Costs

An estimate of the costs of design and construction of the proposed terminal building initial development, and long-range development has been prepared and is included in Table No. 5-1. All costs shown are based on 2017 prices and must be adjusted for inflation.

TABLE NO. 5-1

MAMMOTH YOSEMITE AIRPORT
ESTIMATE OF PROBABLE DESIGN AND CONSTRUCTION COSTS
TERMINAL BUILDING

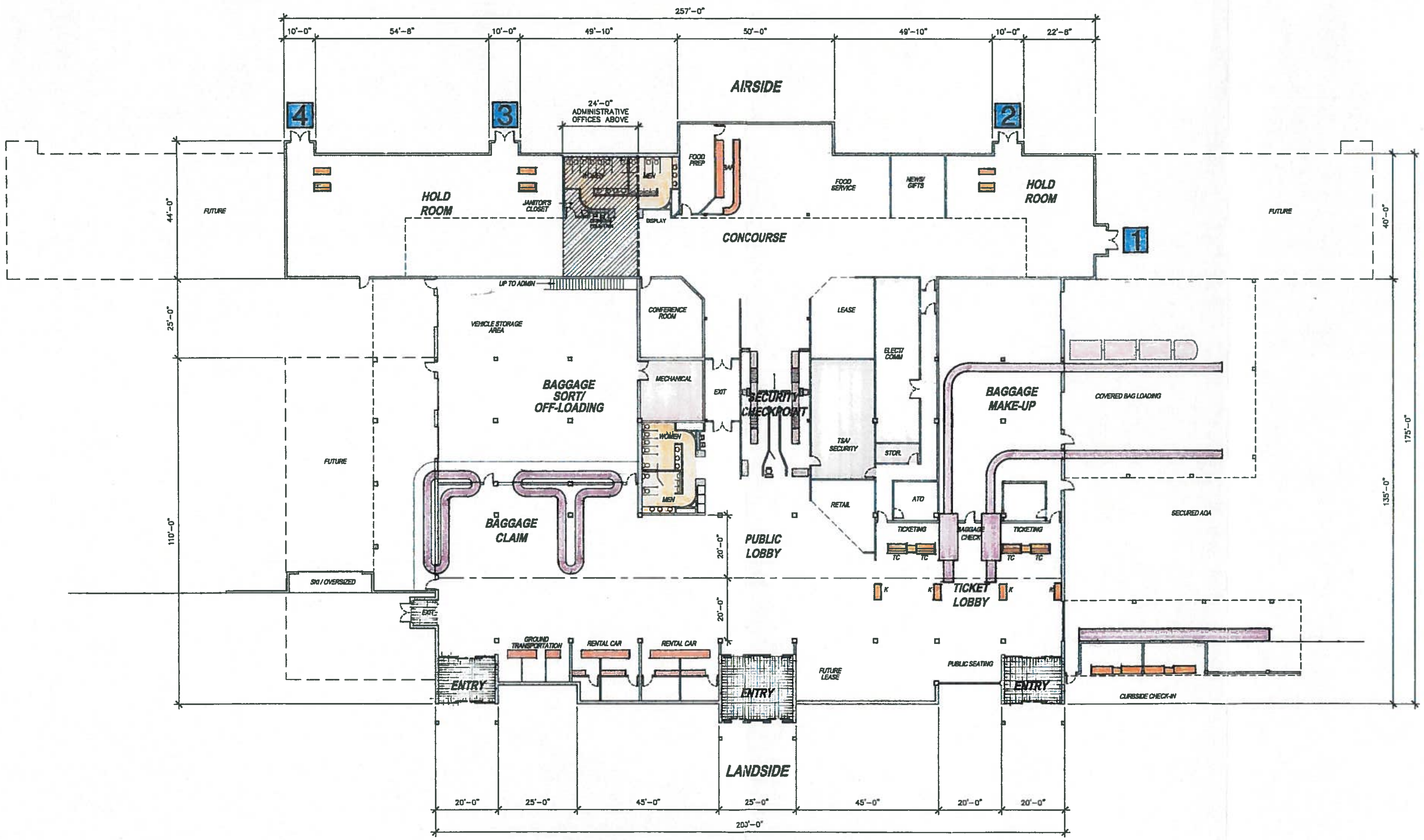
A.	INITIAL DEVELOPMENT (within 5 years)	
	1. Design New Terminal Building	$1,750,000
	2. Construct New Terminal Building	$17,525,000
	3. Design Terminal Apron & Related Infrastructure	$1,120,000
	4. Airline Terminal Apron & Related Infrastructure	$13,114,000
B.	LONG-RANGE PLANNING (approximately 11-20 years)	
	1. Design Expanded Terminal	$514,685
	2. Construct Expanded Terminal	$4,117,500

Note: For long-range planning (10 to 20 years) it may be necessary to expand the terminal area apron, terminal access road, and automobile parking somewhat. Because of the type service forecast for this airport it is not possible at this time to forecast if, when, or how much expansion may be necessary. It is anticipated that the required expansion of these facilities will be minimal. No estimated cost for long-range development has been included in this table.

TABLE NO. 5-2

MAMMOTH YOSEMITE AIRPORT
TERMINAL BUILDING REQUIREMENTS

		EXISTING TERMINAL	NEW TERMINAL	NEW TERMINAL
Year		2016	2021	2026
Enplanements		22,253	23,618	24,581
Peak Hour Passengers		163	171	204
Lease Space				
Airlines				
	Holdrooms	940	3,600	3,600
	Emergency Exit Concourse		314	314
	Ticket Counter	18 LF	30 LF	30 LF
	Ticket Kiosk		20 LF	20 LF
	Ticket Counter Area	420	872	872
	ATO	120	332	332
	Baggage Make-up	285	3,185	3,185
	Curbside Baggage		1,563	1,563
	Baggage Sort/Off-Loading		3,874	3,874
	Baggage Claim	120	1,600	1,600
	Baggage Conveyors		511	511
	Ski/Oversized Baggage		182	182
	SUB-TOTAL	**1,885**	**16,033**	**16,033**
Car Rental				
	Lease Space	150	1,202	1,202
	Counter Length	25 LF		
	Front		34 LF	34 LF
	Back		27 LF	27 LF
Restaurant			1,822	1,822
Retail		22	324	324
Vending			23	23
News/Gifts			340	340
Lease/Display			315	315
	SUB-TOTAL	**172**	**4,026**	**4,026**
Gates		1	3	3
Public Space				
	Ticket Lobby	504	1,360	1,360
	Public Seating Areas		600	600
	Restrooms - Non Secure	285	429	429
	Restrooms - Secure	76	539	539
	Security Checkpoint	835	2,294	2,294
	Circulation	1,215	11,112	11,112
	SUB-TOTAL	**2,915**	**16,334**	**16,334**
Other Areas				
	Ground Transportation		344	344
	Airport Administration		897	897
	Multi-purpose/Support (Conf.)		473	473
Support				
	Mechanical/Elec/Utility	24	1,098	1,098
	Support/Storage	64	83	83
	SUB-TOTAL	**88**	**2,895**	**2,895**
Total Terminal Area (SF)		**5,060**	**39,288**	**39,288**



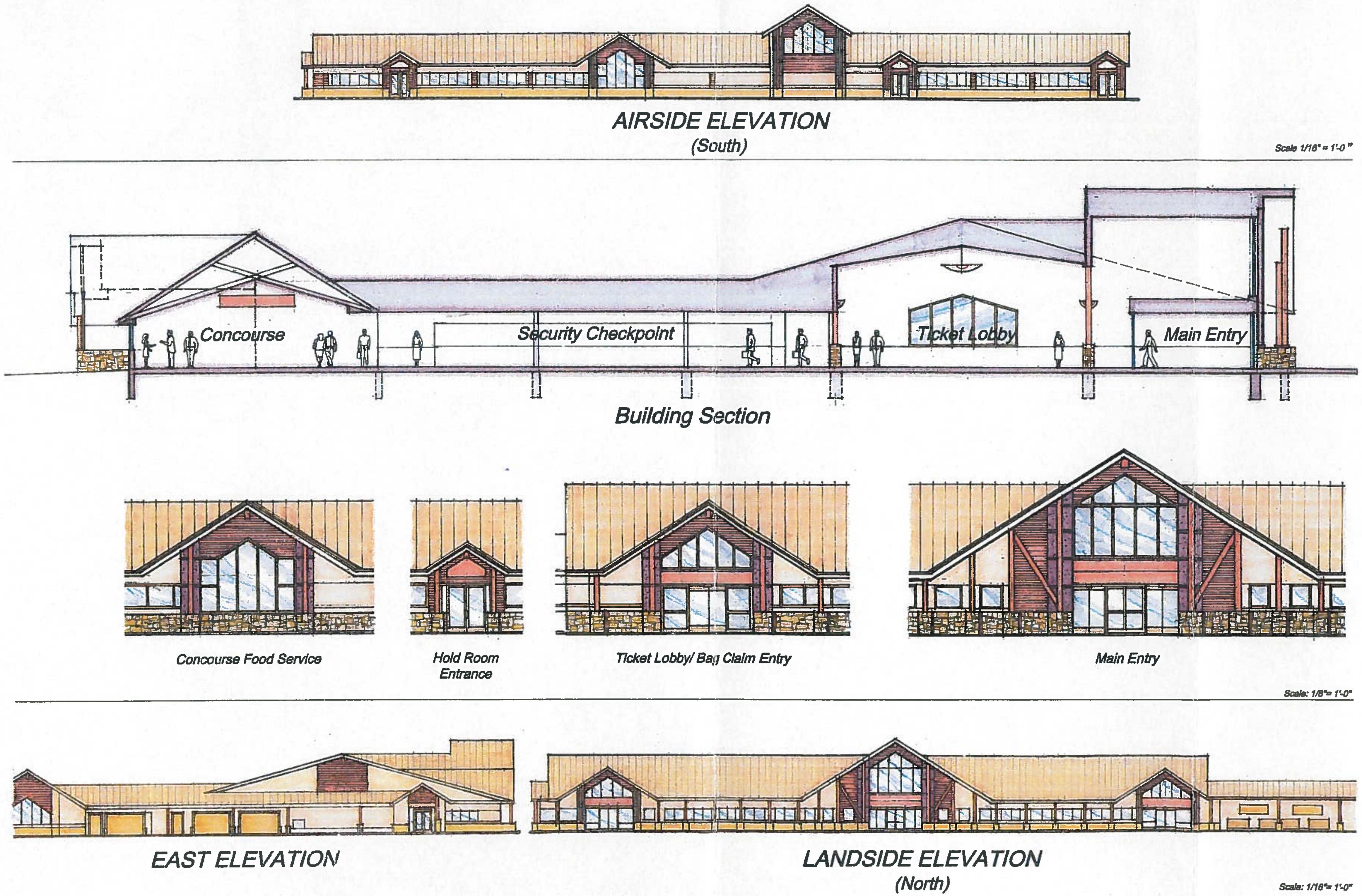
TERMINAL BUILDING – FLOOR PLAN

MAMMOTH YOSEMITE AIRPORT
MAMMOTH, CALIFORNIA

SCALE: 1/16" = 1'-0" FULL SHEET 24" x 36"

Van Sant Group

PLATE NO. 5-1



TERMINAL BUILDING – ELEVATIONS

MAMMOTH YOSEMITE AIRPORT
MAMMOTH, CALIFORNIA

SCALE: 1/8" = 1'-0" (FULL SIZE 24" x36")
SCALE: 1/16" = 1'-0"

Van Sant Group

PLATE NO. 5-2

CHAPTER 6. TERMINAL SUPPORT FACILITIES – CIVIL WORKS

The terminal support facilities include all areas and facilities required to support the airline operations and passengers. These facilities include aircraft parking aprons, deicing facilities, access roads, automobile parking areas, maintenance facilities, utilities, and other facilities required to provide a complete and functional commercial terminal facility. These facilities are civil engineering design features commonly known as Civil Works and are shown on Plates 6-1 and 6-2.

6-1 Terminal Apron

The commercial terminal building has three main gate positions. The proposed apron will be capable of accommodating three Q400 aircraft or three CRJ700 aircraft in a taxi-in/taxi-out type operation. This should adequately serve the proposed commercial services for the first 10 years after opening of the terminal. The terminal apron will be 20,444 square yards and will be a rigid pavement design using a 16-inch Portland cement concrete surfacing material. Space should be reserved to enlarge the concourse and apron so as not to preclude accommodation of a total of six Q400 aircraft positions.

The existing grades require that the terminal apron drain toward the terminal building. A continuous grated slot drain will be installed at the north edge of the apron and immediately behind the aircraft parking position to accommodate all drainage from the apron and terminal. The preliminary grading and drainage plan has been prepared and is included in Plate 6-1. The terminal apron at the north edge will slope from west to east at 1 percent grade to accommodate the drainage and minimize embankments. This will require that the adjoining concourse on the terminal have level areas for the hold rooms and shallow ramps between the hold room areas to accommodate the change in grade.

Apron lighting will be provided by floodlights located along the north edge of the apron.

6-2 Deicing Apron

The majority of the commercial aircraft forecast to use Mammoth Yosemite Airport will operate during the winter months, and in the winter many of these aircraft require deicing immediately prior to takeoff. From an environmental and operational standpoint it is not appropriate to deice the aircraft in their parking positions at the gates. A separate deicing apron is proposed adjacent to the apron.

This deicing apron will also serve the business jets that frequent the airport in the winter.

The deicing apron will also be constructed of a rigid pavement section with a 16-inch Portland cement concrete slab. It will be graded to a central drain in the middle of the apron. Storm water and/or deicing fluid from this apron will be picked up in the central drop inlet and carried by pipe to an area immediately southeast of the deicing apron where a holding tank will be installed to hold the deicing fluid that washes off the aircraft until it can be pumped out and transported to a suitable disposal area. The pipe discharge from the drop inlet in the center of the deicing pad will have a dual discharge controlled by valves. One discharge will be into the deicing fluid holding tank and a second will be in a storm water leaching field in the same area as the holding tank. The valves will be controlled so that at all times when deicing operations are taking place the valve to the storm water leaching field will be closed and the valve to the holding tank will be open. During storms, only when deicing is not occurring, the valve to the holding tank will be closed and the valve to the storm water leaching field will be open.

6-3 Connecting Taxiways

Two connecting taxiways, 230 and 280 feet long, will connect the new aircraft parking apron and deicing apron to Taxiway A. These taxiways will be flexible pavement sections using asphalt concrete for the surfacing.

6-4 Automobile Parking

There is enough space on the existing airport property adjacent to the terminal for two automobile parking areas. The parking area to the west of the terminal will be used for rental car company vehicles and will accommodate 130 automobiles. The parking lot to the east of the terminal will be used by commercial passengers and other visitors and there is space for 60 parked automobiles. Additional existing parking lots can also be used for rental cars. If it becomes necessary to expand the rental car and/or the visitor parking facilities, provision has been made in the Airport Layout Plan for this supplemental parking facility to be located in front of the terminal across the access road on U.S. Forest Service land. Security lighting will be provided for each parking lot.

6-5 Access Road and Service Roads

An access road will be constructed as an extension to Airport Road. This road will have a cul-de-sac at the east end of the east automobile parking lot as shown on Plate 6-1. There will be a 20-foot concrete sidewalk in front of the terminal building, then a 9-foot space for parallel automobile parking used for loading and unloading, two 12-foot eastbound travel lanes, a 10-foot concrete island and two 12-foot westbound travel lanes.

During the design and construction of the access road to the terminal building, care should be taken not to preclude the potential of providing a secondary access road in the future.

An asphalt-paved access road, service area, and automobile parking will also be constructed to the proposed new maintenance building to be located immediately east of the deicing apron.

6-6 Maintenance Building

The Airport currently has need of a new maintenance building to store and maintain snow plows, snow blowers, and other maintenance gear since the maintenance building they original had was converted to the temporary terminal facility. It is proposed to construct a 10,000-square foot maintenance building to the east of the deicing facility. Automobile parking will be provided in front of the building to the north and a paved operations area will be provided to the south of the building.

6-7 Utilities

Utilities within the terminal building and for a distance of 10 feet outside the building are included in the terminal building plan. Utilities serving the building and other facilities on the airport are included in the civil engineering design section of the project and consist of:

- Sewer
- Water
- Electrical
- Telephone

These utilities of the size and type required for the existing and potentially expanded terminal building will be installed both in front of the terminal building and on the airside portion of the concourse.

There is no natural gas available. Propane will be provided for each facility developed at the airport.

A preliminary Utility Plan showing the location and routing of the proposed utilities in the terminal area is presented in Plate 6-2.

6-7.1 Electricity

Electricity is provided to the airport by Southern California Edison from a primary power line located to the south of U.S. Highway 395 and is carried to the existing airport electrical vault building for distribution to the airport users. It will, no doubt, be necessary to enlarge the service to the electrical vault building or directly to the commercial terminal facility, which can be readily handled by

Southern California Edison. Power cables will be carried from the vault to the terminal building by underground duct.

6-7.2 Telephone

Telephone service is provided by Verizon or Voice Over Internet by a variety of carriers via the airports connection to the local broad band network. Both networks terminate in the existing electrical vault building. A significant capacity is available, to be added as needed. Service to the terminal building will be provided from the electrical vault.

6-7.3 Gas

There are no gas lines in the area of the airport and all facilities that require gas are served by propane from local suppliers. The terminal facilities can also be served by propane as necessary.

6-7.4 Water

Potable water is obtained from wells on the airport. There are two wells and a 450,000 gallon storage tank located immediately east of the terminal facilities. An emergency generator is available at the pump house to provide power for the pumps in an emergency. There is adequate water supply to accommodate both domestic and fire use for the new terminal facilities.

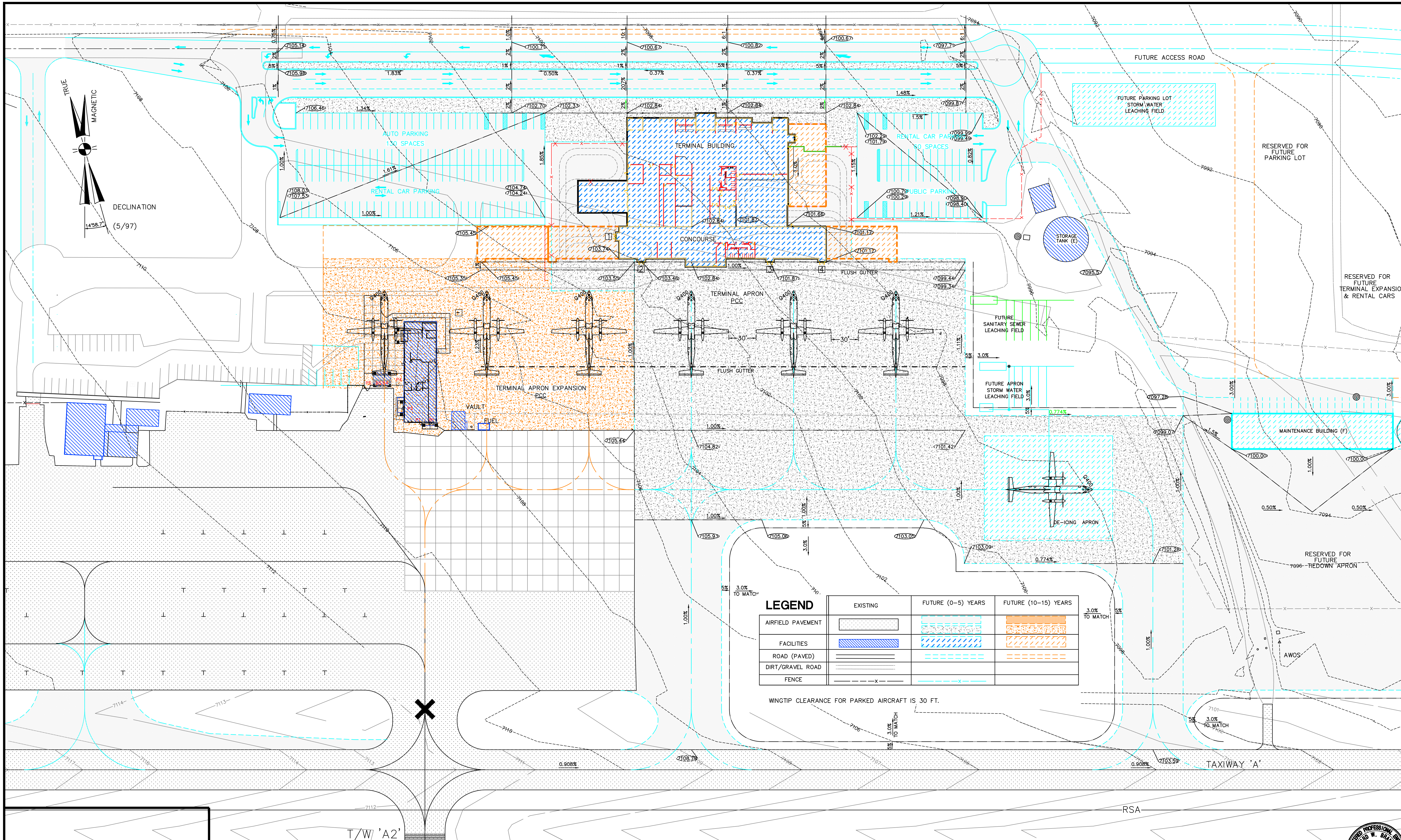
6-7.5 Sewer

The soils at Mammoth Yosemite Airport are very porous clean sand and gravel soils with some small cobbles embedded. The ground water table is deep and these soils provide good leaching characteristics. Currently all facilities at the airport are served by septic tanks and underground leaching fields. With the development of the new terminal facility and the potential development of additional commercial facilities on the airport, it is proposed to construct a package sewage treatment plant and to discharge the effluent from this plant into an underground leaching field adjacent to the plant. The plant will be located west of the commercial apron. New sewer lines will be installed to carry the sewage from the new terminal facility and existing facilities on the airport to this new package plant.

6-8 Security

Security will be provided in the terminal building as necessary, including alarmed doors and security cameras. In the new terminal area the security fencing will be installed and/or relocated such as to separate the airport operations area from the non-secure civilian use area. The existing barbed wire fence around the entire airport will be replaced with a new 8-foot chain link fence with coded gates as required. There will be security cameras at all entrance gates and at critical points on the aircraft parking apron.

The commercial apron, automobile parking lots, and access roads will be lighted with floodlights that will be provided with cut-off features such that full light is available on the apron and parking lots but the light is not visible from the runway, Highway 395, or other surrounding areas.



DATE

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APPROVED DATE
AIRPORT MANAGER – WILLIAM B. MANNING

Reinard W. Brandley
CONSULTING AIRPORT ENGINEER
6125 King Road, Suite 201 • Loomis, California 95650 • (916) 652-4725

STATE OF CALIFORNIA

MAMMOTH YOSEMITE AIRPORT

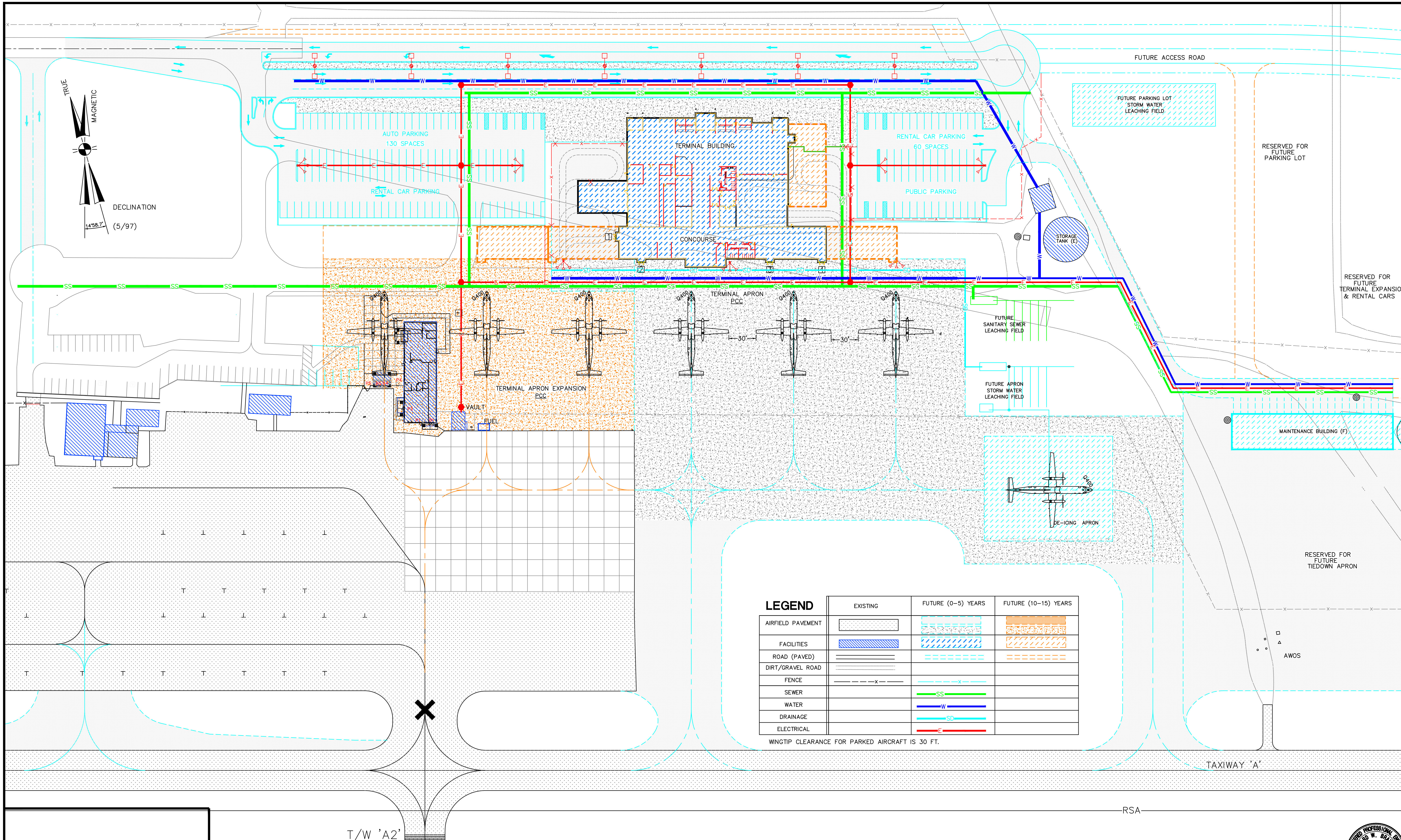
MAMMOTH LAKES, CALIFORNIA

TERMINAL AREA GRADING AND DRAINAGE PLAN

NO.	REVISIONS	BY	APR	DATE

REGISTERED PROFESSIONAL ENGINEER
REINARD W. BRANDLEY
No. C 8044
Exp. 12-31-2018
CIVIL
STATE OF CALIFORNIA

DATE APRIL 18, 2017
SHEET NUMBER
PLATE No. 6-1



LEGEND

	EXISTING	FUTURE (0–5) YEARS	FUTURE (10–15) YEARS
AIRFIELD PAVEMENT			
FACILITIES			
ROAD (PAVED)			
DIRT/GRAVEL ROAD			
FENCE			
SEWER		SS	
WATER		W	
DRAINAGE		SD	
ELECTRICAL		E	

WINGTIP CLEARANCE FOR PARKED AIRCRAFT IS 30 FT.

DATE

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APPROVED DATE
AIRPORT MANAGER – WILLIAM B. MANNING

Reinard W. Brandley
CONSULTING AIRPORT ENGINEER
6125 King Road, Suite 201 • Loomis, California 95650 • (916) 652-4725

STATE OF CALIFORNIA

MAMMOTH YOSEMITE AIRPORT

MAMMOTH LAKES, CALIFORNIA

UTILITY PLAN

NO.	REVISIONS	BY	APR	DATE

REGISTERED PROFESSIONAL ENGINEER REINARD W. BRANDLEY No. C 8044 Exp. 12-31-2018 CIVIL STATE OF CALIFORNIA

DATE APRIL 18, 2017
SHEET NUMBER
PLATE No. 6–2

CHAPTER 7. ESTIMATE OF PROBABLE DEVELOPMENT COSTS

Van Sant Group Architects have prepared an estimate of probable construction costs for the terminal building. These costs are included in Table No. 7-1. The probable construction costs of all civil works required to support the new terminal building have been prepared by Reinard W. Brandley and are included in Table No. 7-2. A summary of estimated total costs for the terminal area development including design fees, construction inspection fees, and 10 percent allowance for administrative costs has been prepared and is included in Table No. 7-3.

Funding sources to cover the cost of the proposed development include:

- F.A.A. Airport Improvement Program (AIP) Grants
- Passenger Facility Charges (PFC)
- Fees and Rents
- Tourist Improvement District Funds
- Municipal Bonds

All cost estimates are based on 2017 prices and must be adjusted for inflation if construction is scheduled beyond that timeframe.

TABLE NO. 7-1

MAMMOTH YOSEMITE AIRPORT
ESTIMATE OF PROBABLE CONSTRUCTION COST – TERMINAL BUILDING

	ELEMENT	COST/SF	COST
A.	**Terminal – Shell Space**		
1.	Ticketing and Queuing	$360/sf	Includes:
	Ticket Lobby		Structural system
	Bag Make-up		Mechanical system
	Bag Claim		Electrical system
	Holdroom		Plumbing system
	Airlines Lease Space		Finishes
	Non-Airline Lease Spaces		Public seating
	Restrooms		
	Security Checkpoint		
	Restaurant		
	Circulation		
	Support Spaces		
	Total Area = 40,010 SF		
	Subtotal – Terminal – Shell Space		**$ 14,403,600**
B.	**Airline Lease Spaces / TSA – Tenant Improvements**		
1.	Airline Offices - 332 sf	$80/sf	$ 26,560
2.	TSA Offices - 950 sf	80/sf	76,000
3.	Lease/ Display - 515 sf	95/sf	48,925
4.	Ground Transportation / Rent Cars-1,546 sf	95/sf	146,870
5.	Airport Administration / Conference-1,370 sf	95/sf	130,150
6.	Restaurant / Lounge - 1,822 sf	100/sf	182,200
	Subtotal – Airline Lease Spaces/TSA		**$ 610,705**
C.	**Other**		
1.	Generator		$ 242,200
2.	Baggage System – Inbound & Outbound		818,300
3.	Curbside Check-in		299,000
4.	Ski-Oversized Bag Claim		231,200
5.	Covered Bag Claim Area		245,100
6.	Covered Outbound Bag Make-Up		675,200
	Subtotal – Other		**$ 2,511,000**
	TOTAL		**$ 17,525,305***

*There is an estimated engineering and administration cost of $3,150,000, for a total estimated cost of $20,675,000. This excludes terminal design costs of $1,750,000.

VS GROUP
June 2011
Revised April 2017

TABLE NO. 7-2
MAMMOTH YOSEMITE AIRPORT
ESTIMATE OF PROBABLE CONSTRUCTION COSTS - CIVIL ENGINEERING FACILITIES

Item No.	Description	Unit	Unit Price	Quantity	Cost
A. Airline Apron - 184,000 Sq. Ft., Taxiways - 35,600 Sq. Ft. & DeIcing Apron - 65,000 Sq. Ft.					
A1	Mark & Light Closed Airport Facilities	L.S.	L.S.	L.S.	$ 20,000
A2	Mobilization	L.S.	L.S.	L.S.	50,000
A3	Clearing and Grubbing	Acre	$ 3,000.00	5.7	17,161
A4	Excavation	Cu. Yd.	18.00	14,000.0	252,000
A5	Imported Embankment	Cu. Yd.	30.00	6,200.0	186,000
A6	Recompact 12" of Native Subgrade	Sq. Yd.	3.00	33,000.0	99,000
A7	10" of Aggregate Subbase	Ton	45.00	2,200.0	99,000
A8	6" or 8" of Crushed Aggregate Base	Ton	60.00	16,600.0	996,000
A9	3" Bituminous Surface Course	Ton	120.00	700.0	84,000
A10	1 1/2" Bituminous Surface Course	Ton	120.00	2,400.0	288,000
A11	16" Portland Cement Concrete	Sq. Yd.	150.00	27,800.0	4,170,000
A12	Bituminous Prime Coat	Ton	1,400.00	16.0	22,400
A13	Bituminous Tack Coat	Ton	1,400.00	1.0	1,400
A14	Marking	Sq. Ft.	3.00	2,200.0	6,600
A15	Drainage Allowance	L.S.	L.S.	L.S.	100,000
A16	Floodlighting Allowance	Each	35,000.00	3.0	105,000
A17	Utilities Relocation	L.S.	L.S.	130,000.0	130,000.0
A18	Fencing	Ln. Ft.	25.00	1,350.0	33,750
	Total Airline Apron				$ 6,660,311
	Total Airline Apron - USE				$ 6,660,000

Item No.	Description	Unit	Unit Price	Quantity	Cost
B. Access Road - 26' x 1,000' & 22' x 1500'					
B1	Mark & Light Closed Airport Facilities	L.S.	L.S.	L.S.	$ 7,000
B2	Mobilization	L.S.	L.S.	L.S.	10,000
B3	Clearing and Grubbing	Acre	$ 3,000.00	2.7	8,100
B4	Excavation	Cu. Yd.	18.00	1,600.0	28,800
B5	Imported Embankment	Cu. Yd.	30.00	5,000.0	150,000
B6	Recompact 12" of Native Subgrade	Sq. Yd.	3.00	8,500.0	25,500
B7	10" of Aggregate Subbase	Ton	45.00	4,500.0	202,500
B8	6" Crushed Aggregate Base	Ton	60.00	3,000.0	180,000
B9	3" Bituminous Surface Course	Ton	120.00	1,300.0	156,000
B10	Bituminous Prime Coat	Ton	1,400.00	5.0	7,000
B11	Bituminous Tack Coat	Ton	1,400.00	2.0	2,800
B12	Marking	Sq. Ft.	3.00	5,000.0	15,000
B13	Drainage Allowance	L.S.	L.S.	L.S.	100,000
B14	Concrete Curb	Ln. Ft.	25.00	4,000.0	100,000
B15	Landscape Allowance	L.S.	L.S.	L.S.	80,000
B16	Floodlighting Allowance	L.S.	L.S.	L.S.	80,000
	Total Access Road				$ 1,152,700
	Total Access Road - USE				$ 1,153,000

TABLE NO. 7-2 (Continued)

Item No.	Description	Unit	Unit Price	Quantity	Cost
C. Automobile Parking Lot - 70,000 Sq. Ft.& Sidewalks - 24,000 Sq. Ft.					
C1	Mark & Light Closed Airport Facilities	L.S.	L.S.	L.S.	$ 2,000
C2	Mobilization	L.S.	L.S.	L.S.	5,000
C3	Clearing and Grubbing	Acre	$ 3,000.00	2.7	8,100
C4	Excavation	Cu. Yd.	18.00	2,000.0	36,000
C5	Imported Embankment	Cu. Yd.	30.00	10,700.0	321,000
C6	Recompact 12" of Native Subgrade	Sq. Yd.	3.00	10,500.0	31,500
C7	10" of Aggregate Subbase	Ton	45.00	5,000.0	225,000
C8	6" Crushed Aggregate Base	Ton	60.00	5,500.0	330,000
C9	3" Bituminous Surface Course	Ton	120.00	1,650.0	198,000
C10	Bituminous Prime Coat	Ton	1,400.00	6.0	8,400
C11	Bituminous Tack Coat	Ton	1,400.00	2.0	2,800
C12	Marking	Sq. Ft.	3.00	1,900.0	5,700
C13	Drainage Allowance	L.S.	L.S.	L.S.	50,000
C14	4" Portland Cement Concrete Sidewalk	Sq. Yd.	30.00	2,700.0	81,000
C15	Concrete Curb	Ln. Ft.	25.00	1,300.0	32,500
C16	Landscape Allowance	L.S.	L.S.	L.S.	40,000
C17	Floodlighting Allowance	L.S.	L.S.	L.S.	120,000
	Total Automobile Parking Lot				$ 1,497,000
	Total Automobile Parking Lot - USE				$ 1,497,000

Item No.	Description	Unit	Unit Price	Quantity	Cost
D. Utilities					
D1	10" Water Line	Ln. Ft.	$ 60.00	2,285.0	$ 137,100
D2	10" Gate Valve	Each	2,000.00	5.0	10,000
D3	Fire Hydrant Assembly	Each	5,000.00	5.0	25,000
D4	Backflow Preventer	Each	3,000.00	1.0	3,000
D5	8" Sewer Main	Ln. Ft.	60.00	3,596.0	215,760
D6	36" Sewer Manhole	Each	5,000.00	10.0	50,000
D7	Package Sewer Station	Each	290,000.00	1.0	290,000
D8	2W-4" Electrical Duct	Ln. Ft.	50.00	2,374.0	118,700
D9	Electrical Pull Box	Each	5,000.00	12.0	60,000
D10	Apron, Parking, and Road Floodlights (45')	Each	25,000.00	18.0	450,000
D11	Electrical Service Allowance	L.S.	L.S.	L.S.	150,000
D12	Telephone Service Allowance	L.S.	L.S.	L.S.	200,000
	Total Utilities				$ 1,709,560
	Total Utilities - USE				$ 1,710,000
	Total Construction Cost				$ 11,019,571
	TOTAL CONSTRUCTION COST - USE				$ 11,020,000
	Engineering and Administration				2,094,000
	TOTAL PROJECT COST*				$ 13,114,000

*Excludes terminal area apron, access road, automobile parking lot, and utilities design costs of $1,120,000.

TABLE NO. 7-3
MAMMOTH YOSEMITE AIRPORT
SUMMARY OF ESTIMATED PROBABLE TOTAL DEVELOPMENT COSTS (x 1,000)
(Based on 2017 Costs)

	Project	Construction Costs	Design Fees	Construction Management Fees	Administration Cost	Total Cost
1.	Terminal Building - First Stage	$ 17,525	$ 1,750	$ 1,400	$ 1,750	$ 22,425
2.	Airline Apron, Taxiways & Deicing Apron	6,660	670	530	670	8,530
3.	Access Road	1,153	120	90	120	1,483
4.	Automobile Parking Lots	1,497	150	120	150	1,917
5.	Utilities					
	a. Sewer	556	60	50	60	726
	b. Water	175	20	20	20	235
	c. Electrical	779	80	60	80	999
	d. Telephone	200	20	20	20	260
	TOTALS	$ 28,545	$ 2,870	$ 2,290	$ 2,870	$ 36,575

CHAPTER 8. RECOMMENDATIONS

The Town is located in one of the most scenic areas of California as well as the United States. It has one-of-a-kind access to many venues of outdoor adventure popular amongst outdoor enthusiasts today. Mammoth Mountain Ski Area is recognized both nationally and internationally as one of the preeminent ski areas in the world. Skiing and other mountain recreation actives are the driving forces for economic development of the area. Flying is a convenient way to access the area and considerably reduces the required travel time; for example one can fly from Los Angeles in 1 hour while driving required 5 hours.

The Town of Mammoth Lakes, Mammoth Lakes Tourism, and Mammoth Mountain Ski Area are dedicated to continuing and improving commercial airline service to Mammoth Yosemite Airport. Over the last eight years the Town has demonstrated that there is a demand for air service, despite the limitations placed on the existing service by the sub-standard temporary terminal building. The temporary terminal building was inadequate for existing demand immediately after it was put into service.

It is, therefore, considered appropriate to construct the new terminal facilities to accommodate the traffic forecast for the 10-year period but to design the facilities and provide room to expand the terminal building, the air operations area, and the support facilities to accommodate possible future growth. The design of the facility should be such that any expansions required can be performed with minimal interference to the operation of the existing facility. It is recommended that the size, location, and configuration of the terminal development presented in this report be developed. This development needs to occur as early as possible since the existing facilities are currently overloaded and major growth is expected within the next five years.

Economic feasibility studies have been performed for the terminal development project. This study included preparing estimates for the following:

- Construction costs for required terminal facilities.
- Anticipated contributions in aid, including Federal grants and Passenger Facility Charges.
- Annual operating costs.
- Annual revenue.

The results of this study are summarized in Table No. 8-1. It will be noted that a $36,575,000 development project can be constructed in a three-year period and the net amount financed is only $1,719,000.

This study shows that over the next 10 years enplaned passengers will remain approximately the same. Therefore, annual support required from the Town of Mammoth Lakes General Fund will remain approximately the same ($530,000).

TABLE NO. 8-1
MAMMOTH YOSEMITE AIRPORT
AIRLINE TERMINAL FACILITY DEVELOPMENT
ECONOMIC FEASIBILTY DATA

Cost of Construction:	Terminal Building	$22,425,000
	Aprons, Roads, Parking, Utilities	14,150,000
	Total	$36,575,000
Less Contribution in Aid	Terminal Building - AIP	$20,330,505
	Aprons, Roads, Parking, Utilities - AIP	12,828,390
	Tourist Business Improvement District / Passenger Facility Charge / Finance costs of $1,718,963	3,416,105
	Total	$36,575,000

Date of Initial Operations: December 2021			
	Year 1 2016	Year 5 2021	Year 10 2026
Annual Revenue			
Airline Rents	$ 121,600	$ 140,000	$ 147,000
Facility Rents	5,500	6,100	6,800
Hangar Rents	90,000	95,000	103,000
Car Rental	106,000	115,000	141,000
Food/Beverage	4,000	6,000	35,000
Overnight Parking	6,000	6,900	23,000
Miscellaneous Income	18,000	19,500	25,500
Total Revenue	$ 351,100	$ 388,500	$ 481,300
Annual Expenses			
Airport Operations	$ 221,828	$ 183,000	$ 193,000
Maintenance	137,482	143,100	182,500
Personnel	584,770	608,500	639,500
Total Expenses	$ 944,080	$ 934,600	$ 1,015,000
Excess Revenues	$ -	$ -	$ -
Annual Support Required from TML General Fund	$ 592,980	$ 546,100	$ 533,700

Source of Data:

Construction Costs - Terminal Area Development Plan

Annual Revenue - Town of Mammoth Lakes

Annual Costs - Town of Mammoth Lakes

APPENDIX A

MAMMOTH YOSEMITE AIRPORT
AVIATION ACTIVITY FORECASTS

PREPARED BY
MEAD & HUNT

MARCH 31, 2017

Mammoth Yosemite Airport Aviation Activity Forecasts

Prepared for the Town of Mammoth Lakes

Mammoth Lakes
CALIFORNIA

Prepared by

Mead & Hunt

March 31, 2017

1. INTRODUCTION

Forecasts of aviation demand are used to identify future facility needs. In planning for the future growth of any airport, it is important to understand the context within which potential increases in aviation activity are likely to occur. Aviation forecasting is not an "exact science," so professional judgment and practical considerations will influence the level of detail and effort required to establish reasonable forecasts and subsequent airport development decisions.

This chapter includes forecasts of the following aviation activities: scheduled passenger enplanements, peak passenger activity, aircraft operations and fleet mix, based aircraft, and air cargo volumes. Because this forecast will be principally used in the assessment of facility requirements for a proposed replacement passenger terminal, it focuses on the next 10 years (i.e., through 2026). The aviation forecasts must be approved by the Federal Aviation Administration (FAA) in order to provide justification for FAA funding participation in eligible airport improvement projects.

Several indicators of aviation activity including regional and local trends for both commercial and general aviation were used to develop an aviation activity forecast for Mammoth Yosemite Airport (MMH or "the Airport"). These trends provide one element that shapes the projections of aviation activity developed for the Airport. However, the unique characteristics of an airport serving a resort destination that is remote from metropolitan areas have a profound effect on forecasting. Particularly important are the revenue guarantees provided to the scheduled passenger airlines.

This chapter is organized into the following sections:

- 1. Introduction
- 2. Airport Role
- 3. Historical Activity at MMH
- 4. National Aviation Industry Trends
- 5. Forecasting Methodologies
- 6. Forecasts
- 7. Design Aircraft
- 8. Summary

2. AIRPORT ROLE

An airport's role is defined by the mix of aviation uses that exist, or are anticipated to exist, at the facility. Each use is defined by the type of aircraft involved and its mission. Aircraft can be used for multiple missions. A medium-sized turboprop may be used by an airline for scheduled passenger service, an air charter operator for on-demand air taxi service, an air cargo airline for transporting express packages, and the military for transport. It is critical to know both the aircraft type and mission in order to identify the necessary airport support facilities. A key part of the forecasting effort is to identify how the current mix of aircraft types and missions will evolve over the 10-year forecast period. This information will be used to identify needed modifications to the airfield and airport facilities.

2.1 CURRENT ROLES

Mammoth Yosemite Airport is classified by the FAA as a primary, non-hub commercial airport which provides scheduled passenger service to the Mammoth Lakes area and surrounding areas. As of January 2016, the Airport is served by two airlines with non-stop service to three destinations. As of 2016, the aviation activities at the Airport are:

- Passenger Service.
- Recreational Aviation.
- Business Aviation.
- Medical Transport.
- Military Aviation.

The Airport also has limited flight training activity and air cargo has been delivered via scheduled airline aircraft in past years. Information about these uses is presented in the paragraphs that follow.

The Airport is home to one fixed-base operator (FBO) that serves general aviation aircraft. The FBO operates from the general aviation terminal located west of the commercial passenger terminal. The FBO provides:

- Aviation fuels: Jet A and 100LL.
- Aircraft parking and hangar storage.
- Oxygen service and pilot supplies.
- A crew car available for pilots.

The Airport's role can also be defined in operational terms. The mission-related roles defined above can also be grouped into three operational groups:

- Commercial service – scheduled and charter passenger service.
- General aviation – aviation activities other than scheduled service and military.
- Military – transient military aircraft.

2.2 FUTURE ROLES

The Airport is anticipated to maintain existing roles throughout the 10-year planning period. No significant changes to the mix of aircraft types or uses is anticipated.

3. HISTORICAL ACTIVITY AT MMH

This section provides background on historical aviation activity at MMH. The many uncommon aspects of aviation uses at the Airport make familiarity with this background information necessary to understand the approaches used in forecasting. **Table 1** presents historical activity data for the years 2009-2016. Data was taken from several sources to provide the most accurate data for forecasting. Enplanement data was obtained from the Airport from records provided by United and Alaska Airlines. Operations counts were obtained from Hot Creek Aviation, the fixed base operator at the Airport. Based aircraft counts were taken from the FAA's 2016 Terminal Area Forecast, except that the 2016 is an estimate provided by Airport staff.

It should be noted that the FAA defines *air carrier* differently for passenger enplanements and aircraft operations. For enplanements, the FAA divides the passenger airline industry into two categories of airlines: *air carrier* and *commuter* (also called *regional airlines*). The primary difference between the two is the role that the airline plays relative to the other. Regional airlines carry passengers to the hub cities of the air carrier airlines, and may feed passengers onto air carrier service at the hub cities. Regional airlines may operate aircraft painted like air carrier airlines, and may have their tickets sold by the air carrier operator. Air carrier airlines typically fly aircraft with more passenger seats than regional airlines and serve larger markets. However, the difference between air carrier and regional airlines is generally indistinguishable to a passenger with the exception of aircraft size. All of the enplanements at MMH are counted in the *commuter* category.

Airline operations are categorized based on aircraft seating capacity. Aircraft with 60 or more seats are *air carrier*, and aircraft with fewer than 60 seats that are operated by airlines are included in *air taxi/commuter*. All of the airline operations at MMH are counted as *air carrier* operations. The only *air taxi/commuter* operations at the Airport are charter operations that are classified as air taxi. One example of charter activity at MMH is the service recently started by JetSuiteX under contract with the Air Partners group (see page 5 for a discussion of the Air Partners group). JetSuiteX started providing service between Burbank and Mammoth in mid-December 2016. Service was offered four times weekly through the end of 2016 and is scheduled to continue until early April 2017. However, charter activity has always been a significant component of general aviation operations. The Airport's FBO, Hot Creek Aviation, estimates that charter operations account for more than half of all general aviation operations by turbine aircraft.

Table 1. Historical Aviation Activity

	Passenger Enplanements			Itinerant Operations					Local Operations			Total Operations	Based Aircraft
Fiscal Year	Air Carrier	Commuter	Total	Air Carrier	Air Taxi & Commuter	General Aviation	Military	Total	Civil	Military	Total		
2009	0	5,021	5,021	314	1,570	4,568	106	6,558	214	0	214	6,772	4
2010	0	19,798	19,798	1,228	1,840	4,296	62	7,426	200	0	200	7,626	4
2011	0	26,196	26,196	1,394	1,824	4,133	38	7,389	202	0	202	7,591	3
2012	0	27,246	27,246	1,564	1,688	3,568	40	6,860	173	0	173	7,033	3
2013	0	30,858	30,858	1,530	1,784	4,108	56	7,478	199	0	199	7,677	7
2014	0	25,892	25,892	1,404	1,514	3,200	24	6,142	148	0	148	6,290	7
2015	0	23,504	23,504	1,234	1,472	3,325	22	6,053	144	0	144	6,197	7
2016	0	22,253	22,253	990	1,634	4,017	32	6,673	143	0	143	6,816	7

Source: Passenger enplanements and air carrier operations: Airport records; all other operations: Hot Creek Aviation; based aircraft FAA 2016 Terminal Area Forecast.

Notes:
1. 2009 air carrier operations data not available. Operations estimated by assuming same number of passengers per aircraft as 2010.
2. Airline passenger service started in 2009 and was only for part of the year.

3.1 PASSENGER ENPLANEMENTS

After an 11 year hiatus, scheduled passenger service resumed at MMH in December 2008 with the introduction of service by Alaska Airlines. Service by United Airlines was added in December 2010. Initially service was only provided during winter months. In 2010, year-round service began and continues as of 2017.

Passengers at MMH are predominantly associated with leisure travel which is concentrated during the ski season. Skiing typically starts by mid-November and some years skiing will continue until July. However, the prime ski season lasts from mid-December through mid-April (usually Easter) and accounts for over 70% of annual passengers. For this reason there are distinct winter-spring (i.e. ski season) and summer-fall airline schedules. Winter-spring schedules commonly include service from Los Angeles (LAX), San Diego (SAN), and San Francisco International Airports (SFO). The summer-fall schedule typically includes only flights from LAX. **Figure 1** shows the average monthly distribution of enplanements from 2010 to 2016.

The passenger service offered at MMH is arranged through Minimum Revenue Guarantee Contracts (MRGCs) with airlines. A local partnership (the Air Partners) was established to implement the MRGC program for service to MMH. The Air Partners consist of the Town of Mammoth Lakes, Mammoth Lakes Tourism, and Mammoth Mountain Ski Area (MMSA). An important change occurred in 2014 with the creation of a new revenue guarantee funding mechanism, the Mammoth Lakes Tourism Business Improvement District (MLTBID). MLTBID was formed by public referendum in which local businesses agreed to a special tax on themselves for the purpose of marketing the town as a resort destination with a unique brand. The MLTBID tax raises between $4.7 and $5 million annually. Up to about $2.3 million is available annually, if needed, to support commercial air service by funding MRGCs. About $2.4 million from the MLTBID fund is available for marketing programs to support tourism.

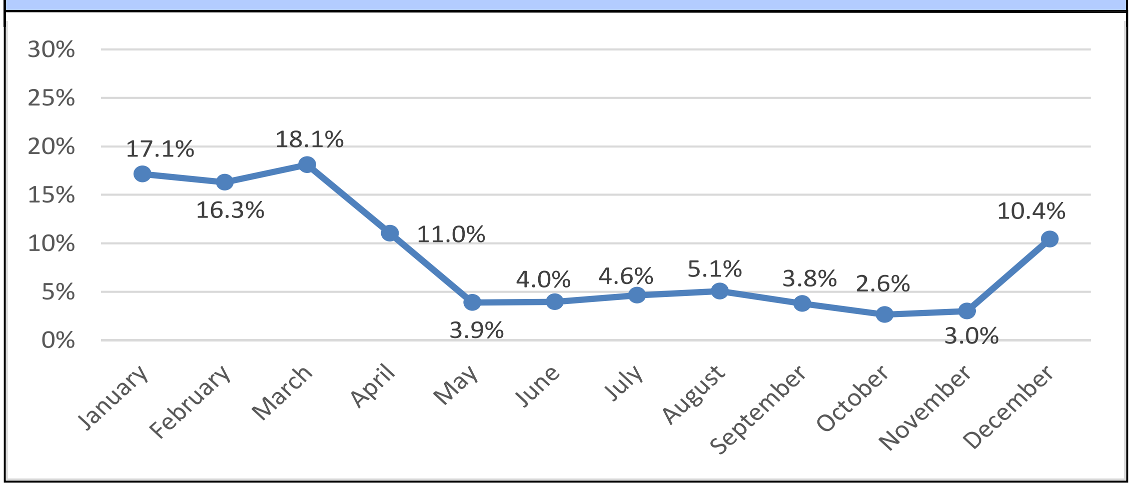
The Air Partners' air service strategy is designed to attract visitors from four markets: southern California, western states, east coast and international. Since the beginning of the program the Air Partners have tried and discontinued flights from five markets. The rationale for initiating and ultimately cancelling service from each destination is summarized below:

- **Reno** – Intent was to pull skiers from the Tahoe-area market. Load factors remained low because the driving distance was too short to make a flight to MMH attractive to many visitors.
- **Denver** – Purpose was to gain access to east coast market by using United Airlines flights from its hub in Denver. The ski clubs on the east coast were specifically targeted. Four drought winters and ski seasons with poor snow resulted in low load factors.
- **San Jose** – Purpose was to attract skiers from the San Francisco Bay Area, particularly the eastern portion. The only available departure time slot was mid-morning with an early afternoon return flight. This proved unattractive to skiers because the mid-morning departure did not allow skiers to begin skiing on the first day and the early afternoon return flight did not permit time for skiing on the last day, while also not allowing for a full work day on either end.

- **Orange County** – This departure location was intended to serve this geographic region within the southern California market. As with the San Jose flights, this service was unsuccessful because of a mid-morning departure and early afternoon return flight.
- **Las Vegas** – Service was started from this location to gain access to the southern Nevada market. Flights were scheduled for a Thursday departure from Las Vegas with a Monday return flight. After the first season it appeared that the choice of days of the week were not appropriate for this market. When it appeared that the aircraft used for this flight was going to be reallocated by the airline, the flight was cancelled by Alaska Airlines.

Over the last three seasons, including the partially completed 2016-2017 ski season, the Air Partners have fine-tuned the schedules for service from Los Angeles, San Diego and San Francisco to increase load factors. This involved reduction or cancellation of service during the shoulder season and reduction in the frequency of service on some routes during the prime winter season. The purpose was to increase load factors to the point where little or no subsidies were required for service from these locations. The load factor is the percentage of filled passenger seats. These schedule modifications were intended to eliminate flights where load factors were in the 20% and 30% ranges. During the 2015-2016 ski season this new strategy reduced flights by 19% while only reducing enplanements by about 6%. This strategy frees-up funds for use in marketing and testing service from new cities.

Figure 1.
Average Monthly Percentage of Annual Enplanements



Source: Airport

Annual enplanements grew from 19,798 in 2010 to 30,858 in 2013 and decreased to 22,253 in 2016 (see **Table 1**). Enplanements declined in between 2013 and 2016. Initially the decline was due to the "right sizing" strategy noted above which eliminated flights with low load factors. Based upon ticket sales, calendar year 2016 would have had higher enplanements than 2015 except for the severe weather in December 2016. The blizzard conditions resulted in flight cancellations that exceeded 50% in some weeks of this peak holiday season.

As a resort destination, visitors come to Mammoth Lakes and the surrounding area for recreation. According to Mammoth Lakes Tourism staff, most travelers are coming in for three- to five-day stays. Flights into Mammoth Lakes during later afternoon hours allow visitors to work half a day, arrive around dinner time and plan on beginning skiing, hiking, biking, fishing and sightseeing the following morning. This also allows them to ski for half a day before their departure (ski lifts close at 4:00 p.m.). The Air Partners have found through experience that flights at other times during the day have not been successful. A late-morning or mid-afternoon flight is often considered a "wasted" day travelling. This flight schedule also allows visitors time during the day to make flight connections from East Coast cities and other locations more conveniently. Early morning flights are not as desirable as late afternoon and early evening flights. An early morning flight would also poorly serve visitors connecting from other cities. The year-round mid-morning flight from LAX exists only because it was the only year-round time slot that Alaska was willing to make available.

The preference for later afternoon or early evening flights is the key factor driving demand for terminal gates at MMH. Currently the terminal has only one gate. During the ski season weather delays occur regularly. This can result in three commercial aircraft being parked at the Airport concurrently approximately 20 times per ski season (about 18%), with rarer occurrences when four aircraft are parked at the Airport concurrently. In 2013, when the Airport had seven flights on five days each week during the ski season, airline scheduling pushed peak hour passengers well past the terminal's capacity. This resulted in three or more planes on the ground more frequently. Some flights had to be scheduled earlier in the day, which reduced their load factor as people chose not to fly due to the inconvenient timing of the flights. By requiring some origination markets to fly during the middle of the day their viability was reduced as enplanements fell and subsidy money was increased. This ultimately led to the cancellation of some of these routes, due to low load factors.

3.2 BASED AIRCRAFT

Based aircraft are defined as those stored at an airport on a long term basis. These aircraft owners buy or lease hangar and parking space from the Airport or a third-party developer. The forecast of based aircraft will be used to determine whether additional hangar spaces are needed. MMH is unusual in that most hangars are used by transient aircraft, that is, aircraft based at another airport. The dominance of hangars used for transient aircraft is due to two factors: aircraft owners who have second homes in the Mammoth Lakes area, and the desire to shield aircraft from the weather (particularly snow) when parked at the Airport. This information will also be used to assess the need for new or expanded supporting facilities or services. The counts of based aircraft from 2009-2016 are shown in **Table 1**.

3.3 AIRCRAFT OPERATIONS

An aircraft operation is either a landing or a take-off. A touch-and-go is a common training activity where the pilot lands and then takes off without leaving the runway. A touch-and-go is counted as two operations.

3.3.1 General Aviation Operations

The Airport does not have an airport traffic control tower, so there is no official count of aircraft operations. However, the Airport's sole FBO is required by contract to keep a record of all landings. The FBO's staff monitors the Airport's Unicom radio frequency and records the aircraft numbers of arriving aircraft. FBO counts include landings that occur during business hours: Saturday-Thursday 8:00 a.m. to 6:00 p.m. and Friday 8:00 a.m. to 8:00 p.m. The counts also include aircraft that arrive at night and are still parked on the transient apron in the morning. Local operations, such as touch and goes, are not included in the count. FBO staff estimate that local operations are about 5% of total piston operations. Based upon a two-month sample of their aircraft logs, the FBO estimates that about 54% of turbine operations are charters (i.e., air taxi). The counts of operations by general aviation aircraft from 2009-2016 are shown in **Table 1.** Aircraft operations include both landings and take-offs. Therefore, the FBO's counts of landings have been doubled.

3.3.2 Military Operations

The FBO's operation counts include military operations. **Table 1** presents the annual counts of operations from 2009-2016. All military operations are transient operations. Most are by helicopters.

3.3.3 Airline Operations

Alaska and United Airlines provide Airport staff with documentation of both their scheduled and actual operations. Records available from the Airport extend back to 2010. The operations estimate for 2009 was calculated from available records of passenger enplanements. It was assumed that the ratio of enplanements to operations was the same as in 2010.

3.4 AIR CARGO

Air cargo activity at MMH does not include any type of scheduled cargo service. According to DOT T100 data, in the first few years following reintroduction of scheduled passenger service small quantities of cargo were carried by the scheduled airlines as belly-haul (i.e., included with passenger baggage). However, in recent years no significant amounts of cargo have been shipped through MMH.

4. NATIONAL AVIATION INDUSTRY TRENDS

Aviation industry trends are based upon data available through April 2016. Separate sections will discuss: passenger enplanements, the general aviation fleet, aircraft operations, and air cargo. Most forecast material is extracted from the FAA's *Aerospace Forecast Fiscal Years 2016-2036* (hereafter *Aerospace Forecast*). The *Aerospace Forecast* presents FAA expectation for the aviation industry at a national level for the next 20 years and is updated annually. This information will provide a context for review of historical activity levels at MMH and development of forecasts. However, as is explained in the individual sections that follow, broad national trends have limited applicability to forecasting for the Airport.

4.1 PASSENGER ENPLANEMENTS

The foremost challenges facing the airline industry are the volatility of fuel prices and global economic uncertainty. Nationally, passenger enplanements have returned to levels achieved prior to the recession that began in 2008. Economic recovery, airline consolidation, and capacity constraints have restored airline profitability. Airlines have increased load factors, the percentage of seats occupied, by reducing flight frequencies. This practice has reduced consumer choice, effectively consolidating a growing number of passengers on to fewer flights. Airlines are also adding aircraft with more seats, which has further necessitated the need to cut frequencies in order to operate the flights profitably.

The *Aerospace Forecast* projects that national passenger enplanements (domestic plus international) will increase an average of 1.9% per year through 2035. Air carrier airlines, called “mainline carriers” in the *Aerospace Forecast*, are expected to grow at 2% a year. This is higher than regional airlines, which are projected to grow at 1.6% a year. This section of the *Aerospace Forecast* is summarized in **Table 2**.

Because commercial carrier capacity is expected to grow at a slightly slower rate than enplanements, most airliners will remain crowded. Domestic commercial carrier capacity (i.e., total number of passenger seats) is expected to grow slowly at an average of 1.8% per year, with mainline carriers growing slower than regional carriers, 1.8% versus 2.0%. Because of subsidies and revenue guarantees, load factors (i.e., percent of seats occupied) for airlines serving ski resorts are commonly lower than for other destinations. Nationally, load factors for domestic mainline airlines are currently around 85% and 80% for domestic regional airlines. It is common to have average load factors on airlines serving ski resorts in the 60% to 70% range and lower on specific routes. It is these low load factors that necessitate having subsidies to make the flights economically viable.

Table 2.
Comparison of Forecast Passenger Enplanement Growth Rates

	Domestic + International Flights 2016-2035	Domestic Flights		
		2016-2025	2026-2035	2016-2035
Mainline Carriers	2.0%	1.5%	1.8%	1.7%
Regional Carriers	1.6%	1.5%	1.8%	1.7%
All Carriers	1.9%	1.5%	1.8%	1.7%

Source: FAA Aerospace Forecast Fiscal Years 2015-2035

Forecasts of national trends in enplanements have limited applicability to the Airport. The airline revenue guarantee program (discussed in Section 1.4) allows scheduled passenger service to be offered that is largely independent of national trends. As long as forecast national economic trends are broadly positive (which they are), it can be assumed that the disposable income necessary for the recreational pursuits (mainly skiing) that are the principal purpose of the Airport’s passengers will be available.

4.2 GENERAL AVIATION AIRCRAFT FLEET

The total number of aircraft in a given area or organization is referred to as a *fleet*. The *Aerospace Forecast* indicates that the national general aviation fleet decreased by 3.2% annually from 2010 to 2013. This decline is partially due to aging aircraft requiring expensive repairs to remain airworthy, the aging pilot community struggling to meet medical requirements, the rising cost associated with aircraft ownership, and fewer new pilots overall. Fewer pilots results in reduced demand for new aircraft, particularly those purchased by individuals who would fly for recreation. The *Aerospace Forecast* expects the number of private pilots in the US to decrease at 0.35% per year through 2035.

The *Aerospace Forecast* projects that the number of piston fixed wing aircraft will continue to decline through 2035. Multi-engine piston aircraft are projected to decline by 0.4% per year and single-engine aircraft are forecast to decline at a rate of 0.6% per year. However, within the single-engine group, the light sport aircraft segment is forecast to experience 4.3% annual growth, although this user class makes up less than 2% of the national fleet.

Although the general trend has been one of decline, there are areas of growth for certain segments of the national fleet. Continued concerns about safety, security, and flight delays keep business aviation attractive relative to commercial air travel. For these reasons, the turbine aircraft fleet (jets, turboprops and turbine-powered helicopters) is forecast to grow from 14.3% of the general aviation fleet to 21.5% by 2035. **Table 3** shows that it is the growth of turbine aircraft that supports the projection that the total general aviation fleet will grow at an average annual rate of 0.4% through 2035.

Table 3.
Comparison of Forecast Growth Rates by Aircraft Type

	Total Fleet	Rotorcraft	Fixed Wing					
			Turbine	Multi-Engine Piston	Single-Engine Piston	Light Sport	Experimental	Other
2015*	198,780	10,440	21,305	13,175	122,435	2,355	24,880	4,190
2035	214,260	17,110	33,785	12,135	108,810	5,360	33.040	4,020
CAGR	0.4%	2.5%	2.2%	-0.4%	-0.6%	4.3%	1.4%	-0.2%

Source: FAA Aerospace Forecast Fiscal Years 2015-2035 *Estimate from *Aerospace Forecast*
CAGR = Compound Annual Growth Rate

National trends have limited applicability in forecasting based aircraft at the Airport. With only seven based aircraft, the unique factors shaping decisions by individual aircraft owners will more profoundly affect changes in based aircraft than broad national trends.

4.3 AIRCRAFT OPERATIONS

The number of annual aircraft operations at towered airports in the United States has declined steadily from 2001-2015 (from 66.2 million to 49.6 million). The sharpest drop in all segments of the aviation industry occurred in 2009, the year following the beginning of the recession. From 2013 to 2014, the number of operations by commercial aircraft (air carrier and regional) grew, reflecting improvement in the national economy. Unlike passenger enplanements, which are categorized as air carrier or regional based on the airlines role, operations are categorized based on aircraft seating capacity. Aircraft with more than 60 seats are *air carrier*, and aircraft with 60 seats or fewer are operated by airlines are *air taxi/commuter*. Charter operations, such as the scheduled charter by JetSuiteX introduced in the December 2016, are included in the air taxi category.

General aviation operations grew from 2011 to 2012, before declining again in subsequent years. Segments of the general aviation market, namely aircraft used for business purposes, are operating more frequently while flight training and leisure and hobby flying are contracting. Business general aviation is growing in response to airline consolidation – it is simply less convenient to fly commercially than it used to be. Flight training is growing among students interested in the airline career track, but fewer are learning to fly as a hobby. This has led to the decline in leisure pilots. Reasons for this decline include the increased cost of aircraft ownership, the expense associated with learning to fly, and competing financial needs. Younger generations are saving for a home and repaying student loans, which limits discretionary income.

The *Aerospace Forecast* projects total operations by all segments of the aviation industry to increase at an average rate of 0.9% per year through 2035 at towered airports. Most of the growth is expected to be from increased commercial aircraft activity (up 1.5% annually). The air carrier component is projected to increase an average of 2.7% per year. The increase in air carrier activity is expected to occur due to a combination of air carrier airlines increasing frequencies on select routes, and a switch by regional airlines from 50 seat aircraft to 70-90 seat aircraft, which are counted in the air carrier category by the Terminal Area Forecast (TAF). Air taxi/commuter operations were forecast to fall 4.9% in 2015 and decrease 1% a year through 2035. This reduction in the air taxi/commuter component will be driven by the retirement of passenger jets with fewer than 60 seats. Nationally, at small and non-hub airports such as MMH, total operations are projected to increase at an average annual rate of 0.5% a year. The *Aerospace Forecast* projects that general aviation activity at towered airports will increase an average of 0.4% annually through 2035.

The national trends forecast for aircraft operations have broad applicability to forecasts for the Airport. Although the forecast percentage changes in operations at the national level are not directly used in the Airport's forecasts, several trends support assumptions used in the Airport's forecasts:

- Increase in operations by air carrier aircraft.
- Growth in use of general aviation aircraft for transportation in lieu of using scheduled commercial flights.
- Decline in flight training for individuals interested in flying as a hobby.

4.4 AIR CARGO VOLUMES

The *Aerospace Forecast* concludes that the national volume of air cargo follows trends in the gross domestic product, with secondary influencers of airline fuel costs and the need for just-in-time logistics chains. Air cargo volumes have grown since the post-recession low point in 2009, although there has been some year-to-year variability. Significant structural changes in the air cargo industry have occurred over the last decade and have affected air cargo volumes, including: FAA and TSA air cargo screening requirements, maturation of the domestic express package market, a shift from air to other transportation modes (especially truck), use of all-cargo carriers by the US Postal Service, and the increased use of internet-based mail substitutes. Another key change is the continuing reduction in the amount of air cargo carried on passenger airliners.

The *Aerospace Forecast* projects that air cargo volumes will increase at an average annual rate of 0.5%. The all-cargo carriers' share of the air cargo market are forecast to grow to 90.2% by 2035 as airlines take less and less cargo.

The national trends forecast for air cargo have limited applicability to forecasts for the Airport. Although the forecast percentage changes in air cargo at the national level are not used in the Airport's forecast, the forecasts do reflect the national trend in reduction in cargo carried by airlines.

5. FORECASTING METHODOLOGIES

A variety of forecasting techniques may be used to project aviation activity range from subjective judgment to sophisticated mathematical modeling. These techniques may utilize local or national industry trends in assessing current and future demand. Socioeconomic factors such as local population, retail sales, employment, and per capita income can be analyzed for the relationship they have had, and may have, with activity levels. This section presents a range of methodologies that were considered for use in forecasting aviation activity at MMH. The applicability of these methodologies to each activity forecast (e.g., enplanements, operations) is addressed in the forecast section (Section 6).

5.1 MARKET SHARE METHODOLOGIES

The market share methodology compares local levels of activity with those of a larger market (e.g. state, nation, or world). This methodology implies that the proportion of activity that can be assigned to the local level is a fixed percentage of the larger entity. Most commonly this involves assuming a ratio between activities at an airport with FAA national forecasts.

5.2 TIME-SERIES METHODOLOGIES

Trend lines and regression analyses are widely used methods of forecasting based on historical activity levels at an airport. Trend line analyses can be linearly or nonlinearly extrapolated and are commonly created using the least squares method. Regression analyses can be linear or nonlinear. In time-series methodologies it is common to have only one variable.

Time-series methodologies are only appropriate when the activity being forecast has a sufficiently long history for trends to be established. At least 10 years is normally required although longer periods are desirable. These methodologies are most robust when the underlying factors that establish the activity levels have not fundamentally changed.

5.3 SOCIOECONOMIC METHODOLOGIES

Though trend line extrapolation and regression analyses may provide mathematical and formulaic justification for demand projections, there are many factors beyond historical levels of activity that may identify trends in aviation and its impact on local aviation demand. Socioeconomic and correlation analyses examine the direct relationship between two or more sets of historical data. Socioeconomic data can include: total employment, total earnings, net earnings, total personal income, and gross regional product. Historical and forecasted socioeconomic statistics are commonly obtained from Federal Agencies, such as the Census Bureau, or private firms, such as Woods & Poole Economics.

In these types of analyses the correlation coefficient, denoted as r, is used to measure the strength of the relationship between two variables. An r can range from -1.00 (one variable increases, the other decreases proportionally) to +1.00 (both variables grow or decline proportionally at the same time). A score close to +/-1.00 suggests a stronger correlation, and a score closer to zero suggests that the two variables are not correlated. Typically an r of at least +/-0.70 is needed to conclude that there is a substantial correlation between the two factors. It is important to understand that correlation does not necessarily imply causality. It could be possible that the two factors are jointly being influenced by another factor. Additionally, it is not sufficient that there is a high correlation between the variables. There must be a logical basis to believe that there is relationship between the two variables.

5.4 COMPARISON WITH OTHER AIRPORTS

Using comparisons with other airports can be valuable when there is a lack of historical data or when a major change has occurred. The airports selected should be of the same relative size and possess relevant characteristics. Activity data from the comparison airports can be used as a source of trends. For example, growth rates when a low-cost carrier is first introduced to an airport. Activity data from comparison airports can also be used as benchmarks to assess the reasonableness of forecasts. These comparison airports are often referred to as peer airports.

5.5 JUDGMENTAL FORECASTING

Judgmental forecasting is used when there is a lack of historical data or where circumstances have changed so significantly that historical trends no longer apply. Judgmental forecasts must be formulated based upon a clear understanding of the factors that shape the activity being forecast. Forecasts prepared with this methodology are strongest when growth rates can be related to the experiences of similar airports or regional or national trends.

6. FORECASTS

6.1 PASSENGER ENPLANEMENTS

Forecasts of passenger enplanements are used to anticipate facility needs, such as expansion of the passenger terminal or modification of gates to accommodate different classes of aircraft. A passenger enplanement is defined as the act of one passenger boarding a commercial service aircraft. Passenger enplanements include scheduled and non-scheduled flights of over nine passenger seats, and do not include airline crew.

6.1.1 Factors Affecting Forecasts

Several factors made forecasting enplanements at MMH particularly challenging:

- Limited historical data (eight years) after 11 years without service.
- Variability in the amount of snowfall in Mammoth Lakes and the timing of storm/snowfall events.
- Minimum revenue guarantee contracts support scheduled service with load factors lower than is common on flights without revenue guarantees.
- The strategy of the Air Partners group in managing the revenue guarantee program and its associated marketing campaign continues to evolve. Section 3.1 provides a history of refinements to the strategy. Although refinement of the strategy has succeeded in increasing load factors, it has contributed to the decline in annual enplanements for the last three years.
- Flight cancellations due to weather are a seasonal issue, although the percentage varies year to year. Both low visibility and crosswinds have resulted in cancelled flights at MMH. Recent improvements to

instrument departure procedures (available to all aircraft) and instrument approach procedures (currently only available to Alaska Airlines) are expected to reduce cancellations due to low visibility. Future improvements to instrument procedures may further reduce cancellations. However, weather-related cancellations are expected to remain an issue.

- Passengers have shown a strong preference for flights that arrive in the late afternoon or early evening. Because the passenger terminal has only one gate, the ability to serve multiple flights during the preferred time period is constrained.

6.1.2 Methodologies Considered and Rejected

Three common forecasting methodologies were considered and rejected based upon the specific circumstances of MMH. These methodologies are identified in two common forecasting reference documents: *Forecasting Aviation Activity by Airport (July 2001)* which was prepared for the FAA and *ACRP Report 25, Airport Passenger Terminal Planning and Design, Volume 1: Guidebook*.

- **Historical trend lines and regression analyses** are widely used methods of forecasting based on historical performance. With only six years of year-round enplanement data, the legitimacy of forecasts based upon this brief period is questionable. Additionally, the evolving strategy of the Air Partners added another dimension of volatility to normal year-to-year variation.
- **Socioeconomic and correlation analyses** examine the direct relationship between two or more sets of historical data. Because enplanements are predominantly generated by passengers from outside the Mammoth Lakes Area, the socioeconomic variables would need to come from another geographic area. While the strongest economic link is to Southern California, it appears unlikely that socioeconomic factors in that region drive passenger volumes to MMH. Rather it is more likely that the relative attractiveness of Mammoth Lakes as a tourist destination compared to other destinations is driving demand; thus, this methodology is judged to be inappropriate.
- **Market share analysis** assumes a relationship between activities at an individual airport with activity forecast for a larger geographic area. Most commonly this involves assuming a ratio between activities at an airport with FAA national forecasts. This is judged not to be an appropriate methodology for MMH because enplanements at MMH are tied to its competitive position relative to other ski resorts rather than general national trends in passenger volumes.
- **Comparison with other airports** would be a potentially viable methodology if it were possible to identify airports with sufficiently similar characteristics. Given that aviation activities at MMH are strongly linked to skiing, it is appropriate to consider whether there are airports serving ski resorts that have characteristics similar to Mammoth Mountain Ski Resort. While there are ski resorts with comparable facilities, the nature of the ski market makes it infeasible to draw links between facilities and passenger enplanements. Skiing in the United States is a mature market; the number of skier days is not growing. Growth in the number of skier days at one resort comes at the expense of a competing resort. This competitive situation makes it infeasible to draw comparisons between MMH and other airports.

6.1.3 Selected Forecasting Methodologies

MMH's circumstances make using the common statistical methodologies described above inappropriate. Therefore, judgmental forecasts have been prepared. The judgmental forecasts include consideration of:

- Seven years of enplanement data.
- The history of successful and unsuccessful introduction of service to MMH.
- An emphasis in growing the service to fully serve the Southern California market and passengers using Southern California airports as a connection to reach MMH.
- The availability of $2.4 to $3 million to spend on marketing and revenue guarantees annually.
- The growth in airline ticket sales from 2015 to 2016 that did not result in an increase in enplanements due to weather-related flight cancellations.

6.1.4 Forecasting Assumptions

In these forecasts, the pattern of incremental growth will follow three paths:

- Expansion of service from LAX and SAN during the ski season when sufficient demand exists.
- Addition of service from one additional Southern California airport during the ski season and then gradual expansion of the number of weekly flights.
- Addition of limited service from an out-of-state airport.

The specifics of the forecasting assumptions are presented in the paragraphs that follow.

Forecasting Assumption No. 1

The undersized passenger terminal will continue to constrain passenger volumes until a replacement terminal with additional gates is added. The replacement terminal is assumed to become operational in 2021. Until that time, incremental growth in enplanements will be principally due to increasing load factors of existing flights and expansion of the number of flights per week with the existing daily schedule. There may be one or more new flights added to the schedule outside of the peak hour.

Forecasting Assumption No. 2

The Airport had 19,798 enplanements in 2010 and since that time has had over 22,000 annual enplanements each year, despite variations in snow conditions and reduction in flights due to refinements in the Air Partner's marketing strategy. It is forecast that enplanement volumes will continue to be at least this high through the 10-year forecast period.

Forecasting Assumption No. 3

When the replacement terminal becomes operational some existing flights will be rescheduled to occur during the peak early evening period due to strong passenger preference. The addition of terminal peak capacity will increase the ability to successfully add service from southern California and an out-of-state airport by enabling this service to meet passenger schedule preferences.

Forecasting Assumption No. 4

Beginning in mid-December daily service from LAX and SAN is offered in the late afternoon or early evening. There is also a daily mid-morning flight from LAX. After the three-week Christmas-New Year's holiday season is over, the late afternoon/early evening service is cut back to four days per week. The forecasts assume that the marketing campaign will increase awareness of the Mammoth Lakes region and MMSA and expand demand for passenger service. That will permit the four times weekly service to be incrementally expanded until the afternoon flight would be made daily throughout the ski season.

Forecasting Assumption No. 5

By its very nature, the passenger service program managed by the Air Partners will involve investigating the viability of service from additional airports. These forecasts assume that the Air Service Partners will follow their plan to test air service from various airports in the Southern California market over the next three years. This may include scheduled charters originating at general aviation airports to test some markets. However, ultimately the vast majority of scheduled service will originate at commercial (i.e., Part 139 certified) airports. Candidate airports include Burbank Bob Hope Airport (BUR), John Wayne Airport (SNA), and Santa Barbara Airport (SBA).

Forecasting Assumption No. 6

It is expected that initially, the service from a new Southern California airport would start with daily service during the first three weeks of the ski season and four times weekly service the balance of the ski season. If demand increased, this service would be incrementally increased by one additional day per week. When demand was sufficient service would be offered daily throughout the ski season.

Forecasting Assumption No. 7

Both the Seattle and Phoenix areas are being considered for service. Residents from these two areas currently purchase season passes to MMSA and/or own a second home in the Mammoth Lakes area. For forecasting purposes it is assumed that it will take five years of experimentation to establish service from an out-of-state airport. Due to competition, it is assumed that service will be limited to three flights per week during the ski season.

Forecasting Assumption No. 8

Service to the San Francisco Bay Area will continue indefinitely. These flights have historically had lower load factors than flights from Los Angeles and San Diego. However, about 50% of the passengers on these flights originate from outside of California. These connecting passengers are a market segment that the Air Partners strongly desires to grow. Additionally, without these flights Mammoth Lakes would receive very few visitors from the San Francisco Bay Area during the ski season due to the long drive time.

6.1.5 Other Forecast Assumptions

Actual Departures

The forecasts assume that the current average of 12% cancellations due to weather will be reduced to at least 10% due to new instrument approaches. In 2015, instrument departures were established for both runways that are available both day and night. New Required Navigation Performance (RNP) instrument approaches were also established that lowered ceiling minimums from 1,300 feet for both runways to 250 feet for Runway 27 and 265 feet for Runway 9. The forecasts assume a three-year phase of use of new departure and approach procedures. Currently the RNP approaches are available only to Alaska; however, Alaska is responsible for 77% of flights at MMH. The instrument departure procedures are available to all aircraft. The RNP approaches will allow Alaska to make approaches with the cloud ceiling about 1,000 feet lower than possible today. This will reduce the number of flights cancelled due to low ceilings. The instrument departure procedures will allow departures under instrument weather conditions

Total Seats

It is assumed that the CRJ700 with 70 seats remains in service through 2021 and then is replaced with a regional jet with 76 seats. Similarly it is assumed that the 76-seat Q-400 is eventually replaced by a 76-seat regional jet.

Load Factor

The right-sizing of the schedule has resulted in ski season load factors of over 70%. The load factor is forecast to grow over 10 years to provide year-round load factors over 60%.

Summer-Fall Season

These forecasts assume that passenger volumes outside of the ski season will remain static. There are ongoing efforts to increase visitors (including airline passengers) during this summer-fall season through the development of cultural events. Examples include the Mammoth Lakes Film Festival held annually in May and the Half Marathon held in June. However, the introduction of these cultural events is too recent to form the basis of a forecast for a change in summer-fall passenger volumes.

6.1.6 Enplanement Forecasts

Based upon the preceding assumptions, annual enplanement forecasts were prepared for MMH (see **Table 4**). A compounded average growth rate of 1% has been used in this forecast. This relatively low growth rate reflects the variability associated with weather/snow conditions and uncertainty associated with introduction of service from new locations. These forecasts project that enplanements will reach 23,388 in 5 years (2021) and 24,581 in 10 years (2026).

Table 4.
Passenger Enplanement Forecast

	Year	Enplanements
Base Year	2016	22,253
	2017	22,476
	2018	22,700
	2019	22,927
	2020	23,157
77Forecast Years	2021	23,388
	2022	23,622
	2023	23,858
	2024	24,097
	2025	24,338
	2026	24,581

Source: Mead & Hunt

6.2 PEAK PASSENGER ACTIVITY

Some elements of terminal planning are based upon peak passenger activity. To support these analyses, the peak monthly, daily, and hourly activity levels for passengers for the most recent five calendar years (2011-2015) are first calculated. This data is then used to project these activity levels for the 10-year forecast period.

6.2.1 Peak Month Passenger Activity Forecasts

Monthly passenger enplanement data for the period 2011-2015 is presented in **Table 5**. The peak month has an average of 18.7% of total annual enplanements. In three of the five years, the peak month was March, in two of the five years it was January. The variation is likely due to snow conditions. In forecasting peak passenger activity, it will be assumed that peak month enplanements for this month will remain at 18.7% of the annual total. Applying this percentage to the preferred annual enplanement forecast above yields a peak month enplanement forecast for 2021 of 4,417 and for 2026 of 4,642.

Mead&Hunt

**Table 5.
Peak Month Enplanements**

Month	2015	2014	2013	2012	2011
January	4,299	4,540	5,766	4,336	4,211
February	3,841	4,017	5,657	4,865	3,653
March	4,622	4,735	5,652	4,897	4,161
April	1,663	2,741	3,025	3,821	3,379
May	749	1,031	1,149	1,061	1,051
June	975	1,022	1,117	931	1,165
July	1,226	1,330	1,259	1,277	1,189
August	1,228	1,294	1,378	1,478	1,419
September	1,015	1,002	1,171	851	1,004
October	712	717	579	566	807
November	773	827	799	562	882
December	2,401	2,636	3,306	2,601	3,275
TOTAL	23,504	25,892	30,858	27,246	26,196
Peak Month % Annual	**19.7%**	**18.3%**	**18.7%**	**18.0%**	**16.1%**
5-year Average	**18.7%**				

MMH has distinct winter-spring and summer-fall flight schedules with winter-spring being the busier. This prime ski season typically starts on December 15 and runs through Easter. This schedule can vary by a few weeks depending upon snow depths and other factors. **Table 6** shows the schedule for the peak days of the 2015-2016 winter-spring season. Scheduled service from SFO is by United Airlines, while service from LAX and SAN is by Alaska Airlines.

The schedule shows that flights are concentrated in the early evening hours (4:35 p.m. to 6:45 p.m.). Arriving in the evening allows skiers to conduct travel during non-skiing hours to maximize the time available to spend skiing during a vacation. The peak hour is between 5:10 p.m. and 6:11 p.m. (1710 and 1811 in international time). This is graphically shown in **Figure 4**. The peak hour passenger volume was calculated using average enplanement and deplanement load factors for each airline. The average is calculated from flights that occurred from 2010-2015. The peak hour for the most recent (2015-2016) winter-spring season is 163 passengers. This includes passengers associated with an additional arrival that occurs one minute after the calculated peak hour. It should be understood that the Airport has had to negotiate with airlines to ensure that flight schedules will not lead to more than two aircraft on the ground at the same time whenever possible. This constraint has an impact on scheduling which reduces peak hour passengers below that which would otherwise occur. The right-sizing strategy has increased load factors over the last two years (2015-2016). Higher load factors increase the number of peak hour passengers.

6.2.2 Peak Month Average Day Passenger Activity Forecasts

Daily peak activity figures are based on a regularly occurring level of daily activity during the peak, or busiest, month. A review of airline activity schedules for the peak months of March and December indicates that activity is concentrated in the Thursday-Monday block of days. Although some scheduled service changes from daily to four times weekly service during these peak months, the schedule on peak days remains constant. Therefore, the seat total shown in **Table 6** (596) will be used as the peak day seats. The average passengers on the average day in the peak month equals 3.2% of the peak month's passengers.

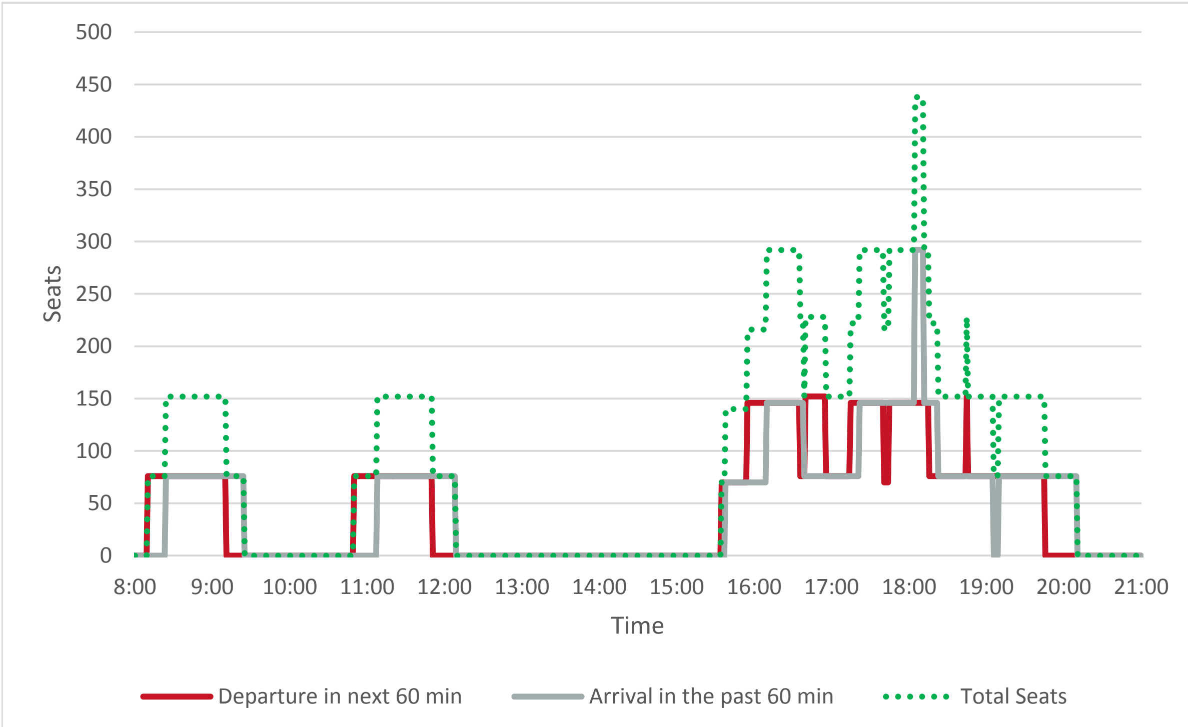
Table 6.
Winter-Spring 2015-2016 Peak Day Flight Schedule

	Time*	Origin / Destination	Aircraft Type	Seats
Arrival	924	LAX	Bombardier Q-400	76
Departure	1050	LAX	Bombardier Q-400	76
Arrival	1638	SFO	Bombardier CRJ700	70
Arrival	1710	LAX	Bombardier Q-400	76
Departure	1715	SFO	Bombardier CRJ700	70
Departure	1745	LAX	Bombardier Q-400	76
Arrival	1811	SAN	Bombardier Q-400	76
Departure	1845	SAN	Bombardier Q-400	76

* Time is expressed as a 24-hour clock

Source: Schedule - Airport

Figure 2.
2015-2016 Ski Season Peak Hour Seats



Source: DEO data base

Peak Hour Passenger Forecast

The number of hourly arriving and departing seats during a typical day in the latter half of the peak month (December) is shown in **Table 5**. Peak hour departing seats currently occur between 5:45 p.m. to 6:45 p.m. (1745 to 1845). Peak hour arriving seats occur between 5:10 p.m. to 6:11 p.m. (1710 to 1811). The peak total arriving and departing seats occurs between 5:10 p.m. to 6:11 p.m. (1710 to 1811).

Peak hour passenger volumes through 2026 were calculated by applying the current peak hour percentages (described above) to the annual passenger volumes previously projected. It is presumed that one additional departure will occur by 2026. These projected peak hour passenger volumes are presented in **Table 7**.

Table 7.
Forecast Peak Hour Passengers

Year	Peak Month Enplanements + Deplanements	Average Day Peak Month Enplanements + Deplanements	Peak Hour Passengers		
			Enplanements	Deplanements	Total
2021	8,833	285	89	81	171
2026	9,284	299	94	131	204

Source: Mead & Hunt

6.3 TERMINAL GATE REQUIREMENTS

An airport's gate requirements are typically examined in terms of the ability of both the airside and terminal building facilities to meet current and projected aviation demand. Commercial airline operations are quantified in peaking characteristics which comprise the "design hour" demand for passengers and aircraft. This approach provides sufficient facility capacity for most days of the year but recognizes that facilities should be neither underbuilt nor overbuilt. Aircraft gate capacity is determined using a design day flight schedule (DDFS), the peak hour of which is the "design hour." For most airports, an average day of the peak month's operations is used to develop a DDFS. The design hour is typically not the absolute peak level activity scheduled throughout a year, nor does it usually represent the total number of people occupying the terminal at a given time. It is a level of activity that is driven by flight schedule and quantified in terms of scheduled aircraft size. For MMH, historical data show the peak hour to be consistent at late afternoon for arrivals and departures during peak winter season travel.

For the peak winter season, Alaska has scheduled a morning arrival and departure at the Airport (see **Table 6**). Alaska and United's next arrivals into the Airport are scheduled between 4:30 p.m. and 5:30 p.m., with corresponding departures between 5:00 p.m. and 6:00 p.m., which constitute the Airport's peak hour for departures. These operations overlap one other with Alaska's Los Angeles flight arriving five minutes before United's San Francisco departure. This requires two gates to accommodate these current operations.

The winter schedule has been developed over time to reflect passenger preferences, which show mid-to-late afternoon departures from originating cities with arrivals at Mammoth Yosemite occurring about 5:00 p.m. to 6:00 p.m. generally. The airlines have attempted to schedule arrivals away from this late afternoon period with little success, noting that passengers generally prefer a mid-afternoon departure from the major cities. This allows them sufficient time to work in the morning, travel to the airport to catch their flight and still arrive at Mammoth Yosemite with time to enjoy the evening and be ready for a full day of recreation the following day. It also allows time for recreation prior to their departure, it should be noted that the ski lifts at MMSA close at 4:00 p.m. It also allows time for weather events in Mammoth Lakes to clear if their flight is delayed.

Given current passenger preferences for travel from destinations within the state, service to a new market will most likely be scheduled into the peak hour. In order to allow for this as well as provide flexibility for operations generally, an additional aircraft gate will be required (for a total of three). MMH currently has one terminal gate and two aircraft parking positions. To accommodate current and future peak hour enplanements forecast in **Table 7**, two gates will not be adequate. Three gates will allow the Airport and carriers to provide a high level of service to their customers. While on a smaller scale at MMH, air carrier service is generally in line with other resort airports in the west, such as Eagle/Vail in Colorado and Friedman Memorial/Sun Valley in Utah.

Three gates would be in addition to hardstand positions provided to accommodate irregular operations. At MMH the most common irregular operations are associated with weather delays. During the winter-spring season weather delays occur regularly. This results in three airline aircraft being parked at the Airport about 20 times per winter-spring season (about 18%) with rarer occurrences when four aircraft are parked at the Airport. In 2013, when the Airport had seven flights on five days a week, it proved difficult to schedule flights to reduce peak hour passengers to the terminal's capacity and had three or more planes on the ground more frequently.

Advisory Circular 5360-9, *Planning and Design of Airport Terminal Building Facilities at Nonhub Locations,* contains the FAA's general guidance on terminal planning. Paragraph 25.a. states:

> *The initial stage of construction of airport terminal facilities should be designed to accommodate, comfortably, the forecast demands 5 years from the proposed date for occupancy.*

The currently adopted Airport Layout Plan includes development of a replacement passenger terminal. It is anticipated that it would take about five years to complete the process leading to occupancy of the replacement terminal (2021). This time would be needed to complete state and federal environmental review, design, and then build the replacement terminal and associated facilities. Therefore, the likely date of occupancy plus five years is approximately nine years from now (2026). As noted in the paragraph above, three gates are needed to accommodate peak hour departures in 2026**.**

6.4 BASED AIRCRAFT FORECASTING METHODOLOGY

All of the aircraft based at the Airport are piston-driven. Nationally this segment of the general aviation fleet is expected to decline in numbers. The *Aerospace Forecasts* states that "the largest segment of the fleet, fixed wing piston aircraft is predicted to shrink over the forecast period at an average annual rate of 0.6 percent." As noted in Section 3, records of based aircraft at MMH are not sufficiently complete to be used to establish a trend. The most that can be said with confidence is that the number of based aircraft appears to have been stable for the last three years.

With only seven based aircraft, the decisions by individual aircraft owners profoundly effects the number of aircraft that will actually be based at the Airport in the future. Decisions by aircraft owners will be based upon economic factors, such as disposable income and changes in aircraft operating costs, as well the mobility value of owning an aircraft to access a somewhat remote location. Small populations are inherently less stable than larger ones and, therefore, likely to have higher variation.

No local factors have been identified that would suggest that growth in the number of based aircraft will occur. Neither Airport nor FBO staff anticipate turboprop or jet aircraft will be based at the Airport. These aircraft have historically been associated with visitors and owners of vacation homes in the Mammoth Lakes area. Neither group is likely to base an aircraft at the Airport.

6.4.1 Methodologies Considered and Rejected

Four of methodologies presented earlier in this document have been rejected as inappropriate for forecasting based aircraft.

- **Historical trend lines and regression analyses** has been rejected due to the lack of reliable historical data.
- **Socioeconomic and correlation analyses** is rejected because no clear link between the number of based aircraft and available socioeconomic data.
- **Market share analysis** is rejected because poor historical data makes it infeasible to evaluate the relationship between the number of based aircraft at MMH and state or national trends.
- **Judgmental forecasting** is rejected because the comparison with other airports provides a less subjective methodology.

6.4.2 Methodology Selected

Comparison with other airports is the methodology that was used to forecast based aircraft at MMH. Three airports were selected: Bishop Airport, Lone Pine/Death Valley Airport and Independence Airport. As with MMH all of these airports are located in valleys east of the Sierra Nevada Mountains along Highway 395. Bishop Airport is located 35 miles from MMH, Independence 66 miles and Lone Pine 83 miles. In 2015 Bishop had 45 based aircraft, Lone Pine had five and Independence had two. The 2016 TAF forecasts anticipates no change in the number of based aircraft at these airports. Therefore, the forecast of based aircraft for MMH is for the number of aircraft to remain at its current level of seven aircraft. Based upon this forecast, no new hangars are needed to accommodate based aircraft.

6.5 AIRCRAFT OPERATIONS

The forecast of operations will be used to determine whether the airfield will need capacity improvements during the next 10 years to accommodate expected demand. Forecasts for total operations are a composite of individual forecasts by operation type. Individual forecasts were prepared for: scheduled passenger airlines, general aviation aircraft, and military aircraft. General aviation operations forecasts include air taxi. The results are then totaled to produce a forecast of annual operations. Operations are also classified as either itinerant, meaning they originate and depart from different airports; and local, meaning that the flight remains near the Airport. Local operations are normally only conducted by general aviation and military aircraft for purposes of flight training.

6.5.1 Methodologies Considered and Rejected

Four of methodologies presented earlier in this document have been rejected as inappropriate for forecasting aircraft operations.

- **Historical trend lines and regression analyses** has been rejected for commercial and general aviation operations due to limited available historical data.
- **Socioeconomic and correlation analyses** is rejected for use in forecasting all operations because no clear link exists between the number of commercial or military operations and socioeconomic factors.
- **Market share analysis** is rejected because, as an airport serving a resort/recreational destination, there is not a strong link between operations at MMH and state or national trends.
- **Comparison with other airports** is rejected for general aviation operations because MMH is an isolated airport that cannot be expected to follow operations trends at other airports. It is rejected for commercial and military operations because there is a stronger link between forecast enplanements and operations than operations at other airports.

6.5.2 Methodology Selected

- **Judgmental forecasting** has been used for commercial and military operations. Previously forecast enplanements have been used to forecast commercial operations using assumptions on aircraft seating capacity and load factors. The low number of military operations have been forecast to remain constant due to a lack of data suggesting and change in past activity levels.
- **Socioeconomic analysis** has been used for general aviation operations. Population growth in the Mammoth Lakes area is believed to be the best available indicator of future general aviation operations.

6.5.3 Scheduled Passenger Airlines

Operations by scheduled passenger airlines was calculated by applying assumed load factors and average seats per departure to the enplanement forecast. The current (2016) load factor is 60.9%. The Air Partners group has indicated that the right-sizing strategy is fully in place and no changes are currently planned to boost load factors. For forecasting purposes it was assumed that this percentage will continue through the 10-year forecast period. Similarly the current (2016) number of average seats per departure, 74.5 seats, is presumed to remain unchanged. This reflects the assumption that the current mix of Q-400 aircraft with 76 seats and the CRJ700 aircraft with 70 seats, will remain unchanged through the forecasting period.

Applying the load factor and average seats per departure to the previously presented enplanement forecast would yield the following forecasts of operations:

- 1,040 air carrier operations in 2021.
- 1,094 air carrier operations in 2026.

6.5.4 General Aviation Operations

With only seven based aircraft and no flight school based at the Airport, the majority of general aviation operations are by transient aircraft. The FBO estimates that about 20% of the transient operations are by aircraft owners who own hangars at the Airport because they also own second homes in the Mammoth Lakes area. Because of this link between second home ownership and transient use, the forecast of general aviation operations has been developed by utilizing the rate of population growth projected for Mono County. Mono County includes the Mammoth Lakes area.

Population forecasts for Mono County were taken from the California Department of Finance, Demographic Research Unit Report P-1, *State and County Population Projections: July 1, 2010-2060*. These projections anticipate that Mono County will grow from 14,525 residents in 2015 to 16,671 residents in 2035. The increase represents a compound annual growth rate of 0.69%. Applying this growth rate to the preceding estimate of 2016 noncommercial operations (minus military operations) yields:

- 6,215 operations in 2021.
- 6,432 operations in 2026.

Air taxi operations are forecast to continue to account for 28.2% of total general aviation operations. Itinerant general aviation operations are assumed to remain 69.3% of general aviation operations. Local operation will remain 2.5% of operations

6.5.5 Military Operations

Military operations have averaged about 35 operations annually over the last 5 years. Therefore, for forecasting purposes, annual military activity has been assumed to remain at 35 operations.

6.5.6 Operations Forecasts

A summary of operations forecasts is presented in **Table 8** below.

Table 8.
Operations Forecast

	Itinerant Operations					Local Operations			
Year	Air Carrier	Air Taxi & Commuter	General Aviation	Military	Total	Civil	Military	Total	Total Operations
2016	990	1,634	4,017	32	6,673	143	0	143	6,816
2021	1,040	1,186	1,753	35	7,137	155	0	155	7,292
2026	1,094	1,314	1,814	35	7,403	161	0	161	7,564

6.5.7 Peak Hour Operations Forecasts

There are no sources that directly provide peak hour operations information for the Airport. However, available data for both scheduled airlines and general aviation activity both indicate that March is the peak month. The attraction is the high quality of snow and good weather for skiing that commonly exists in this month. Airport data on actual airline operations indicate that March has accounted for about 20% of total annual operations in 2013-2015. Counts of noncommercial operations (i.e., all nonairline operations) by the FBO show that March 2013-2015 also accounted for about 20% of annual operations for these aircraft. Where peak day counts are not directly available industry practice is to assume equal division of operations during the peak month. The peak day in March would then equal the monthly total divided by 31. Therefore, the peak day at Mammoth Yosemite Airport would be 20% / 31 = 0.65% of total annual operations. The peak day's percentage of annual operations (0.65%) equated to 44 operations in 2016.

No generic distribution of operations during a peak day is available. Every airport is unique. During the ski season at Mammoth Lakes visitors arriving by air commonly seek to arrive by civil twilight (i.e., sundown). During March this occurs between 6:15 p.m. and 7:45 p.m. During the 2015-2016 ski season three of the four scheduled daily arrivals occur between 4:35 p.m. and 6:45 p.m. General aviation arrivals follow a similar pattern. Based upon FBO landing records, an average peak day in March would see five arrivals by general aviation aircraft during the peak hour. The peak hour is typically 4:30 p.m. to 5:30 p.m. As noted earlier in this report the 2016 peak hour saw three operations by scheduled passenger aircraft. Adding commercial and general aviation peak hour data yields a total peak hour in 2016 of eight operations. In 2016, eight operations would equal 0.12% of total annual operations. Applying this percentage (0.12%) to the 2026 operations forecast yields 9 operations.

6.5.8 IFR Operations Forecasts

Instrument Flight Rule (IFR) operations are recorded in the FAA Traffic Flow Management System Counts (TFMSC). TFMSC operations data for the last four years (2013-2015) ranged from a high of 4,409 in 2013 to a low of 3,699 in 2016. Air carrier operations accounted for about 33% of IFR operations during this four-year period. Total IFR operations accounted for 62% of total operations. Introduction of the RNP instrument approach in the fall of 2016 is expected to increase the total number of air carrier IFR operations by about at least 2%. If air carrier IFR operations increase as projected, the percentage of total IFR operations would increase to 63%. At this rate in 2026 the number of IFR operations will total 4,765.

6.5.9 Cargo Forecasts

Nationally the trend has been a decline in cargo carried as belly-haul in scheduled passenger airline aircraft. The trend at the Airport has followed a declining trend since it started in 2010. Based upon these two trends it is forecast that no air cargo will be handled at the Airport in the future.

7. DESIGN AIRCRAFT

Plans for airport facilities must conform to FAA design standards. Design standards accommodate the physical and operational characteristics of the most demanding 'design aircraft.' The design aircraft must have or reasonably be forecast to conduct 500 annual operations at the Airport. In some cases the design aircraft will actually be a composite of the characteristics of the most demanding aircraft. According to the adopted Airport Layout Plan the current design aircraft for MMH is the Bombardier Q-400 turboprop. The operations counts for the Q-400 for the last four calendar years were:

- 882 operations in 2013
- 1,014 operations in 2014
- 952 operations in 2015
- 796 operations in 2016

The key characteristics of the Q-400 are:

- Aircraft Approach Category: C.

- Airplane Design Group: III.
- Taxiway Design Group: 5.

The Aircraft Approach Category (AAC) relates to aircraft approach speed and is classified by a letter (from A – E). The Airplane Design Group (ADG) component, depicted by a Roman numeral (from I – VI), relates to the aircraft's wingspan and tail height. The Taxiway Design Group (TDG) is based upon the undercarriage (i.e., wheel) spacing of the design aircraft.

The Q-400 is expected to remain the critical aircraft throughout the 10-year forecast period. It should be used as the design aircraft for facility planning.

8. SUMMARY

A summary of the forecasts are shown below in **Table 9**.

Table 9.
Summary of Forecasts

	2016	2021	2026
Passenger Enplanements			
Air Carrier	22,253	23,388	24,581
Commuter	0	0	0
TOTAL	22,253	23,388	24,581
Operations			
Itinerant			
Air Carrier	990	1,040	1,094
Commuter/Air taxi	1,634	1,753	1,814
Total Commercial Operations	2,624	2,793	2,908
General Aviation	4,017	4,309	4,460
Military	32	35	35
Local			
General Aviation	143	155	161
Military	0	0	0
TOTAL OPERATIONS	6,816	7,292	7,564
Instrument Operations	3,699	4,594	4,765
Peak Hour Operations	8	8	9
Cargo (enplaned+deplaned pounds)	0	0	0
Based Aircraft			
Single Engine (Nonjet)	4	4	4
Multi Engine (Nonjet)	3	3	3
Jet Engine	0	0	0
Helicopter	0	0	0
Other	0	0	0
TOTAL	**7**	**7**	**7**