Manhattan
Regional
Airport

Airport Master Plan Update

Prepared for:
City of Manhattan, Kansas

Prepared by:
HNTB Corporation

February 5, 2009

Final Master Plan Report

HNTB

MANHATTAN REGIONAL AIRPORT

MASTER PLAN UPDATE

FINAL

FEBRUARY 5, 2009

PREPARED FOR THE

CITY OF MANHATTAN, KANSAS

PREPARED BY

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CHAPTER ONE

OBJECTIVES

CHAPTER TWO

INVENTORY

CHAPTER THREE

FORECAST OF AVIATION DEMAND

CHAPTER 10

AIRPORT LAYOUT PLAN

LIST OF TABLES

LIST OF FIGURES

APPENDICES

APPENDIX A

- Published Approach Procedures
- Terminal Building HVAC System Assessment

APPENDIX B

- Forecast of Scheduled Airline Service
- FAA Terminal Area Forecast (TAF)
- Airport Traffic Records for MHK
- Environmental Assessment (AIP-24) Revised Activity Forecasts

APPENDIX C

- Runway Study (B757-300 Capability) Memo
- Existing Apron Size Calculation for Transient Aircraft (FAA Form)
- Ultimate Apron Size Calculation for Transient Aircraft (FAA Form)
- Paid Parking System Study

APPENDIX D

- Table D1: Short-term Operations Development (2008-2012)
- Tabel D2: Intermediate-term Financial Development (2013-2017)
- Table D3: Long-term Conceptual Development (2018-2027)
- Table D4: Master Plan Update Capital Improvement Program
- Table D5: Capital Costs in Escalated Dollars
- Table D6: Estimated Available PFC and FAA Entitlement Funds
- Table D7: Projects by Estimated Funding Source (Preliminary): Base Case
- Table D8: Summary of Capital Costs by Project Eligibility
- Table D9: Summary of Capital Costs by Estimated Finding Source
- Table D10: Summary of Casph Flow Analysis
- Engineer's Opinion of Probable Cost Estimates for 20-year ACIP

APPENDIX E

- Airport Layout Plan Set (11x17)

Chapter One
OBJECTIVES

1.1 NEED FOR AIRPORT MASTER PLAN UPDATE

Significant growth and changes are underway in the City of Manhattan and the communities surrounding the Manhattan Regional Airport (MHK). Several key issues developing in the region are having a noticeable impact on MHK.

- By 2011, the Ft. Riley troop population is projected to increase to nearly 20,000 and the City of Manhattan and the surrounding communities are currently focusing on ways to ease the integration of incoming troops and their families. With such growth, it is anticipated that MHK's constant charter aircraft operations and passenger enplanements in support of Ft. Riley will increase significantly over the next few years. Consequently, a phased program is needed to improve the facility's taxiway system to accommodate the larger civilian charter aircraft that ferry troops abroad.

- KDOT is currently conducting a Corridor Realignment Study of Kansas Highway 18 (K-18). The study is the first step in expanding the capacity of the highway to accommodate the projected growth of the City of Manhattan and the traffic demands of Fort Riley. The study has considered several highway realignments and as MHK is accessed via K-18, the preferred alignment needs to be incorporated into MHK plans for future development.

- Urban development in the Eureka Valley is another concern. Although substantial coordination is being carried out with appropriate city planners, the Sponsor must ensure the continued flexibility of MHK given development of the surrounding areas. As such, a more in- depth review of MHK's land use plan is necessary.

These and other regional issues are beyond the strategies contained in the 2002 Airport Master Plan Update, and are requiring more of the City's attention and planning efforts. To properly and proactively address the communities' needs and protect the planned growth of MHK, an update of the 2002 Airport Master Plan has been undertaken by the City. Updating the Master Plan is part of MHK's continuing effort to increase capacity, accommodate larger aircraft, and fulfill its role as a primary Regional commercial service airport.

As a historical reference, an Airport Master Plan was completed in 1976 with a 10-year update undertaken in 1986. An update to the 2002 Master Plan, which was based on 1998 data (slightly more than 10 years from the previous Master Plan), would be necessary in 2012 if the industry's decade interval were followed. The realization by City and the FAA to update the 2002 Airport Master Plan five years before the traditional 10-year revision date clearly points to the region's rapid growth and need for on-going planning and coordination.

1.2 MASTER PLAN OBJECTIVES

To address the above changes and welcomed growth surrounding MHK, several objectives have been identified for this Airport Master Plan Update. To accomplish these objectives requires a comprehensive evaluation of MHK's existing infrastructure and development of a phased and financially-acceptable plan to meet the aviation needs of the Flint Hills Region. Specific objectives of this Manhattan Airport Master Plan Update are:

OBJECTIVE 1 – BECOME THE AERIAL PORT OF EMBARKMENT FOR FORT RILEY

Of all the issues influencing MHK's development, arguably the one issue that will determine its future is whether to expand facilities to

support Fort Riley's mission objectives or preserve land for civilian aviation needs.

Will MHK be established as an ultimate Aerial Port of Embarkment (APOE) – an air terminal at which troops, units, military-sponsored personnel, unit equipment, and materials are loaded – or will it continue to serve as an occasional location for troop and equipment movements? A critical component of the planning process will be to establish the true intent of MHK as it supports Fort Riley.

At present, Forbes Field in Topeka serves as Fort Riley's APOE. Should several projects come to fruition at MHK, Fort Riley's APOE may shift. This would be a monumental change for MHK and has consequences not only for the terminal facility, but also for ancillary facilities that might be co-located for that purpose.

OBJECTIVE 2 – ATTAIN FINANCIAL SELF SUFFICIENCY

Recent years have seen significant changes in the City's financial position. With that in mind, future airport capital improvement projects need to be well planned to avoid straining the City's bonding capabilities and impacting bond ratings.

The Airport Master Plan Update will focus on creating a capital improvement program for MHK that is realistic and can be executed based on the City's financial budget. As needed, alternative financing instruments for all or a portion of the proposed airport development program will be identified. A financially-integrated approach will not only ensure the viability of Airport's capital improvement program, but also serve to move MHK toward its long term goal of being financially self-sufficient.

Many airports across the United States are getting more and more revenue out of non-aeronautical sources (up to 70% of total revenues). The land areas and configuration of MHK's facilities may provide some unique opportunities for revenue enhancement. This master plan update will explore ways to get more return out of the existing airport assets that are available. This will include both aviation-related, retail, and commercial land development.

OBJECTIVE 3 – EXPLORE TERMINAL BUILDING EXPANSION

The Airport Master Plan Update will determine the infrastructure improvements necessary in the event larger commercial service and charter aircraft serve MHK. Careful analysis of the terminal building and automobile parking must be completed to assure a positive passenger experience.

The current terminal building configuration adequately accommodates the 19-passenger Beech 1900 aircraft currently in operation, but if a larger aircraft were to serve Manhattan, the holding room would need to be expanded. Other areas of the terminal that could be impacted and expanded are the baggage screening system, passenger security screening space, ticketing and concessions, and baggage claim. Part 139 security issues and Secure Identification Display Area (SIDA) requirements at MHK will also need to be investigated.

In addition, if a high level of service is desired during inclement weather, ground level access to passenger boarding bridges can be explored to serve a range of larger aircraft. Passenger boarding bridges will occupy a significant area of the terminal apron area and a detailed look at how these structures would impact aircraft parking would need to be performed.

Lastly, reconfiguration of the short-term parking lot, which currently requires an automobile to pass in front of the terminal building twice in order to enter and exit the airport, will be analyzed. By reconfiguring the parking, fewer vehicles will pass along the front of the terminal and vehicle/pedestrian conflicts would be reduced thereby improving public safety.

OBJECTIVE 4 – INVESTIGATE RECLASSIFICATION OF RUNWAY 13-31

A major component of this Airport Master Plan Update will be to investigate reclassifying Runway 13-31 from B-II to C-II to accommodate larger aircraft. This potential enhancement was discussed during the Environmental Assessment which was completed by HNTB in late 2006 and received FAA approval in March 2007.

Reclassification of Runway 13-31 would allow MHK to accommodate larger commercial service and general aviation aircraft thereby increasing the flexibility and capacity of MHK. With a crosswind runway capable of supporting larger aircraft, MHK would have a backup runway in the event Runway 3-21 is closed due to maintenance or construction.

OBJECTIVE 5 – EXPAND GENERAL AVIATION FACILITIES

The Master Plan Update will also examine MHK's ability to expand general aviation facilities to meet local hangar demand and remain competitive with other airports. The General Aviation Complex, located north of the Approach End of Runway 31, includes a dense mix of individual hangars, T-hangars, various business and residences. This mix of facilities and differing land uses makes hangar expansion difficult in this area.

The General Aviation Complex has no room for expansion and in order to develop the area for aviation and defense-related businesses, hangars and associated taxiways, it may be necessary to acquire and convert properties east of Airport Road. In addition to lacking basic utility service, drainage is also a concern as the entire complex has historically been prone to flooding.

Moreover, reclassification of Runway 13-31 would require further separation between the runway itself and the hangars located north of Taxiway E. It may be necessary to relocate some facilities to meet FAA runway safety and airspace standards to accommodate an upgraded crosswind runway.

Because of these site constraints it may be more cost effective to investigate other areas of MHK for general aviation. Other areas that could support new hangar development include the Corporate Tech Park, the area north of the TVOR facility, or the area along the north end of Taxiway A. These areas would have direct access to a runway and access for vehicle traffic could be provided. Regardless of the ultimate area chosen, the site selection process will weigh heavily the required utility improvements and coordinate vehicular access with City planning and engineering staff.

OBJECTIVE 6 – ASSESS AIRFIELD DRAINAGE

Airfield drainage is not just a concern in the General Aviation Complex; it is a feature that impacts the entire airfield. A large amount of water drains from the Fort Riley property and the Corporate TecPark west of MHK where it is eventually conveyed under Kansas Highway K-18 and Union Pacific Railroad infrastructure into the Kansas River. The airport drainage system must not only have enough capacity to properly drain storm water runoff from the runway and taxiway pavements, but also handle the runoff from those areas west of the airfield. The Airport Master Plan Update will review the existing drainage patterns and storm drain system and determine drainage improvements associated with future airport development.

1.3 PURPOSE OF THE AIRPORT MASTER PLAN UPDATE

The Airport Master Plan Update will be a valuable tool that creates a framework to develop MHK to meet the long-term needs of the region it serves. This document will position the Manhattan Regional Airport to meet the demands of military, commercial service, and general aviation operations and the needs of key stakeholders.

The Airport Master Plan Update will accomplish the objectives listed above by carrying out the following:

- Determine project needs of airport users through the year 2026;
- Identify future facility needs and evaluating alternatives to make efficient use of existing airport facilities and property;
- Identify opportunities to enhance aeronautical and non-aeronautical revenues; and
- Develop a realistic capital improvement program that can be implemented based on the City's budget and FAA funding.

1.4 MASTER PLAN GUIDELINES

This Airport Master Plan Update will be prepared for the City of Manhattan in accordance with Federal Aviation Administration (FAA) Advisory Circular 150/5070-6B, Airport Master Plans; Advisory Circular 150/5300-13, Change 11, Airport Design; and other appropriate advisory circulars and Federal orders. The Airport Master Plan Update will follow industry-accepted principals and practices and consist of several chapters that are intended to assist in the discovery of future facility needs and provide the supporting rationale for their development.

Chapter Two
INVENTORY

The purpose of the Inventory Chapter is to summarize the relevant data pertaining to the Manhattan Regional Airport (MHK) and the area it serves. The information collected during the inventory phase will serve to support subsequent chapters of the Airport Master Plan Update.

2.1 AIRPORT BACKGROUND

Since its founding on April 4, 1928, MHK has been providing a variety of aviation services for the City of Manhattan and the northern Flint Hills Region. Today MHK supports commercial service, military and general aviation aircraft on a daily basis.

Once served by airlines such as Frontier and Capital, MHK is currently served by Great Lakes Airlines which provides daily air service to Kansas City, Missouri (MCI) and Denver, Colorado (DEN). Since the Terminal Building opened in 1997, approximately 145,000 passengers have been enplaned.

At 7,000 feet long, Runway 3-21 has allowed Fort Riley to conduct many troop deployment and cargo operations out of MHK – operations that meet National Defense and Homeland Security objectives. Many military cargo operations are conducted by the C-17 Globemaster depicted in Figure 2-1.

Figure 2-1: C-17 Globemaster

Kansas State University Biography

With more than 23,000 attending students representing all 50 states and more than 90 countries, Kansas State University is one of the premier educational institutions in the United States and the World. Resting on more than 660 acres, Kansas State comprises the northern portion of the City of Manhattan.

Kansas State has eight Colleges: Agriculture, Architecture, Arts and Sciences, Business Administration, Education, Engineering, Human Ecology, and Veterinary Medicine. The eight Colleges represent sixty Departments and offer over 250 undergraduate majors. The Graduate School offers 65 masters degrees, 45 doctoral degrees and 22 graduate certificates in multiple disciplines across campus.

As well as being an international mix of cultures, the University offers many educational, recreational and athletic attractions. Among them are over 400 student organizations, 20 club sports and the prestigious Alfred M. Landon Lecture Series on Public Issues. The "K-State Wildcats" are members of the Big 12 Athletic Conference which is made up of 12 institutions, sponsors 21 sports and encompasses seven states in its geographical footprint.

K-State at Salina is home to the College of Technology and Aviation. The College offers associate and bachelors degrees in the fields of engineering technology, aviation, and technology management. Students attending the College can earn an associate degree in aviation maintenance and associate and bachelor degrees to prepare students for a career as a professional pilot. The fleet at Salina totals more than 30 aircraft including Cessna 172s, Beech Bonanza F33s, Beech Baron BE 58s, a Beech King Air C90, and a Cessna CitationJet.

Sources: http://www.ci.manhattan.ks.us and http://www.k-state.edu/welcome/

General Aviation also has a rich history at MHK and can trace its roots back to the birth of the facility when Runway 13-31 was a turf strip and the only runway available. Today, general aviation services at MHK include air charter, aircraft rental, flight instruction, aerial photography, major aircraft maintenance, transient aircraft refueling, tie-downs, and hangar space.

These services are provided to recreational pilots, corporate jet aircraft owners and other Airport users including Kansas State University, whose charter aircraft frequently fly across the United States in support of the various Athletic Department sporting events. The KSU Flying Club, a tenant for over 50 years, has office space at MHK for instruction and flight planning.

For nearly 80 years, MHK has grown to support the aviation industry in many ways and Table 2-1 summarizes key airport development events that have come to fruition over the last half century. MHK's infrastructure includes two runways, a network of taxiways, three aircraft parking aprons, an Aircraft Rescue and Fire-Fighting (ARFF) fire station, 48 aircraft hangars, a multi-tank fuel farm, and a City-funded Air Traffic Control Tower. This infrastructure normally supports aircraft equivalent in size to a DC-9 or B-737, but can support the occasional use of commercial aircraft as large as the B-757 or military C-17.

Manhattan Community Profile

- *Settled 1855*
- *Population: 51,700 (approx)*
- *Area : 18 square miles*
- *University/Colleges: Kansas State University, Manhattan Christian College, Manhattan Area Technical College*
- *Bases: Fort Riley (15,000+ soldiers)*
- *Parks: Tuttle Creek Lake, Konza Prairie Tall Grass Preserve*
- *Riley County*
- *County Seat: City of Manhattan*

Historic Development

The Manhattan Regional Airport was originally constructed in 1938 as a grass strip with stone hangars being erected in 1939. The remainder of the development history for the Manhattan Regional Airport is summarized below.

Table 2-1: Airport Development Chronology

Date	Development Event
1950	Runway 13-31 Paved
1953	Runway 13-31 Expanded
1958	Original Terminal Built
1963	Runway 3-21 Constructed
1976	Airport Master Plan
1979	Runway 3-21 Extended to 7,000 Feet
1982	General Aviation Ramp
1986	Airport Master Plan
1988	Taxiway A Extended to the Approach End of Runway 21
1991	New Aircraft Parking Apron
1994	New Airfield Signage Installed
1996	New Airport Terminal Construction
1997	Service Road Phase I and Passenger Walkways Install
1998	East Apron Rehabilitation
2000	H Row Hangars Construction
2000	Clear Span Hangar Construction
2000	Taxiway A Extension to Runway 3
2002	Fire Station #4/ARFF Station Construction
2002	Air Traffic Control Tower Construction
2002	Airport Master Plan
2003	Taxiway D Widening Project
2005	USACE Deployment Ramp Project
2005	Airfield Lighting and Electrical Improvements Project
2006	Wildlife Fence Installation (Phase 1) Project
2007	Environmental Assessment (EA) and Airport Layout Plan (ALP) Update Project Completed
2008	Armory Building Conversion Project
2008	Remark Runway 3-21 Thresholds

2.2 LOCATION AND ACCESS

Located in the central United States, MHK resides in northeast Kansas approximately 110 miles west of Missouri and 60 miles south of Nebraska. MHK is located seven miles north of Interstate I-70 and three miles southwest of downtown Manhattan along Kansas Highway 18. Figures 2-2 and 2-3 depict MHK in its regional and local settings, respectively. MHK is 1,057 feet above sea level.

2.3 AIRPORT ROLE

An airport can be classified as commercial service, reliever, or general aviation by the FAA.[1] Commercial service airports are public facilities that receive scheduled passenger service. Reliever airports are those located in metropolitan areas that provide pilots with an attractive alternate to using congested commercial service airports. Communities that do not receive scheduled commercial service at their airport are labeled as general aviation airports.

The commercial service airports are further broken down in terms of the number of passengers they enplane (board) as follows:

- Non-primary Commercial Service - between 2,500 and 10,000 passengers enplaned annually.
- Primary Commercial Service - more than 10,000 passengers enplaned a year. Primary commercial service airports are grouped into four "hub" categories depending upon the level of activity at the airport. The four groups are Large-, Medium-, Small-, and Non-Hub airports.

MHK is classified as a Non-Hub Primary Commercial Service Airport. By definition, a non-hub primary airport has more than 10,000 annual passenger enplanements (boardings) but less than 0.05 percent of all commercial passenger enplanements. In 2006, MHK enplaned 14,969 passengers. Primary airports receive an annual apportionment of at least $1,000,000 in Airport Improvement Program funds from the FAA. There are 243 non-hub primary airports in the United States.

Currently, MHK is served by Great Lakes Aviation Ltd., an Essential Air Service (EAS) carrier that operates a 19-passenger Beechcraft 1900 D to Kansas City International (MCI) three times daily and to Denver International (DEN) three times daily. Originally, two daily flights were offered to DEN but the passenger demand necessitated a third flight in response. The third flight makes a stop in McCook, Nebraska (MCK)

Prior to Great Lakes, MHK was served by Air Midwest Inc. (a subsidiary of Mesa Air Group), an Essential Air Service (EAS) carrier that operated a 19-passenger Beechcraft 1900 D to MCI three times daily on weekdays, once on Saturday, and twice on Sunday.

It is important to note the above changes in airline service at MHK. The forecast of aviation demand presented in Chapter 2 was completed in November 2007 with FAA approval received prior to the Great Lakes service. As such, the Forecast Chapter makes no reference to the current Great Lakes schedule.

2.4 PART 139 CERTIFICATION

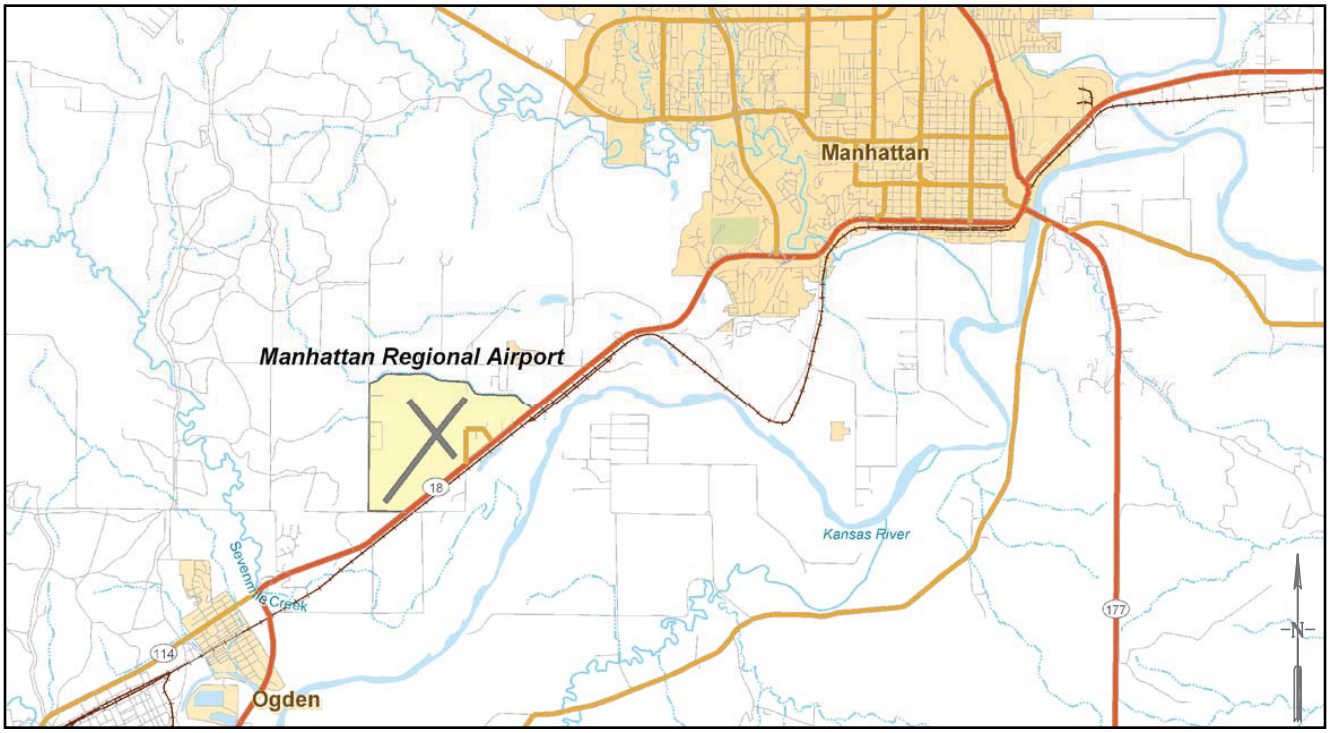
MHK holds a Class II Airport Operating Certificate from the FAA which allows an airport to be served by scheduled operations of small air carrier aircraft and the unscheduled passenger operations of large air carrier aircraft. The FAA defines small aircraft as having between 10 and 30 seats whereas large aircraft are defined as having 31 seats or more.

Airport Operating Certificates serve to ensure safety in air transportation. To obtain a certificate, an airport must agree to certain operational and safety standards and provide for such things as fire fighting and rescue equipment. Title 14 of the Code of Federal Regulations (CFR) Part 139, Certification and Operations: Land Airports Service Certain Air Carriers, establishes the standards relating to safety, planning, and maintenance.

1. FAA National Plan of Integrated Airports System (NPIAS), 2007-2011 Report.

Figure 2-2: Regional Setting

Figure 2-3: Local Setting



2.5 AIRPORT RESCUE AND FIRE FIGHTING (ARFF)

By holding an Airport Operating Certificate, MHK is required to provide aircraft rescue and fire fighting (ARFF) services during air carrier operations. CFR Part 139 provides for varying levels of ARFF requirements depending upon the length of aircraft served and the frequency of flights. There are five levels or indexes of ARFF from Index A to E. With an increase in index, there is a corresponding increase in the number of ARFF vehicles, the type and quantity of necessary fire fighting, and the implied size of the aircraft and complexity of airport being served. Because of the size and frequency of the commercial service aircraft in operation, MHK is required to provide Index A capabilities. Currently, MHK is capable of providing ARFF Index B based on their Primary ARFF vehicle. Table 2-2 below lists current ARFF equipment.

2.6 ADMINISTRATION

MHK is owned and operated by the City of Manhattan under the direction of a full-time Airport Director. The Airport Director, who reports to the Deputy City Manager, oversees the Airport Department which consists of six full-time positions and one part-time janitorial position. The administrative staff includes the Airport Administrative and Finance Assistant and the Airport Operations Assistant, both report directly to the Airport Director. The four-person maintenance staff includes the Maintenance Supervisor who also reports directly to the Airport Director. The part-time custodian reports directly to the Maintenance Supervisor.

Airport development is guided by an 11-member Airport Advisory Board (AAB) representing key stakeholders from throughout the region. The Airport Director serves as an ex officio member of the AAB without a vote. It is the responsibility of the AAB to advise the City and airport management on matters that pertain to MHK and its development. An AAB member is appointed by the Mayor and serves a three-year term.

2.7 SECURITY

The Transportation Security Administration (TSA), created from the 2001 Aviation and Transportation Security Act, is the agency responsible for oversight of all federal security responsibilities in all modes of transportation. Under the Act, aviation security functions and the rules governing civil aviation security were transferred to the TSA from the FAA.

TSA Regulations Part 1542 regulates airport operations, that is, security that affects or could affect safety in flight. The regulation outlines the responsibilities for airport operators serving certificated air carriers and air cargo carriers and requires an airport to have a TSA-approved Airport Security Plan (ASP). An ASP establishes the basic requirements for an airport to operate under Part 1542 and details the security procedures,

Table 2-2: ARFF Vehicle Inventory

Function	Vehicle Type	Water Capacity (gallons)	Roof turret discharge rate	Roof turret discharge rate	Dry chemical system capacity
Primary ARFF Vehicle	1999 Emergency One HPR 4X4	1585 gallons of water/ 205 gallons of 3% AFFF	375/750 GPM	500 GPM	500 pound
Backup ARFF Vehicle	1980 Oshkosh T-6 4x4	1585 gallons of water/ 205 gallons 6 % AFFF	400/800 GPM	300 GPM	--

access control system, and existing security infrastructure. MHK has an active TSA-approved ASP on file with the agency.

This Master Plan Update will develop a GIS database that includes all existing security infrastructure including gate numbers and locations, access devices, fence types, etc.

2.8 AIRSPACE STRUCTURE

The Federal Aviation Act of 1958 gave jurisdiction of all US airspace to the FAA. Following this authorization, the FAA established the National Airspace System (NAS) to manage the airspace safely and efficiently among commercial, general aviation, military, and other competing users. The NAS is defined as the common network of navigational aids (NAVAIDS), airport and landing sites, charting and information, procedures, regulations, technical support, and resources.

To ensure a safe and efficient airspace environment, the FAA separates the airspace structure into categories, controlled and uncontrolled, and identifies them as Classes A, B, C, D, E, and G as depicted in Figure 2-4 and described below.

Class A airspace (controlled airspace) is the band of airspace between 18,000 feet and 60,000 feet above mean sea level (MSL) over the entire continental United States. Only aircraft operations under Instrument Flight Rules (IFR) are permitted in Class A. Pilots must be instrument rated, have air traffic control (ATC) clearance, and a transponder with altitude reporting capability (Mode C) to enter this airspace.

Class B airspace, also referred to as a terminal control area, is controlled airspace surrounding high-activity commercial services airports (e.g., Kansas City International Airport). Typically, Class B airspace exists from the ground to 10,000 feet above MSL, surrounding the busiest airports in the country. This airspace is individually designed for each airport and consists of a surface area and two or more layers of controlled airspace. Many refer to this airspace layout as an "upside down wedding cake" as it consists of three cylinders stacked atop one another. Operations under both visual and instrument flight rules are permitted as long as ATC clearance has been received to enter this airspace.

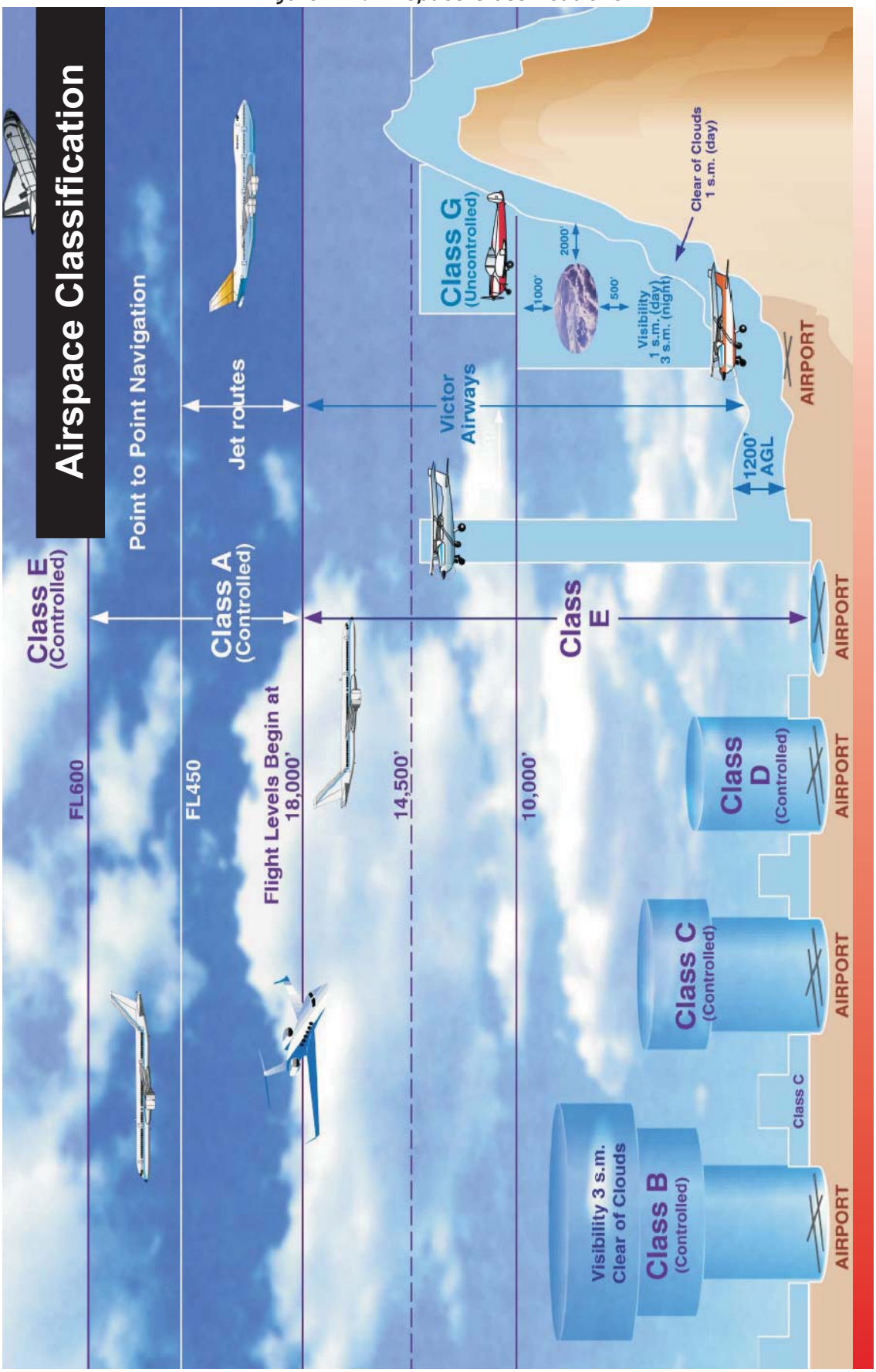
Class C airspace is controlled airspace surrounding lower activity, commercial service airports (e.g., Wichita Mid-Continent Airport) and some military airports. Class C airspace is made up of two cylinders. The lower cylinder is five nautical miles in diameter and extends from the airport ground elevation to 4,000 feet above ground level (AGL). The upper cylinder sits on top of the lower cylinder area has a diameter of 10 nautical miles and extends from 1,200 feet AGL to 4,000 feet AGL. Two-way radio communications with ATC and a Mode C transponder are required for flight in Class C airspace.

Class D airspace is also controlled airspace surrounding low-activity commercial services and general aviation airports with an air traffic control tower (ATCT). The cylinder of airspace extends from the airport ground elevation to an elevation of 2,500 feet AGL and typically covers a five-mile radius around the airport; however, the configuration of this airspace can be tailored to fit the operational needs of the area.

Class E airspace is general controlled airspace and control zones at airports without control towers. This airspace begins at ground level and extends upward to 18,000 feet above MSL.

All uncontrolled airspace that has not been designated as Class A, B, C, D or E is considered to be Class G. While within Class G airspace communication with and air traffic control tower is not required. The amount of uncontrolled airspace has steadily declined because of the expanding need to coordinate the movement of aircraft en route.

Figure 2-4: Airspace Classifications



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MHK is governed by Class D airspace when the ATCT is open from 7:00 A.M. to 9:00 P.M. Class D airspace extends to a 4.2-nautical-mile radius from the tower and to an elevation of 3,600 feet AGL. This airspace excludes the portion overlapping Ft. Riley's Marshall Army Field and restricted area R-3602B. When the ATCT is closed MHK operates in Class E airspace.

MILITARY OPERATIONS AREA (MOA) AND RESTRICTED AREAS

West and northwest of MHK is the Riley MOA. A MOA is an area of airspace designated for military training use. This is not restricted airspace so pilots can use the airspace, however, they should be on alert for the possibility of military traffic. Under visual meteorological conditions (VMC), aircraft can navigate through the MOA, but when under instrument meteorological conditions (IMC), aircraft are routed around the MOA by air traffic control.

In addition to the Riley MOA, two areas of restricted airspace exist west of MHK. These areas are labeled R-3602B and R-3602A. R-3602B is located immediately west of MHK. R-3602A is located adjacent to and further west of R-3602B. Under VMC, aircraft cannot navigate through restricted airspace; however, when under IMC, an aircraft can travel through restricted airspace under the direction of air traffic control.

Because of this restricted airspace, specific take-off procedures are in effect at MHK during IMC conditions. When aircraft are departing on headings between 210 and 360, the ATCT staff will advise the most appropriate departure procedure. In addition, departures from Runway 31 are not allowed when the R-3602B airspace is active.

The MOA and restricted airspace areas are the result of Fort Riley's artillery training exercises and the concentration of military aircraft activity in the area.

2.9 NEIGHBORING AIRPORTS

A review of the airport facilities within a 30 nautical mile radius of MHK was conducted to identify and distinguish the types of aviation services provided in the region. As summarized in Table 2-3 on the following page, there are five neighboring public-use airports within the area. Although not open to the public, Marshall Army Airfield is listed in the table given its close proximity to MHK and as it is located under the Runway 3 approach path.

2.10 NAVIGATIONAL AIDS (NAVAIDS)

NAVAIDS are electronic devices that transmit radio frequencies that pilots of properly-equipped aircraft can use to accurately navigate between airports. The NAVAIDS in the vicinity of MHK or on Airport property include non-directional beacons (NDB), a very high-frequency omnidirectional range (VOR) station, an instrument landing system (ILS), and the Global Positioning System (GPS).

The NDB is a general purpose, ground-based, low-frequency radio beacon that a pilot can use to determine a bearing. NDBs were developed in the 1920s and transmit radio signals in all directions (omnidirectional) acting as a homing device for an aircraft. These facilities are gradually being phased out as new airport GPS-based approach procedures are being developed. Three NDBs serve aircraft navigating in the airspace surrounding MHK as follows:

- Cavarly NDB is located 9.0 nautical miles southwest on the NDB's 034° radial.
- Clay Center NDB is located 26.9 nautical miles northwest on the NDB's 115° radial.
- Herington NDB is located 27.7 nautical miles southwest on the NDB's 008° radial.

MHK is equipped with four lighted supplemental wind cones (one at each runway end) to comply with Part 139 Requirements. The lighted wind cone provides information to pilots regarding wind direction and intensity at the runway end.

Table 2-3: Neighboring Airports				
FAA Airport Identifier	Airport Name	Primary Runway Length and Surface Pavement	Based Aircraft	Distance and Direction from Airport
MHK	Manhattan Regional	7,000' concrete	45	0 nautical mi. (nm)
FRI	Marshall Army Airfield	4,500' concrete	N/A	7 nm,SW
3JC	Freeman Field (Junction City)	3,495' asphalt	22	10 nm, SW
69K	Wamego Municipal	3,184' asphalt	5	19 nm, W
CYW	Clay Center Municipal	4,199' asphalt	17	27 nm, NW
HRU	Herington Regional	4,184' asphalt	11	28 nm, S
K78	Abilene Municipal	4,100' asphalt	22	30 SW

As a historic basis for navigation in the United States, a VOR station transmits high frequency radio signals 360 degrees in azimuth from the station. A VOR station is 1950s technology developed from NDBs. VORs can be combined with Distance Measuring Equipment (DME), which enable pilots to determine their line-of site distance from the VOR. In fact, a VOR-DME station is located on Airport property north of the runway intersection and is shown in Figure 2-5.

MHK is serviced by another VOR in the area – the Fort Riley VOR which is located 13.5 nautical miles southwest of MHK along the VOR's 035° radial.

Another NAVAID installed by the FAA includes a precision instrument landing system (ILS) for Runway 3. The four components of ILS are the glide slope antenna, the localizer antenna, the approach lighting system, and an outer marker.

The Glide Slope antenna is located beside the primary runway just north of the Runway 3 threshold. The Localizer antenna is located on Airport property just 660 feet north of the Runway 21 threshold. Runway 3 is also equipped with a Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR). The Localizer antenna, MALSR, and Glide Slope antenna are presented in Figures 2-6, 2-7, and 2-8, respectively as shown on the following page.

The fourth component of the ILS is located off Airport property – the outer marker beacon. The outer marker is located 5.8 nautical miles southwest of the Runway 3 threshold. This beacon provides a pilot on final approach with a visual and aural indication of a precise position reference point. The ILS system was

Supplemental Wind Cones

Under AIP-26, the supplemental wind cones to Runway 3-21 were relocated from 225 feet from runway centerline to 255 feet. This relocation placed the wind cones five feet beyond the RSA limit. Also under that project, supplemental wind cones were installed on Runway 13-31. The Runway 31 wind cone is located 800 feet upwind of the runway threshold. The Runway 13 wind cone is located 200 feet from the threshold to accommodate the future 1,200-foot extension of the crosswind runway. Relocation and installation of the supplemental wind cones were completed in 2004.

equipped with a middle marker but it has since been decommissioned and removed. The FAA terminated its lease of the middle marker property with the City on April 26, 2000. The middle marker was located south of Wildcat Creek Road along the extended Runway 3 centerline.

The Global Positioning System (GPS), a constellation of 24 satellites orbiting 11,000 miles above the Earth, is an additional navigational aid for pilots. The GPS, launched in 1989 by the Department of Defense, is capable of providing continuous, highly accurate,

Figure 2-5: Airport VOR

Figure 2-6: Localizer Antenna

Figure 2-7: MALSR

Climate Data[1]

Manhattan has typical continental climate with rather large changes in temperature between winter (January) and summer (July). The first fall freeze typically occurs in the month of October with the last spring freeze in mid April or early May. Over the course of a year, average high and low temperatures range from 40°F to 16°F in the coldest month of January and 92°F to 67°F in the warmest month of July.

The Manhattan area receives nearly 35 inches of precipitation during an average year with the largest share being received in May and June. During a typical year, the total amount of precipitation may be anywhere from 24 to 46 inches. Winter snowfall averages almost 16 inches, but the median is less than 10 inches. Measurable snowfall occurs an average of 10 days per year with at least an inch of snow being received on six of those days. The average monthly wind speed ranges from 9 to 12.5 mph.

1. *Kansas State University and Wikipedia.org*

Figure 2-8: Glide Slope Antenna

three-dimensional position information to aircraft equipped with GPS receivers. The future of navigation for most military and civil applications is the GPS.

2.11 TRAFFIC PATTERNS

Standard aircraft traffic patterns have been developed to allow safe use of a runway during takeoff and landing operations. The standard traffic pattern requires aircraft to make left turns when approaching or departing a runway. As such, right traffic patterns are non-standard and MHK has two such procedures in place.

Runway 3 has a right traffic pattern to minimize the impact to Fort Riley airspace as well as the approaches and traffic patterns at Marshall Army Airfield. For similar reasons, Runway 31 also has a right traffic pattern.

To convey a right traffic pattern visually to pilots preparing to land at an airport, a segmented circle is outfitted with traffic pattern indicates. MHK is not equipped with a segmented circle.

2.12 OBSTRUCTIONS TO AIR NAVIGATION

There are several obstructions noted on the FAA 5010 Form which are a concern to the City, MHK, and airport users. According to the Airport Layout Plan, there are 40 natural and man-made obstructions to the FAR Part 77 Surfaces. Given the number of objects and obstructions identified, a discussion of them and their ultimate disposition is relegated to the Airport Layout Plan chapter where they will be reviewed to determine their full impact to MHK's airspace and aircraft operational safety.

2.13 INSTRUMENT APPROACH PROCEDURES

In total, MHK has six published instrument approach procedures to aid based and transient aircraft to land in weather with cloud ceilings as low as 200 feet AGL and visibility down to 1/2 statute mile. These approach procedures can be found in Appendix A and are summarized as follows:

- ILS to Runway 3
- RNAV to Runway 3
- RNAV to Runway 21
- VOR/DME or GPS-F
- VOR Runway 3
- VOR-H

2.14 COMMUNICATIONS AND WEATHER AIDS

The Air Traffic Control Tower (ATCT) supervises, directs, and monitors the arrival and departure traffic at MHK and in the immediate airspace. Pilots communicate with the ATCT via air-to-ground VHF radio (118.55 MHz) during the tower's operational hours. When the ATCT is closed, pilots have access to the Common Traffic Advisory Frequency (CTAF) to communicate with each other about approaches to, or departures from, MHK. The CTAF frequency is 118.55 MHz.

Remote Transmitter/Receiver (RTR) towers are located west of the approach end of Runway 3 adjacent to Wildcat Creek Road. The RTR towers support antennas for ground to air communications.

Co-located with the Glide Slope antenna at the Approach End of Runway 3 is an Automated Surface Observing System (ASOS). By recording weather conditions and updating the data every minute (24 hours a day), an ASOS provides pilots in the vicinity of MHK with up-to-date weather information. The information is transmitted via ground-to-air VHF signals at 119.075 MHz and via telephone at 785-537-1035. The ASOS is owned and operated by the National Weather Service and is depicted in Figure 2-9 on the following page.

MHK is not equipped with an Automated Terminal Information Service (ATIS). An ATIS broadcasts pre-recorded messages that are used by airports to notify arriving and departing pilots of the current surface weather conditions, communication frequencies, and other airport-specific information.

Figure 2-9: ASOS

2.15 AIRPORT OVERLAY DISTRICT

Zoning in the vicinity of MHK, on any land that has been annexed by the City of Manhattan, is regulated by the Manhattan Zoning Regulations. Those regulations include the Airport Overlay (AO) District, which is applied to all annexed lands that are located beneath the Part 77 Airspace. The AO District was originally adopted by the City Commission on June 18, 1996, by Ordinance No. 4977. This Ordinance, created an AO District allowing the City to protect MHK by restricting the use of land on, or adjacent to, the airport. The AO District is detailed in Article XI of the City's Zoning Regulations.

Prior to adopting the AO District, an airport zone did not exist in the City's zoning regulations as MHK was not annexed as a part of the City. That changed on January 4, 2000, when the City annexed MHK and the land was rezoned from Riley County's zoning designation to the City's AO District.

2.16 AIRPORT FACILITIES

The existing airfield configuration is comprised of two intersecting runways: the primary Runway 3-21, the crosswind Runway 13-31, and a series of taxiways that provide access between the runways and the various aircraft parking apron areas. A detailed discussion of the airfield system is presented in the following paragraphs while Exhibit 2-10 depicts the runways, taxiways, and aprons.

RUNWAY 3-21

Runway 3-21 is a grooved concrete runway measuring 7,000 feet long and 150 feet wide with 25-foot wide turf shoulders. Because of its length and width, the runway can safely accommodate aircraft within FAA Aircraft Approach Category C and Airplane Design Group IV. Category C aircraft include transport aircraft with an approach speed of 121 knots or more, but less than 141 knots. Airplane Design Group IV includes aircraft with wingspans between 118 and 171 feet. Examples of aircraft that fall into the C-IV category are the commercial-use Boeing 757 and the U.S. military's C-17 Globemaster.

Runway 3-21 complies with all FAA design standards with the exception of the Safety Area off the Departure End of Runway 21. A standard 1,000-foot long runway safety area is required but because of the location of the Localizer Antenna, a shorter length of 660 feet is provided.

To address this issue, the City completed an Environmental Assessment (AIP-24) in 2006 to investigate options for correcting this safety concern. The preferred alternative was to extend Runway 3-21 by 400 feet to the southwest and displace the Runway 21 threshold by the same amount. This results in a "shifting" of the runway to provide a standard 1,000-foot long runway safety area off the Departure End of Runway 21 and maintain the 7,000 foot runway length.

In March 2007, the FAA issued a Finding of No Significant Impact for the Environmental Assessment and concurred with the runway "shift" alternative. As a result of those planning efforts and in parallel with this Master Plan update, plans are underway to design and construct the Runway 3-21 Shift project. Design is currently underway with construction expected in 2009.

Until the Runway 3-21 Shift project is completed, however, MHK has published Declared Distances for Runway 3-21 as a temporary safety measure. Under the Declared

Figure 2-10: Manhattan Regional Airport Layout

Distances concept, aircraft have the full 7,000 feet available for operations to/from Runway 21 but not for operations to/from Runway 3. The runway length available for landings to or takeoffs from Runway 3 is 6,660 feet. This reduced length significantly impacts the larger charter aircraft used by Fort Riley and K-State.

PAVEMENT SECTION

The pavement section consists of 13 inches of Portland cement concrete pavement underlain by 6 inches of crushed aggregate base course. Records indicate the subgrade soil was not treated to increase is load-bearing capacity. An underdrain system is not present.

The pavement section is capable of supporting aircraft weighing 75,000 pounds single wheel and 110,000 pounds double wheel. A City Ordinance is in effect requiring all aircraft with gross landing weights of 110,000 pounds or greater to contract the Airport Director prior to landing at MHK.

Upon visual inspection of the concrete pavement[2], the runway appears to be in good condition. The last comprehensive visual survey of the airside pavement areas was conducted in December 1998 and utilized the Pavement Condition Index (PCI) procedure. A Pavement Condition Report was prepared in January 1999 with PCI values determined for the runways, taxiways, and aprons. A PCI value is a numerical representation of the pavement's overall surface condition. PCI values range from zero to 100 with zero indicating the pavement has failed completely and is in need of immediate replacement. A PCI value of 100 reflects newly constructed pavement in excellent condition.

PCI values of Runway 3-21, as reported in 1999, exceeded 70 which indicates the pavement is in good condition and performing well. With the exception of a few isolated areas, no maintenance or rehabilitation activities were advised in the Pavement Condition Report.

In 1963, the runway was paved with 13 inches of concrete to a length of 5,500 feet by 100 feet wide making the majority of the runway pavement 44 years old. In 1979 the runway was extended[3] to the southwest by 1,500 feet to its present 7,000 feet and widened to 150 feet by adding 25 feet of pavement on both sides of the runway. This southernmost section of the runway is the youngest section at 28 years old.

APPROACH LIGHTING

Runway 3 is equipped with a Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) to aid pilots in aligning their aircraft with the runway. Along with the Glide Slope and Localizer antennae, the MALSR is the third component of the FAA owned and maintained ILS.

According to the FAA's database, the ILS was commissioned on October 1, 1979 as part of the 1979 runway extension and widening project. The Glide Slope and Localizer antenna were upgraded to Mark 1E on April 1, 1997.

Runway 21 is equipped with Runway End Identifier Lights (REIL) owned and maintained by the FAA. The REIL consists of two flashing lights, one on each side of the runway, which aid pilots in identifying the location of the runway end. A photograph of the West REIL unit for Runway 21 is shown in Figure 2-11.

Both ends of the runway are equipped with 4-box Visual Approach Slope Indicators (VASI). These devices are also owned and maintained by the FAA. The VASI provides visual descent guidance during approaches to the runway. The Runway 3 VASI is depicted in Figure 2-12.

LIGHTING, SIGNAGE, AND MARKINGS

Runway 3-21 is equipped with a High Intensity Runway Lighting (HIRL) system (See Figure

2. HNTB conducted a visual inspection of the pavement on July 17, 2007.

3. In August 1977, the FAA issued a $2.1M grant to the City of Manhattan to acquire land to support the Runway 3-21 Extension and the Runway Protection Zone for Runway 3. In 1978, a second grant was issued for $2.4M to construct the extension and to make improvements to the former Terminal Building (currently referred to as the GATTS Building).

2-13). The lights are in excellent condition as they were replaced in 2005 under AIP-26. As-built records indicate the previous HIRL system was installed in 1984 under AIP-02.

The runway is also equipped with airport guidance signs in accordance with FAR Part 139 requirements. The signs were installed in 1994 under AIP-10. The Part 139 Sign Plan, which is contained in the Airport Certification Manual, was updated in July 2007 under AIP-29. To complete the new signage plan, MHK completed an extensive digital photographic inventory of all sign panel faces and backs. The sign information was included in the Airport Geographic Information System (GIS).

Runway 3 has precision markings and Runway 21 has non-precision markings. The runway threshold bars for both ends of the runway are in excellent condition as they were remarked in July 2007 under AIP-29 (See Figure 2-14). The threshold bars were remarked to meet the FAA's Configuration B marking standards deadline of January 1, 2008. All other markings are in fair condition but are not outlined with a black border and therefore do not contrast well with the light colored concrete pavement.

RUNWAY 13-31

The crosswind runway measures 3,801 feet long and 100 feet wide with turf shoulders. Because of its length and width the runway can safely accommodate aircraft within FAA Aircraft Approach Category B and Airplane Design Group II. Category B aircraft include aircraft with an approach speed of 91 knots or more but less than 121 knots. Airplane Design Group II includes aircraft with wingspans between 49 and 79 feet. Examples of aircraft that fall into the B-II category are the Beechcraft 1900D and Citation III.

Of the two runways, the crosswind runway was the first to be paved in 1950 (to a length of 2,950 feet). In 1953 the runway was extended to its present-day length. The runway received an asphalt overlay in either 1979 or 1980.

Figure 2-11: Runway 21 REIL

Figure 2-12: Runway 3 VASI

Figure 2-13: HIRL

Figure 2-14: Runway Threshold Bars

PAVEMENT SECTION
Weight bearing capabilities are 24,000 pounds single wheel and 33,000 pounds double wheel; however, due to the poor condition and rough surface of the runway, it is currently closed to all commercial aircraft and those aircraft weighing over 33,000 pounds. A picture of the Runway 13-31 pavement is provided in Figure 2-15.

With the exception of the pavement between the Runway 3-21 and Taxiway A intersections, the runway pavement section consists of a estimated three-inch thick asphalt surface course underlain by seven inches of concrete pavement. It is very interesting to note that the asphalt pavement is 27 years old and the concrete is 57 years old. The base course material type and thickness below the concrete is unknown. It has been confirmed that an underdrain system is not present.

The 1999 Pavement Condition Report indicated a PCI range of approximately 40 to 60. PCI values in this range indicate major rehabilitation is needed to improve the pavement condition. The asphalt surface is in very poor condition and contains numerous reflective cracks and blowups based upon the July 2007 visual inspection.

In the short-term planning period, MHK intends to reconstruct and lengthen the runway to 5,000 feet to the northwest while reducing its width to 75 feet. This improvement is discussed further in the Facility Requirements chapter.

APPROACH LIGHTING
Runway 31 is equipped with an FAA-owned and maintained (REIL) which is in good condition. Runway 13 is not outfitted with an approach lighting system.

LIGHTING, SIGNAGE, AND MARKINGS
Basic runway markings are in place on both Runway 13 and 31 and are in poor condition. Lighting on Runway 13-31 includes Medium Intensity Runway Lights (MIRL). The 29-year-old system was installed in 1978 under AIP-02. At present, a 4-box VASI is located at each end of the runway. The VASI are owned and maintained by the FAA and are in fair condition.

TAXIWAY SYSTEM
MHK has five taxiways, Taxiways A, B, C, D, and E with the details of each summarized below.

TAXIWAY A
Taxiway A is the full length taxiway parallel to Runway 3-21. Taxiway A is 50-feet wide for its entire length except at the Runway 3 and 21 Ends. At the Runway 3 End, Taxiway A is 65 feet with a 100-foot turning radius onto the runway. At the Runway 21 End, Taxiway A is 70 feet wide with a 70-foot radius. In general, the Taxiway A pavement is in good condition.

Taxiway A was originally constructed in 1979 or 1980 with a 13-inch concrete pavement supported by a 6-inch thick crushed aggregate base course. Subgrade stabilization was not included in construction. The original construction installed the 50-foot wide taxiway

Figure 2-15: Runway 13 Pavement

from Taxiway B to Runway 13-31. Taxiways B and D were also constructed with Taxiway A.

In 1988, Taxiway A was extended north from Taxiway E to the Approach End of Runway 21 under AIP-05. The pavement section consists of 13 inches of concrete pavement (P-501) supported by a 6-inch thick crushed aggregate base course (P-209). Subgrade stabilization was not included in construction. An MITL system and four taxiway guidance signs were installed under this project.

To convey storm water runoff under the taxiway pavement, two 42-inch diameter reinforced concrete pipes were installed. AIP-05 included a bid alternate to install a 4-inch PVC underdrain system along both sides of Taxiway A.

In 2000, Taxiway A was extended south from Taxiway B to the Approach End of Runway 3. This project provided Runway 3-21 with a full-length parallel taxiway and greatly improved airport efficiency and safety. This south extension (1,687 feet by 50 feet) and the associated connector taxiway (285 feet by 60 feet) also utilized a pavement section comprised of 13-inches of concrete pavement and a 6-inch crushed aggregate base; however, it is unknown if subgrade stabilization was incorporated. A 4-inch PVC underdrain system along both sides of this section of Taxiway A was installed along with an MITL system.

TAXIWAY B

Taxiway B is a 65-foot wide connector taxiway that links Runway 3-21 with Taxiway A. The pavement section is equivalent to the Runway 3-21 pavement section. Taxiway B is in good condition.

TAXIWAY C

Taxiway C is a 50-foot wide connector taxiway that allows access from Taxiway A to the ramp area. The pavement section consists of 13 inches of concrete pavement (P-501), 6 inches of crushed aggregate base course (P-209), and a compacted subgrade (P-152). Subsurface water is removed from the pavement section via a 4-inch perforated PVC underdrain system. Taxiway C was constructed as part of the Terminal Apron project. Taxiway C is in good condition based upon visual inspection. With the construction of the Army Deployment Ramp, Taxiway C is now contiguous to the new apron pavement.

TAXIWAY D

Taxiway D is a connector taxiway that links Runway 3-21 to Taxiway A and provides access to the ramp area. The pavement section for Taxiway D is the same as Taxiway C for it too was constructed as part of the Terminal Apron project. Taxiway D is in good condition based upon visual inspection. In 2003, the taxiway was widened from 50 feet to its current width of 75 feet as described in the sidebar. Figure 2-16 on the following page depicts the Taxiway D widening.

TAXIWAY E

Taxiway E is the partial length taxiway parallel to Runway 13-31 terminating at Runway 3-21. Taxiway E provides access to Taxiway A from Runway 3-21 and 13-31. Taxiway E (from Runway 3-21 to the GA Apron) was constructed in 1979 along with the Runway 13-31 asphalt overlay. The portion of Taxiway E between Runway 3-21 and Taxiway A is in excellent condition. The portion east of Taxiway A is in poor condition.

Taxiway E is 50 feet wide for its entire length except where it connects to the Approach End of Runway 31. At this location, the taxiway is 65 feet wide. Under AIP-07, Taxiway E received new edge lighting.

From the 1999 Pavement Condition Report, the PCI values for all the taxiways ranged from a low of 60 to a high of 98 with the exception of a portion of Taxiway E rated at a 41. When Runway 13-31 is reconstructed, Taxiway E will be as well.

All taxiways are equipped with new Medium Intensity Taxiway Lights (MITL) except for Taxiway E. The new MITL were installed in 2005 under AIP-26. These fixtures include LED bulbs which reduce electrical costs

Figure 2-16: Taxiway D Widening

Taxiway D Widening

On May 15, 2001, MHK received the first-ever landing of an Air Force C-17 Globemaster transport plane. The purpose of its visit was to provide an opportunity for Fort Riley soldiers to get actual "hands on" practice loading and unloading equipment onto the aircraft. From that initial landing of the C-17; however, it quickly became apparent that Taxiways C and D were not wide enough to safely accommodate the turning movements of such a large aircraft from Taxiway A onto the Terminal Apron.

On November 8, 2001, U.S. Representative Jim Ryun (R-KS) announced the inclusion of $240,000 in federal assistance for taxiway widening at MHK. This funding was provided in the Fiscal Year 2002 Veterans Affairs and Housing and Urban Development (VA/HUD) Appropriations Act in the form of a Community and Development Block Grant. The funding provided for a portion of the construction costs to widen Taxiway D.

In 2003, Taxiway D was widened from 50 feet to 75 feet to accommodate the C-17, other larger military aircraft, and several civilian charter aircraft.

and maintenance efforts. The edge lights are in excellent condition based upon visual inspection (See Figure 2-17).

APRONS

There are three aircraft parking aprons at MHK: the Terminal Apron, the GA Apron, and the Army Deployment Ramp. These aprons are depicted in Figure 2-10.

Figure 2-17: Taxiway Edge Light

TERMINAL APRON

The Terminal Apron is approximately 725 feet long by 275 feet wide and is bounded by the Terminal Building on the east and Taxiway A on the west. The north and south limits of the Terminal Apron are Taxiways D and C, respectively. Five tie-down positions are available for parking aircraft.

Constructed in 1992 under AIP-06, the Terminal Apron consists of 13 inches of concrete pavement (P-501), 6 inches of crushed aggregate base course (P-209), and a compacted subgrade (P-152). A 4-inch perforated PVC underdrain system was installed along the north and south pavement edges and along both sides of Taxiway C and Taxiway D (west of Taxiway A).

Taxiway edge lights were installed adjacent to all new pavement. In addition, 40-inch tall bollard-style lighting fixtures were installed along the west apron edge but have since been removed to accommodate the 1997 Terminal Building construction.

Overall, the concrete pavement is in good condition with the exception of the area adjacent to the Terminal Building. During the spring months, concrete panels adjacent to the Terminal Building heave vertically to the point several access doors cannot freely open. This not only impacts the daily operations of Airport and airline staff, but in the event of an emergency such as fire, the heaving panels represent a valid safety concern (refer to

Figures 5-16 and 5-17 in Chapter 5 for pictures of the heaving concrete slabs).

The concrete panels to the west were constructed as part of the original Terminal Apron construction and do not exhibit this heaving behavior. The first row of concrete panels was constructed in 1996 as part of the Terminal Building project and based on those record drawings, these concrete panels are 6-inches thick and are underlain by 2-inches of sand. Lastly, pavement joint sealant within the southern portion of the apron requires replacement. Apron markings are in poor condition and have faded to the point that remarking is necessary.

Commercial service, general aviation, and military aircraft use the Terminal Apron on a daily basis. Kansas Air Center Inc., the largest FBO at MHK, is located north of the Terminal Building and uses the northern and southern portions of the Terminal Apron for parking itinerant aircraft. The center section is reserved for commercial service and military aircraft. From the FBO's perspective, having to park aircraft at two locations is inefficient.

With three different aircraft types using the same area, apron space is often at a premium. In addition, a large charter or military aircraft will occupy a majority of the Terminal Apron leaving only a select area for the FBO customers' aircraft. Between the Terminal Apron and Taxiway A is a turf area that if paved would expand the Terminal Apron's capacity and improve the safety of this area.

GA APRON

The GA Apron is located north of the Approach End of Runway 31 and is served by partial parallel Taxiway E. The apron is comprised of both asphalt and concrete pavement surfaces. The asphalt area, which is rated in fair to poor condition, is actually an asphalt overlay underlain by concrete pavement. Several areas of ponding water were noted during the visual inspection. The concrete area is in fair condition.

The GA Apron is equipped with 27 aircraft tie-down positions. Prior to the construction of the Terminal Apron, the GA apron served as the primary apron.

ARMY DEPLOYMENT RAMP

The newest addition to the airfield is the recently completed Army Deployment Ramp located adjacent to the Terminal Ramp (See Figure 2-18 on the following page). The purpose of the 460,000 square foot Deployment Ramp is to allow Fort Riley to use MHK as a Rapid Deployment Facility in support of its Quick Reaction Force (QRF) mission in support of Homeland Defense.

The apron area has been designed to allow two C-17 aircraft to park simultaneously. The pavement section consists of concrete/ aggregate base/sand base/lime-treated subgrade.

When not in use by the Army, the City will be able to use the new apron for aircraft taxiing and parking. Construction of the Deployment Ramp was completed in 2008.

ATCT

The ATCT is located north of the Terminal Building adjacent to the Kansas Air Center (FBO) building. The ATCT became operational in 2002. The City has contracted with Midwest ATC Services, Inc. to staff and operate the facility from 7:00 AM to 9:00 PM daily.

In the summer of 2005 (under AIP-26) a new Airfield Lighting Control and Monitoring System (ALCMS) was installed to simplify the control and monitoring of airfield lighting systems and lighted visual aids from the ATCT using computerized touch screen controls (See Figure 2-19). The ALCMS controls the runway and taxiway edge light circuits, supplemental wind cone and the rotating beacon. The project also relocated all airfield regulators and electrical equipment to the base of the ATCT.

Also under this project, the high-intensity rotating beacon was refurbished and relocated

to the roof of the ATCT (See Figure 2-20). The rotating beacon was previously located atop a steel tower situated east of the T-Hangars. The high-intensity beacon is in excellent condition.

TERMINAL BUILDING

The Terminal Building is located south of the intersection of Runways 3-21 and 13-31. Constructed in 1996, the building's 13,000 square-foot floor plan (See Figure 2-21) provides space for the following activities:

- Airport administration;
- Airline ticket counter;
- Passenger security screening/departure area;
- Baggage claim;
- TSA offices;
- Public waiting lounge, restrooms, and vending; and
- Hertz and Enterprise Rental car companies.

AUTOMOBILE PARKING

The Terminal Parking Lot is MHK's main public parking area (See Figure 2-22). Constructed in 1996 (under AIP-13) the Terminal Parking Lot is sub-divided into three areas: rental car, short-term, and long-term parking which are detailed as follows:

- Hertz and Enterprise lease the southern portion of the Terminal Parking lot from the City. This area is not available for public parking.
- The 40-stall short-term parking area is located in the center of the Terminal Parking Lot and typically reaches 60-80 percent capacity.
- Lastly, the long-term parking area (located north of short-term parking) is constantly at capacity with parking overflow extending into the gravel area east of the paved parking stalls.

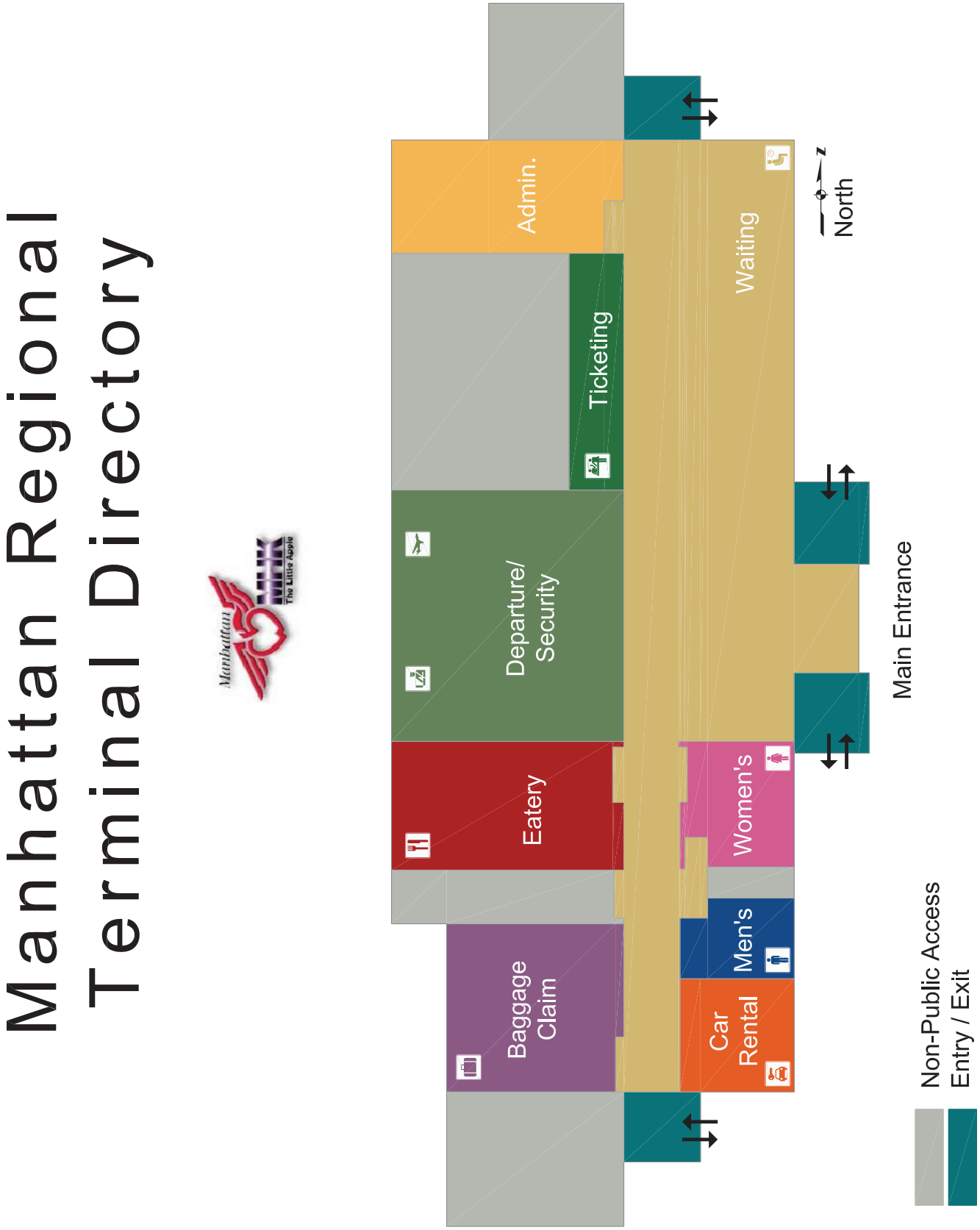
The airport entrance road loops around the short-term parking area in a one-way,

Figure 2-18: Army Deployment Ramp Under Construction

Figure 2-19: ALCMS Touch Screen

Figure 2-20: Rotating Beacon Relocation

Figure 2-21: Terminal Floor Plan



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counterclockwise direction. To enter and exit the short-term parking area, automobiles must pass the Terminal Building twice which increases the likelihood of a vehicle/pedestrian conflict. The Landside Facility Requirements chapter will investigate the short-term parking lot configuration and identify areas for expansion of the Terminal Parking Lot.

Figure 2-22: Terminal Parking Lots

PRIMARY FIXED BASE OPERATOR (FBO)
Given its size and level of operations, MHK is unique in that three FBOs are located on the field.

Kansas Air Center, Inc. is the primary FBO and is located at the base of the ATCT. From a 3,200 square-foot facility shown in Figure 2-23, they provide executive air charter, flight support operations, aircraft management, flight instruction, aircraft rental, fuel, and pilot lounge services.

Figure 2-23: Kansas Air Center, Inc.

Heartland Aviation, located at the GA Apron, operates from the 1930s Stone Hangar. Heartland Aviation offers fuel, aircraft parking (ramp or tiedown), hangars, aircraft maintenance, and pilot lounge services.

The third FBO is General Aviation Training & Testing Service (GATTS). GATTS offers a variety of services including fuel, charter service, flight instruction, aircraft rental, and aircraft maintenance. GATTS is located in the former Terminal Building, directly east of Heartland Aviation.

HANGARS
The reclassification of Runway 13-31 analysis (alluded to in Chapter 1) will by its very nature involve a discussion of the existing hangars and other facilities in the GA Complex. As such, it is more appropriate to co-locate the crosswind runway upgrade discussion and the subsequent hangar impact discussion in the Airside Facility Requirements Chapter. A detailed summary of existing hangar tenants, capacities, and conditions are discussed in the Landside Facility Requirements chapter.

AIRPORT MAINTENANCE FACILITIES
Airport maintenance facilities include the five-bay Airport Vehicle Maintenance Building (Shop), the Snow Removal Equipment (SRE) Storage Building (former Armory Building[4]), and the newly constructed Material Storage Building. The west facade of the shop is shown in Figure 2-24.

4. The City purchased the Armory Building from the Army National Guard in 2005.

Figure 2-24: Airport Vehicle Maint. Building

In May 2008, renovation to the Armory Building were completed. The renovations allow MHK to store their fleet of SRE in the vehicle bay/room of the Armory. By replacing the existing 14-foot wide roll-up door with a larger 28-foot wide door, both the Oshkosh H and J series vehicles can be stored year-round, thereby protecting the City's investment. This work was completed through a grant (AIP-33) from the FAA.

As part of this project, a new 960 square foot, two-bay Material Storage Building was erected south of the existing Shop and will store FAA-grade aviation sand and pre-packaged dry deicing chemicals. The new building will protect the materials from the elements and keep them friable.

Lastly as part of AIP-33, the gravel area between the Armory Building and the Material Storage Facility was paved to accommodate the SRE traffic. The new pavement section consists of six inches of concrete placed on top of six inches of a mixture of asphalt millings and crushed limestone. The subgrade soil was compacted to a depth of six inches.

FUEL AND LIQUID DEICING STORAGE

South of the Vehicle Maintenance Building are the aircraft fuel storage facilities which consist of the several storage tanks as depicted in Figure 2-25. Two additional fuel tanks are located on the GA Apron adjacent to the Stone Hangar. The storage capacity, contents, and owner of each tank is summarized in Table 2-4 on the following page.

Figure 2-25: Fuel Storage Facilities

Aircraft deicing fluid (ethylene glycol) is stored in three City-owned tanks each capable of storing 1,500 gallons of liquid. All three tanks are located adjacent to the Fuel Farm. Kansas Air Center is responsible for deicing aircraft. In addition, the City owns a 5,150 gallon tank for storage of potassium acetate for deicing runway pavements.

ARFF BUILDING

The joint-use ARFF Building is located northeast of the Stone Hangar along South Airport Road. The building, site work, utilities, and the access road were constructed in 2000. The vehicle apparatus bay measures 3,592 square feet and the office support and living quarters areas total 1,486 square feet.

Access to the runways is provided via a taxilane (north of the Stone Hangar) to Taxiway E. The ARFF Building houses both ARFF trucks referenced in Section 2.5. The City of Manhattan responds to all ARFF calls at MHK. The City is assisted by MHK staff who are trained to operate the ARFF vehicles.

CORPORATE TECHNOLOGY PARK

The Manhattan Corporate Technology Park (TecPark) is a 190-acre business enterprise located directly west of MHK. Access to the TecPark is via Wildcat Creek Road from K-18. In 2007, the City made improvements to this intersection by adding turn and acceleration lanes to accommodate the increasing truck traffic and improve safety.

Current tenants of the park include: Alorica and ALLTEL (two customer call centers); KSU Printing Services; and Auth-Florence, a mailbox manufacturer; Flint Hills Beverage (See Figure 2-26); and Covan Moving & Storage.

A number of lots are available for purchase and all lots are fully served with all utilities and ready for immediate development. The Corporate Technology Park Master Plan and Comprehensive Plan Update document was completed in August 1998.

Table 2-4: Aboveground Fuel Storage			
Tank Location	Tank Capacity (gallons)	Contents	Owner
Fuel Farm	1,000	Diesel	City of Manhattan
Fuel Farm	500	Automobile gasoline (97 octane)	Kansas Air Center, Inc.
Fuel Farm	12,000	100LL AvGas	Kansas Air Center, Inc.
Fuel Farm	15,000	Jet A	Kansas Air Center, Inc.
Fuel Farm	15,000	Jet A	Kansas Air Center, Inc.
Fuel Farm	10,000	100LL AvGas	Heartland Aviation Inc.
GA Apron	3,000	100LL AvGas	Heartland Aviation Inc.
GA Apron	3,000	MOGAS (91 Octane)	Heartland Aviation Inc.
Total Capacity	59,500		

Figure 2-26: Flint Hills Beverage

WILDLIFE FENCE

Although security fencing does not exist around the entire Airport, chain-link fencing does exist in certain areas for crop restriction and wildlife control. Wildlife fence is in place beginning near the Approach End of Runway 3, extending along MHK's west property limit, and terminating near the Approach End of Runway 13. The northern 5,090 feet of this wildlife fence was recently constructed in 2006 under AIP-28 and extended the existing wildlife fence from the southeast corner of the TecPark to the Approach End of Runway 13.

The additional wildlife fence has been effective in preventing deer, elk, and other fauna from entering the airfield as MHK has seen a decrease in deer and elk sitings on the aircraft operations area. Unfortunately, wildlife appears to be adapting to the fence configuration as evidenced by animal tracks.

The wildlife fence project represents Phase 1 of a two-phase wildlife fence installation program. Phase 2 will continue the wildlife fence clockwise around MHK from the Approach End of Runway 13, through the GA complex, along K-18, and ending at the Approach End of Runway 3.

2.17 LAND USE AND PROPERTY

Situated on approximately 710 acres of City-owned property, MHK is surrounded by property comprised of a combination of land uses.

According to the Riley County Community Geographic Information System (GIS) website, the land north and south of MHK, is mainly used for agricultural purposes. However, small low- to medium- density residential areas are interspersed to the northeast and east of MHK. Northeast of the Approach End of Runway 21 are several homes and a few of which are located within the Runway 21 RPZ.

A larger pocket of residential land use exists southwest of MHK and is known as Random Woods. This area is located south of 24th Street and east of 68th Avenue. In addition, approximately one mile southwest of MHK and under the approach path to Runway 21, lays the City of Ogden. Ogden consists mainly of residential land use (both low- to medium-

density and high density) with a population of approximately 1,130 residents.

Commercial and industrial land use dominates to the east of Airport along Highway K-18. Along the west side of MHK, there is another small residential area consisting of five homes, along with the Corporate Technology Park and vacant land. Fort Riley is also located adjacent to the west side of MHK. Construction of a Veterans Cemetery is underway on Fort Riley property, due west of the Runway 3 End.

Although several residential areas exist around MHK, the Manhattan Urban Area Comprehensive Plan adopted by the City and County in 2003 advocates a policy of no further residential development in Eureka Valley. In addition, the Joint Land Use Plan (JLUS), which is centered around Fort Riley, addresses incompatible land uses by recommending that there generally be no urban-density residential development west of Scenic Drive. The City of Ogden is located beyond the Urban Area Comprehensive Plan area and is developing new residential areas along the east side of K-18.

Simultaneous with the Master Plan Update project, the City is conducting a Part 150 Airport Noise Compatibility Study (under AIP-32). Through an exhaustive land use investigation the Noise Study will:

- Examine corrective strategies to resolve existing land use non-compatibility,
- Identify and evaluate compatible land use alternatives, and
- Examine preventive strategies to discourage future land use Incompatibilities.

The Airport Master Plan Update will incorporate key elements of the land use and property analysis and recommendations from the Noise Study.

2.18 UTILITIES

Utility service capacity is sufficient to meet all current and anticipated future demands for MHK. Some highlights include the following:

- MHK is connected to the City of Manhattan's public water system. The system supplies sufficient pressure and quantity of water to meet the needs of MHK.
- The Airport's electrical system is not on a dual path system. A dual path system would automatically re-route power in the event an electric supply failure from one area occurred and thereby keep MHK operational.
- MHK maintains a Caterpiller™ emergency backup diesel generator located at the base of the ATCT to power the runway and taxiway lighting system in the event of an area wide power outage. The generator was acquired in 1998 by the City as part of its Y2K program. Under AIP-26 the generator was relocated from the now-abandoned vault building.
- Airport staff maintain back up cellular phones on contract from ALLTEL for use during a power outage or in the field.

2.19 ENVIRONMENTAL OVERVIEW

As mentioned previously in Section 2.16, the City recently completed an Airport Environmental Assessment (EA) to determine the potential environmental impacts from several proposed projects. Through the EA, it was determined these projects would not significantly affect the quality of the human environment and on March 1, 2007 the FAA issued a Finding of No Significant Impact (FONSI). Given the recent data and level of detail, the EA will be referenced heavily during this Airport Master Plan Update.

As part of the EA planning effort, several coordination letters were sent to various Federal and State environmental agencies requesting review and comment of the then-proposed Airport development. No further environmental reviews are included in the scope of this Master Plan Update.

MHK has been concerned with drainage as portions of the property are prone to flooding. In general, storm water runoff from lands west of MHK travels through Airport property to the Kansas River to the east. A series of

open channels, concrete drainage pipe, and box culverts convey the storm water runoff beneath the runways and taxiways.

Individual airfield improvement projects should move to better the drainage situation as best they can. Based on the findings of the EA and the K-18 Realignment Study indicate, a detention basis on Ft. Riley property will help to mitigate the flooding of airport property during large storm events.

Chapter Three
FORECAST OF AVIATION DEMAND

This chapter of the Master Plan Update presents the forecast of aircraft operations and passenger enplanements at the MHK for commercial service, military, and general aviation activity.

Forecasts are the basis for determining facilities requirements to accommodate future aviation demand. The basic premise for developing aviation forecasts is that aviation activity correlates well to the socioeconomic characteristics of a community. This Airport Master Plan Update, however, will not be based on population and economic trends, but instead modify the forecast developed by the Environmental Assessment (EA) project. The FAA recently approved this forecast in June 2005.

The Master Plan Update forecast, once approved by the FAA, also will be used in the Part 150 Noise Study, which is progressing in parallel with the Master Plan Update. By using the EA forecast as the basis for the Master Plan Update and Part 150 Noise Study, several benefits result including continuity among all three planning efforts, shortened project schedules, and a simplified message sent to all users and the general public.

3.1. AVAILABLE DATA SOURCES

Several data sources were used to estimate current and future years of aviation activity. Professional judgment was used in selecting which relevant sources to use for the various data requirements of the forecast based on the data reported, its consistency, completeness, and other factors. The remainder of Section 2 provides a review of the following data sources:

- FAA Air Traffic Control Tower Counts
- Airport Landing Reports
- U.S. Department of Transportation T-100 Data
- FAA Terminal Area Forecasts
- Interviews
- EA Forecast

FAA AIR TRAFFIC CONTROL TOWER COUNTS

Since February 2002, the tower operates on a 14-hour schedule, staffed between 7:00 AM and 9:00 PM local time. Prior to this, the ATCT was staffed between 8:00 AM and 6:00 PM local time. Aircraft operations are logged by ATCT staff using the following categories:

- Air carrier (typically larger airline operations, both scheduled and non-scheduled),
- Air taxi/commuter (typically scheduled and unscheduled large turboprop and regional jet operations),
- General aviation, and
- Military.

Airport operations data (tower counts) covering the years 2004 to 2006 as well as the first nine months of 2007 were provided to HNTB for use in forecasting aviation activity.

The unreported "after-hours" traffic (9:00 PM to 7:00 AM) is important to this Master Plan Update in order to estimate the total number of aircraft operations. It is also important to the Part 150 Noise Study because the FAA's Integrated Noise Model (INM) program used to generate noise contours assigns a 10-decibel penalty to aircraft operations conducted between 10:00 PM and 7:00 AM. It was therefore necessary to account for these after-hour operations, as described in the subsequent sections of this chapter.

AIRPORT LANDING REPORTS

MHK collects landing fees from scheduled and non-scheduled air carrier landings. Monthly landing reports summarizing the number of landings by aircraft type were used to estimate total commercial operations. Monthly landing

reports for 2006 and the first nine months of 2007 were provided to HNTB.

U.S. DEPARTMENT OF TRANSPORTATION T-100 DATA

The U.S. Department of Transportation (DOT) publishes a T-100 database listing scheduled and non-scheduled commercial flights, passengers, and cargo by carrier and aircraft type. For this Master Plan Update, T-100 data were available for all of 2006 and the first six months of 2007.

This database was also used to estimate total commercial operations and to calculate a "completion factor" for scheduled operations. For the period covering October 2006 to July 2007, the completion factor for scheduled commercial flights is 96.5 percent.

Non-scheduled operations are frequently underreported in the T-100 database; therefore, it was necessary to compare the data from this source to other counts.

FEDERAL AVIATION ADMINISTRATION TERMINAL AREA FORECASTS (TAF)

The FAA annually publishes the TAF for airports in the U.S. system. The aircraft operations forecast is based on historical tower counts (when available) or traffic estimates listed in airport 5010 forms. Since the MHK tower is not a 24-hour facility, its TAF undercounts historical aircraft operations and therefore identifies activity forecasts that which are lower than actual activity. Therefore, TAF forecasts also underestimate future aircraft operations activity.

INTERVIEWS

To validate forecast assumptions, Interviews were conducted with representatives from Airport management, Ft. Riley, and the Kansas Air Center. Phone interviews were conduced with Kansas State University's (KSU) Athletics Department staff, a major factor in non-scheduled air carrier activity.

EA FORECAST

As mentioned in the Introduction, this forecast for this Master Plan Update is based in part on the FAA-approved forecast found in the recently completed EA. To estimate the number of total aircraft operations conducted outside the ATCT's normal hours of operations, an extensive process was undertaken during the EA project. The Master Plan Update has updated the after-hours percentages, as appropriate, for commercial, military, and general aviation activity. The derivations of the updated percentages from those used in the 2005 forecast are discussed in subsequent sections of this chapter.

3.2. SELECTION OF THE BASE YEAR TIME PERIOD

The twelve-month period covering October 2006 to September 2007 will serve as the reference year, or Base Year, for the forecasts as it is the most current time period of which actual data was available. Coincidentally, this is the same period (Federal fiscal year) used by the FAA in developing the Terminal Area Forecast (TAF) for airports in the U.S. system. By using this timeframe, a more direct comparison with the TAF can be completed, resulting in a more representative time frame for the Part 150 Study.

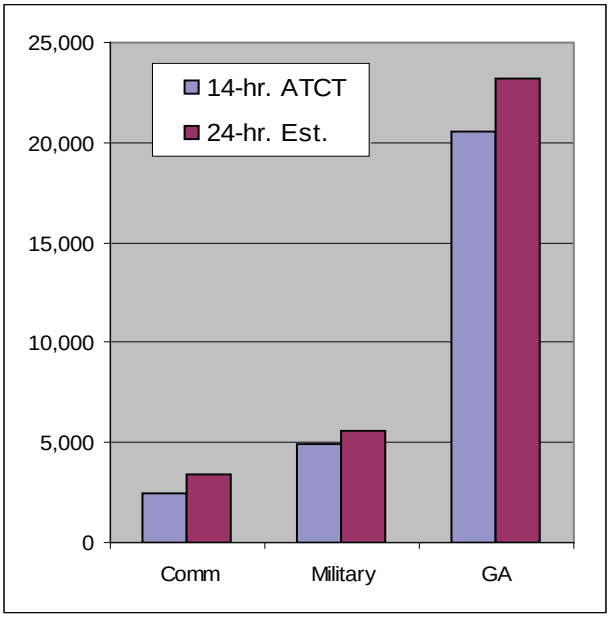
Table 3-1: Estimated Total Aircraft Operations in Base Year								
	Commercial (b)		General Aviation		Military		Total	
Time Period	Ops.	Pct.	Ops.	Pct.	Ops.	Pct.	Ops.	Pct.
0700-2059 (c)	2,488	73%	20,555	87%	4,943	87%	27,986	87%
2100-0659 Est.	918	27%	2,673	13% (d)	643	13% (d)	4,234	13%
Total Estimated	3,406		23,228		5,586		32,220	

a. Base year is 12-month period from October 1, 2006 to September 30, 2007.
b. Scheduled plus non-scheduled air carrier and air taxi operations.
c. Recorded by ATCT during normal operating hours (0700-2059).
d. After-hours percentage retained from EA Forecast.

3.3. ESTIMATES OF BASE YEAR AIRCRAFT OPERATIONS

The first step in preparing the activity forecasts for the Master Plan Update was to estimate actual activity levels for the Base Year. Table 3-1 above summarizes the estimated commercial, general aviation, and military aircraft operations conducted over the Base Year. Figure 3-1 compares actual 14-hour tower counts to 24-hour estimated counts for the Base Year. Sections 4.1 through 4.4 describe the process of how total activity was estimated for the Base Year.

Figure 3-1: Comparison of ATCT and Estimated Traffic Counts



3.3.1. SCHEDULED COMMERCIAL AIRLINE OPERATIONS

U.S. DOT T-100 data were used to obtain the number of scheduled commercial flights at MHK in the Base Year with the exception of August and September 2007. Since T-100 data were not available for these two months at the time of this writing, the Air Midwest schedule was used to estimate the number of scheduled commercial flights for August and September.

It is important to note that in July 2007, Air Midwest changed its flight schedule contract to provide 18 weekly flights between MHK and Kansas City International (MCI). Prior to this, Air Midwest provided 18 weekly round trips between MHK, MCI, and Salina Municipal (SLN), i.e., arrivals via Salina (SLN-MHK-MCI) with departures to MCI (MHK-MCI). In conclusion, with a completion factor of 96.5 percent, the total estimated number of scheduled commercial operations was 3,060 (an average of between eight and nine operations per day).

3.3.2. NON-SCHEDULED COMMERCIAL AIRLINE OPERATIONS

To estimate total charter operations for the Base Year, data was obtained from Ft. Riley and KSU. The data indicates 238 and 108 charter operations were conducted for Ft. Riley and KSU, respectively. The estimated 346 annual non-scheduled operations are equivalent to a weekly average of between six and seven operations.

From discussions with KSU Athletic Department staff, the sports team schedules have not changed appreciably since 2004. As such the 108 annual charter operations from the EA remains an accurate count.

To confirm these charter operations, other data were examined. The Airport Landing Reports from October 2006 to September 2007 suggest charter flights totaled 202 operations (including ferry flights to reposition aircraft). This is significantly less than the 346 charter operations conducted by Ft. Riley and KSU. To obtain a better understanding of how the Airport Landing Reports are compiled, a discussion between HNTB and MHK ensued.

Airport Landing Reports are provided on a monthly basis to Airport Administration from the Kansas Air Center (KAC). KAC only tracks those landing fees associated with charter aircraft companies to whom they have dealings with. The difference between the 346 and 202 charter operations is 72 arrivals.

By comparison, the T-100 database reported 96 operations from October 2006 to June 2007 (T-100 data for July, August, and September were not available). This is less than one-third of the operations reported by Ft. Riley and KSU. Based on experience at other airports, non-scheduled activity is sometimes underreported in the T-100 database especially for smaller carriers. This underreporting is the case for MHK.

Tower Count data reveals 2,488 operations were conducted by scheduled and non-scheduled aircraft operations during ATCT hours. Comparing this against the estimated 3,060 scheduled and 346 non-scheduled aircraft operations, approximately 27 percent of operations are conducted after-hours. This percentage is higher than the 24.7 percent estimated in the EA forecast.

3.3.3. GENERAL AVIATION OPERATIONS

An estimate of total annual GA traffic was derived by taking the 14-hour counts produced by the ATCT and adding estimates of after-hour (i.e., between 2100 and 0700) GA activity. Per the EA Forecast, the percentage of GA operations conducted after-hours is 13 percent. The total number of GA operations for the Base Year is estimated at 23,228 (or between 63 and 64 daily operations) and is represents approximately 72 percent of total operations conducted at MHK.

Total GA operations are comprised of what are called local and itinerant operations. Local operations are performed by aircraft that take off and land at the same airport and operate within the local airspace. For MHK, local operations are predominantly performed by single engine piston aircraft. Itinerant operations are those in which aircraft land or take off at one airport and have a terminus of flight at another airport.

According to Tower Count data for the Base Year, approximately 46 percent of GA operations are local with the remaining 54 percent classified as itinerant operations. As discussed later in Section 5.3.1, this local/itinerant split changes over the forecast period.

3.3.4. MILITARY OPERATIONS

Twenty-four-hour totals of military traffic were derived by summing the 14-hour counts from the ATCT and estimates of after-hour activity. The after-hour military operations were estimated using the EA Forecast's after-hours value of 13 percent. This percentage was confirmed by Ft. Riley for use in this Master Plan Update.

The total number of annual military operations was estimated at 5,586 which is an average of 15 operations per day. It should be noted that compared to FY2006, military operations have increased nearly 300 percent although they are expected to return to FY2006 levels over the next several years.

Similar to GA, military operations are also comprised of itinerant and local activity. Give the highly variable nature of military operations, relatively constant itinerant

and local operations over time is not likely. Consider the following data in Table 3-2.

Table 3-2: Historic Local and Itinerant Military Operations

Period	Percent Local Operations	Percent Itinerant Operations
2007 (Jan. to July)	76%	24%
2006	60%	40%
2005	33%	67%
2004	20%	80%

It is clear from this data that since 2004, local military operations have comprised more and more of the total military operations. However, it is expected in the near future that local and itinerant percentages will return to pre-2006 levels.

As discussed later in Section 5.2.1, a project mission change could occur in approximately 2017. At that time, Fort Riley's Aerial Port of Embarkment (APOE) could be relocated from Topeka Forbes Field (FOE) to MHK.

In light of this, the forecast assumes that military operations will be split 33 percent local and 67 percent itinerant until the year 2017. At that time, MHK will become Ft. Riley's APOE and the percentages will reverse with local operations representing 70 percent of total operations and itinerant set at 30 percent.

3.3.5. TOTAL AIRCRAFT OPERATIONS

Based on the above analysis and updated assumptions from the 2005 EA forecast, the total number of operations conducted at MHK in the Base Year was approximately 32,220. This is approximately 13 percent more than recorded by the tower during their 14-hour operational day.

3.4. FORECAST OF AIRCRAFT OPERATIONS

This section presents the detail assumptions, methodology, and results of the Master Plan Update operations forecast. Depending on the aviation segment being discussed, the forecasts reflect varying degrees of national trends (including FAA's national forecasts), local conditions (including FAA's TAF for MHK), discussions with airport and user representatives, and professional judgment. Forecasts were prepared for calendar years 2012, 2017, 2022, and 2027.

The forecast of aircraft operations is broken down into four activity types: scheduled airline, non-scheduled airline, military, and general aviation. For each activity type, the parameters forecasted include annual aircraft operations, the time of day these aircraft fly, the distance flown (stage length), and the number and type of based aircraft (for GA only).

3.4.1. SCHEDULED AIRLINE ACTIVITY FORECAST

This section outlines the assumptions and forecasts of scheduled airline operations at MHK.

3.4.1.1. SCHEDULED AIRLINE OPERATIONS

MHK is currently designated as an Essential Air Service (EAS) community. The EAS program is designed to ensure that small communities retain their link to the national air transportation system, with federal assistance if necessary.

At the end of February 2008, the current EAS contract held by Air Midwest will expire. In anticipation of this event, the U.S. DOT has issued a Request for Proposals to the airline industry. In response, the City of Manhattan has received two proposals, one from Air Midwest and another from Great Lakes Aviation. The actual flight schedule has yet to be determined as the City has just begun reviewing the two proposals.

At this time, two scenarios of scheduled airline service are before the City. The first scenario would be to continue the EAS contract with weekly flights to MCI and possibly another hub market. Air Midwest's fleet is comprised exclusively of Beech 1900 aircraft. Great Lakes Aviation operates the Beech 1900 as well as the 30-seat Embraer EMB-120 turboprop. These two aircraft are depicted in Figures 3-2 and 3-3.

Figure 3-2: Beech 1900

Figure 3-3: Embraer EMB-120

Depending upon which air carrier is selected, the type of aircraft could change during the forecast period. As such, this "turboprop" scenario includes two separate options:

- Maintaining the Beech 1900 aircraft through the forecast period but with increased frequency of flights and service to two markets; or
- Initial use of Beech 1900 aircraft with a change in gauge to the larger EMB-120 within ten years followed by an increase in operational frequency. This option also assumes service to a second market other than MCI.

Regardless of the actual type of aircraft use, the turboprop scenario effectively maintains the EAS status quo for the community. The turboprop scenario with Beech 1900 aircraft would have no significant impact on the Terminal Building or apron. With an upgrade to the 30-seat EMB-120, however, the security hold room and passenger baggage throughput would need to be expanded.

An alternative to the turboprop scenario, however, such as the use of a regional jet, would have a very different impact to MHK and the community.

According to the results of the Passenger Demand Analysis prepared for the City of Manhattan by Mead and Hunt earlier in 2007, there is real potential for MHK to graduate from the EAS program and be served by an airline not subsidized by the U.S. DOT. In this "regional jet" scenario, MHK would be served by a 50-seat regional jet. Table 3-3 lists possible regional jet aircraft types that could be used. Figure 3-4 depicts an EMB-145.

Figure 3-4: Embraer EMB-145

To be profitable, the regional jet airline likely would provide service to an airport other than MCI. The most probable hub airports identified by the air service study are Denver International (DEN), Chicago O'Hare (ORD), or Dallas Fort-Worth International (DFW). Hub airports such as these three could provide the traffic necessary to sustain regional jet service to MHK.

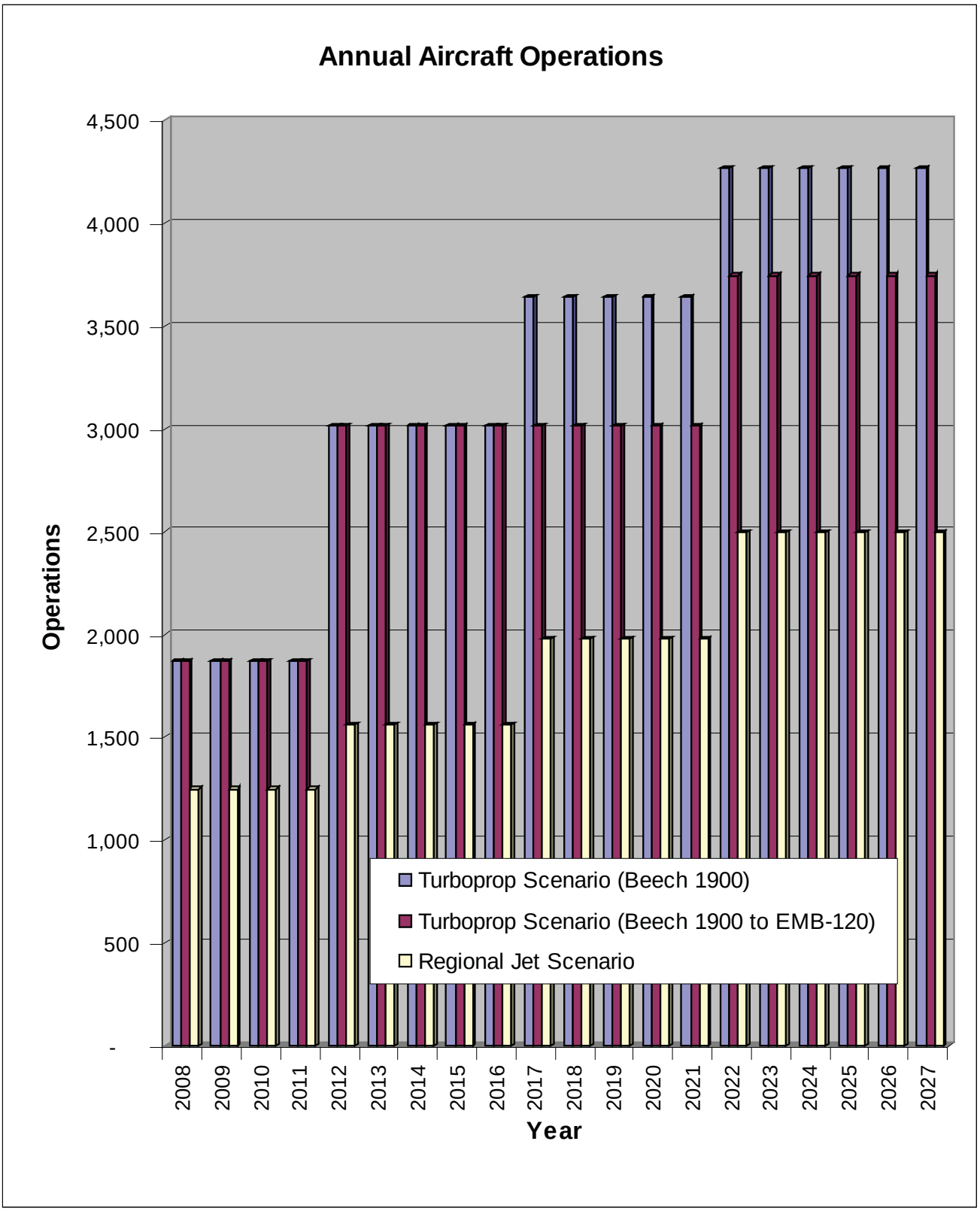
Table 3-3: Types of Regional Jet Aircraft				
Aircraft	No. of Seats	Maximum Takeoff Weight (pounds)	Length	Wingspan
Embraer 140	44	46,517	93 feet, 5 inches	65 feet, 9 inches
Embraer 145	50	45,415	98 feet, 0 inches	65 feet, 9 inches
Bombardier CRJ 600	50	51,000	87 feet, 10 inches	69 feet, 7 inches
Bombardier CRJ 700	70	78,153	106 feet, 8 inches	76 feet, 3 inches

The potential demand to support regional jet service is documented within the air service study. Factors such as a large underserved service area and the existence of two major institutions in the community were taken into account. It takes a conservative approach in that it does not overlap the service area for Wichita Intercontinental Airport.

On the other hand, there are factors relative to Fort Riley that may give further justification for enplanement scenarios that result in even greater enplanement levels. The recent mandate by Congress in accordance with the Base Realignment and Closure (BRAC) program will result in a significant increase in troop movements to and from Fort Riley. From interviews with Fort Riley officials, there may be an additional brigade assigned to Fort Riley in addition to the potential that Fort Riley serves as a training base for other army bases around the country, for example, Fort Sill, Oklahoma and Fort Knox, Kentucky. In this eventuality, there will be more troops flying to and from MHK via commercial service aircraft as well as the potential for additional non-scheduled charters by Civilian Reserve Aircraft Fleet (CRAF) aircraft. While these events are not incorporated into the forecasts per se, their potential does give credence to the increasing enplanement forecasts.

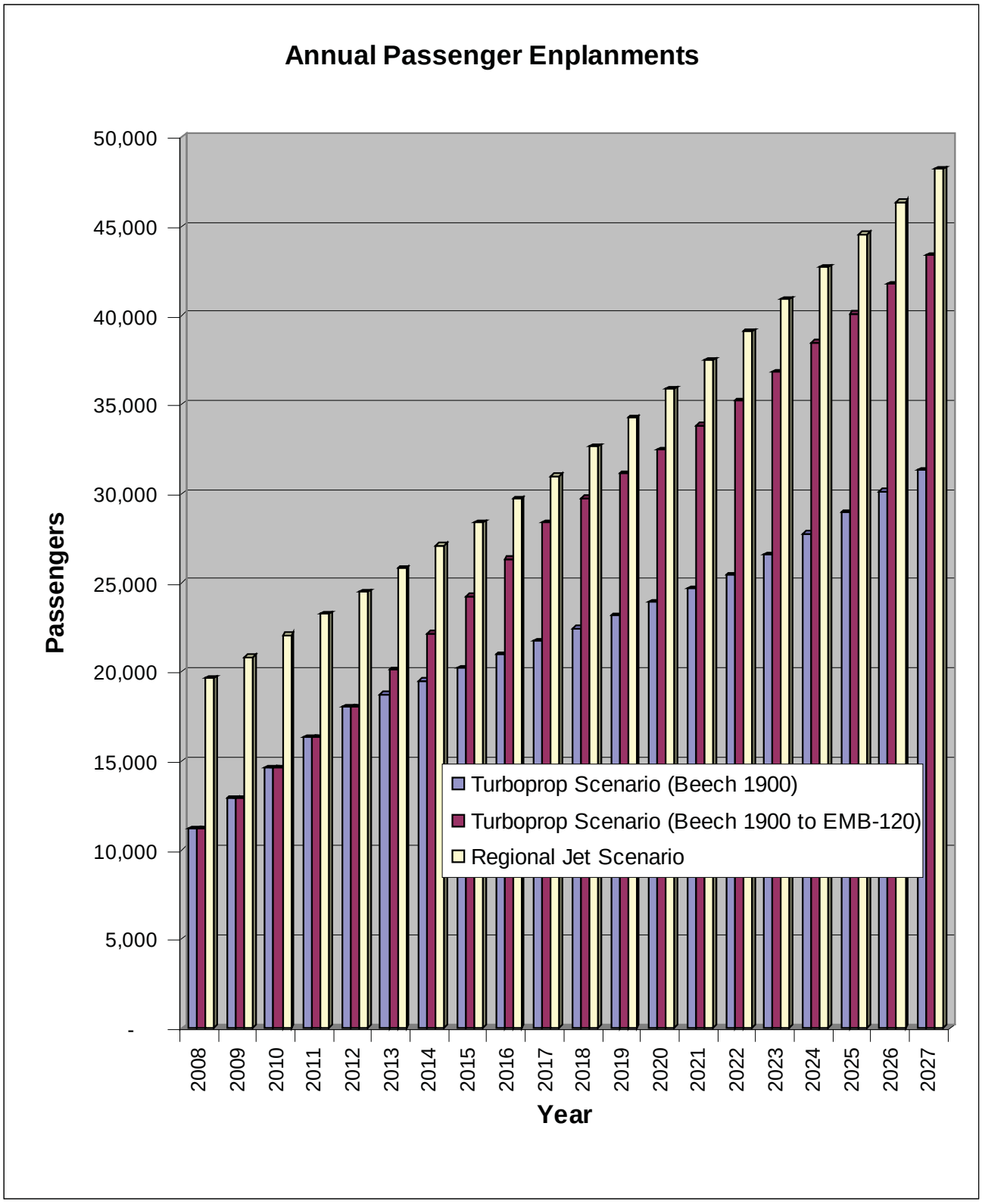
Figures 3-5 and 3-6 depict the annual aircraft operations and passenger enplanements, respectively, for the turboprop (both aircraft type options) and the regional jet scenario.

Figure 3-5: Forecast of Scheduled Airline Operations



Background calculations supporting operations changes depicted in Figure 3-5 are included in Appendix B.

Figure 3-6: Forecast of Scheduled Passenger Enplanements



For each of the above three passenger enplanement scenarios, the passenger load factor at the start of the Base Year is 65 percent. It is assumed that the load factor would reach 85 percent in the fifth year. With a load factor of 85 percent, the airline would most likely increase seat capacity by adding additional flights. This would result in the load factor returning to a level near 65 percent. This step pattern would be repeated for each subsequent five year period remaining. Again, background calculations supporting the forecast passenger enplanement numbers are included in Appendix B.

3.4.1.2. SCHEDULED AIRLINE FLEET MIX

The recommended forecast for the MHK master plan is the mid-range forecast assuming the turboprop scenario with the transition from Beech 1900 to the EMB-120. In this scenario, the current schedule of 18 weekly departures would be maintained for the next five years. In the year 2012, this would increase to 29 departures per week and assume initiation of service to a second market. This schedule would be maintained for a minimum of five years.

In the year 2017, the schedule would remain the same but the aircraft type would change from the Beech 1900 to the EMB-120. In the year 2022, the schedule would be adjusted to 36 weekly departures of the EMB-120 and would remain as such for the remainder of the forecast period.

3.4.1.3. SCHEDULED AIRLINE TIME OF DAY

The FAA's integrated Noise Model (INM) requires a "day/night split" for arrivals and departures. Daytime operations are those defined as operating between 7:00 AM and 9:59 PM. Nighttime operations are those operating between 10:00 PM and 6:59 AM.

Based on the most recent schedules published by Air Midwest, there are, on average, about 12 weekly operations occurring during nighttime hours. This represents one-third of the total weekly operations. It is assumed that the percent nighttime scheduled airline operations will stay constant through the forecast period.

3.4.1.4. SCHEDULED AIRLINE STAGE LENGTH

In general, the longer the flight segment, the heavier the aircraft's takeoff weight, since more fuel is required to reach its destination. This increased weight affects aircraft performance and therefore its noise level. For this reason, the INM requires departing flights to be forecast by "stage length", i.e., the distance the flight is traveling, and if a flight will be making multiple stops, only the first leg is considered. The following stage lengths, illustrated in Figure 3-7, are used by INM:

- 0 to 499 nautical miles (Stage Length 1),
- 500 to 999 nautical miles (Stage Length 2),
- 1,000 to 1,499 nautical miles (Stage Length 3),
- 1,500 to 2,499 nautical miles (Stage Length 4),
- 2,500 to 3,499 nautical miles (Stage Length 5),
- 3,500 to 4,499 nautical miles (Stage Length 6), and
- 4,500 nautical miles or more (Stage Length 7).

As of July 2007, scheduled airline service is provided to a single market (MCI). This market is within Stage Length 1—the distance between MHK and MCI is 91 nautical miles. Given the range of the Beech 1900 and EMB-120 aircraft, it is assumed that any new market also will be within Stage Length 1.

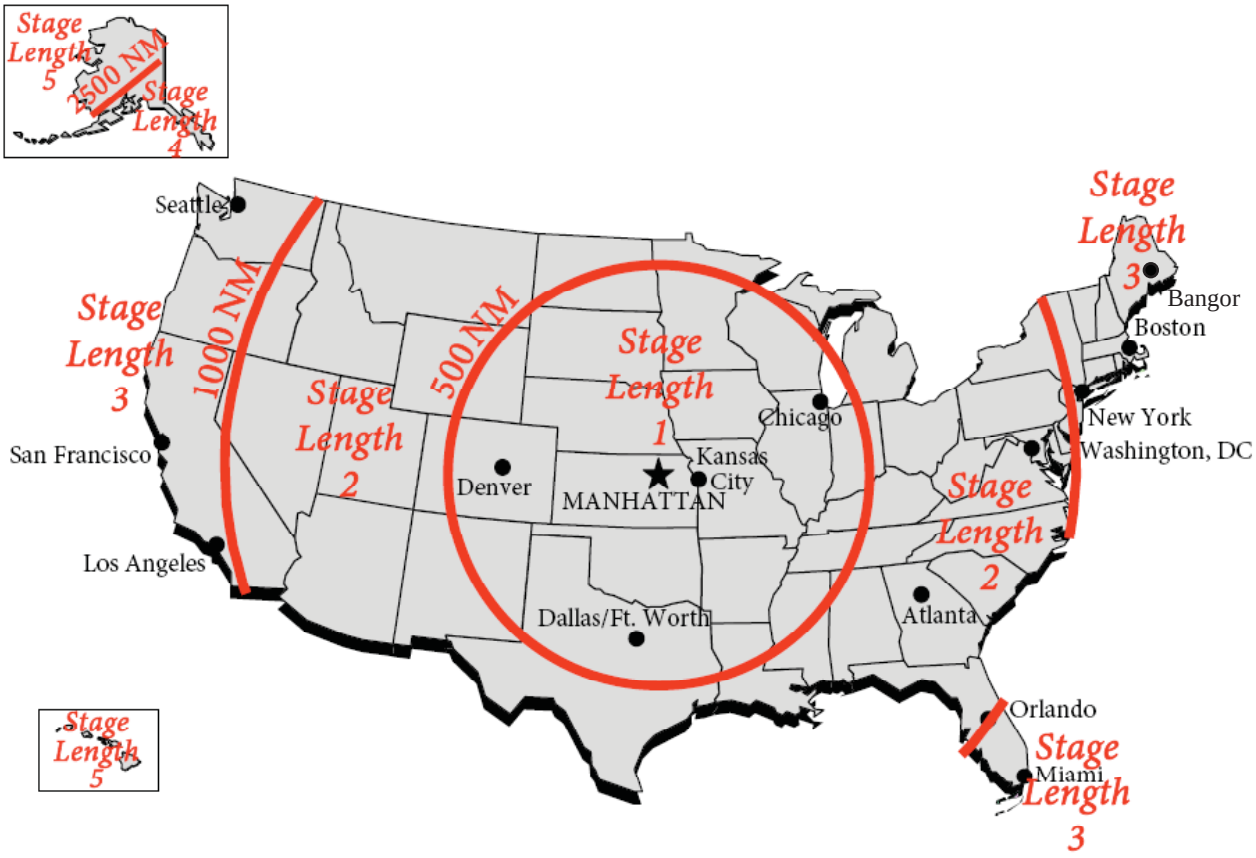
3.4.2. NON-SCHEDULED AIRLINE (CHARTER) ACTIVITY FORECAST

By their very nature, charter flights are difficult to forecast. The two primary generators of non-scheduled activity at MHK are charters related to various KSU sports programs and those related to Ft. Riley personnel transport.

3.4.2.1. CHARTER OPERATIONS

As discussed previously, an estimated 108 charter operations were flown in association

Figure 3-7: Stage Length



with Kansas State athletics during the Base Year. According to discussions with KSU Athletic Department staff, it is not anticipated that Kansas State athletic activity will increase during the forecast horizon; therefore, the number of operations associated with the Kansas State sports program activity was kept constant through 2027.

The troop transport operations conducted by Ft. Riley are primarily to transfer military personnel between the fort and the National Training Center (NTC) at Ft. Irwin in California or the Joint Readiness Training Center (JRTC) at Ft. Polk in Louisiana. The requirement to position aircraft (i.e., ferrying empty aircraft) for the charter flights generated additional charter-related operations. In addition, there are ongoing troop movements to the theater of war in Iraq that carry troops from Manhattan to either Dover, Delaware or Bangor, Maine. Many of these troops are destined to Germany for further deployment.

According to the July 2007 edition of the Big Red One & Ft. Riley Community Update publication, the population of Ft. Riley was slightly more than 56,000. By FY2011, the population is anticipated to reach 74,000 which would represent a 32 percent increase. As a result of the programmed population increase, it was estimated that the number of troop rotations related to training would increase and increased charter activity will result from direct deployment flights. It was also assumed that miscellaneous troop transport would also increase over the forecast horizon.

At present, FOE in Topeka serves as Ft. Riley's APOE. An APOE is an air terminal at which troops, units, military-sponsored personnel, unit equipment and material board are loaded. Should the following infrastructure projects be completed at MHK, Ft. Riley's APOE may shift:

- Widen taxiways associated with Runway 3-21, construct Hot Cargo Pad, and access road to cargo pad. Although the 50-foot wide taxiway system at MHK is

designed for Group III size aircraft, larger Group IV aircraft such as the C-130, C-17, and B757-200 do operate at MHK within acceptable safety limits. The taxiway system would need to be widened to accommodate the C-5 and B757-300 aircraft. These two aircraft must operate out of FOE. Based upon discussions with Fort Riley personnel, if this facility existed today, the potential exists for CRAF aircraft (B757-300 and similar narrow body aircraft) to increase by as much as 50 to 100 percent immediately.

- Extend Runway 3-21.
- Expand Deployment Ramp (south towards Approach End of Runway 3)

These three projects have been programmed into Ft. Riley's capital improvements budget with funding available no earlier than FY2015.

In discussions with Ft. Riley regarding the programmed population increase, the recently completed Deployment Ramp, and other projects underway at MHK, the potential for MHK to serve as Ft. Riley's APOE is very good although would not be feasible within the next five to ten years. It takes a number of years for the Department of Defense to build multi-year projects into their capital improvements program and that program has been identified through 2016. Given the ongoing communication between the City of Manhattan and Fort Riley, there is recognition that the City of Manhattan will make it a primary goal to become Fort Riley's APOE. Consequently, the earliest that MHK could serve as Fort Riley's APOE is 2017 which is a main tenant of this Master Plan Update.

Total charter operations associated with Ft. Riley are forecast to increase from 238 operations in the Base Year to 892 operations in the year 2017 (and remain at that level) to reflect MHK's designation as the APOE for Ft. Riley. This increase in operations was provided by Ft. Riley.

The charter companies hired by KSU typically use narrow body aircraft and regional jets Of the 108 total charter operations, it is estimated that 88 operations are conducted by aircraft with 60 seats or less.

3.4.2.2. CHARTER FLEET MIX

Table 3-4 on the following page details the forecast of charter operations associated with Ft. Riley and KSU over the forecast period.

3.4.2.3. CHARTER TIME OF DAY

Based on discussions with Ft. Riley, many troop transport charters occur during nighttime hours (up to 40 percent). Applying this percentage as derived under the EA forecast, nighttime charter operations account for 27.5 percent of overall charter activity in the Base Year and will be increased to 35.7 percent by 2027.

3.4.2.4. CHARTER STAGE LENGTH

Per U.S. DOT T-100 data, some of the destinations flown by Ft. Riley during the Base Year are listed in Table 3-5 on the following page. From this data half of the destinations are within 500 nautical miles, nearly 38 percent are between 500 and 999 nautical miles, and the remaining 13 percent were located more than 1,000 nautical miles from MHK. By the end of the forecast period, the following distances would be flown by charter aircraft:

Nautical miles of MHK	Percent
Within 500	20
500 to 999	29
1,000 to 1,499	28
1,500 to 2,499	18
2,500 to 3,499	< 5
3,500 to 4,499	< 1
More than 4,500	< 1
Total	100

Table 3-4: Charter Operations by Aircraft Type					
Aircraft Type	Base Year	2012	2017	2022	2027
Associated with Ft Riley					
DC-9-15	25	25	0	0	0
B727-200	14	14	0	0	0
B737-200	2	2	0	0	0
B737-300	15	15	0	0	0
B737-700	34	34	136	136	136
B737-800	68	68	240	240	240
A319	8	8	0	0	0
A320	10	10	0	0	0
B757-200	13	13	252	252	252
B757-300	0	0	184	184	184
ERJ-145	24	24	24	24	24
FD-328	8	8	8	8	8
CRJ-200	10	10	10	10	10
EMB-120	6	6	6	6	6
B767	0	0	8	8	8
MD-11	1	1	24	24	24
Subtotal	238	238	892	892	892
Associated with KSU					
B737-300	10	10	10	10	10
A319	5	5	5	5	5
A320	5	5	5	5	5
EMB-145	48	48	48	48	48
CRJ-200	40	40	40	40	40
Subtotal	108	108	108	108	108
Total Charter	346	346	1,000	1,000	1,000

Table 3-5: Typical Charter Destinations for Ft. Riley		
Airport Code	City, State	Distance from MHK (nautical miles)
LNK	Lincoln, NE	118
OFF	Omaha, NE	142
SWO	Stillwater, OK	207
DSM	Des Moines, IA	229
COU	Columbia/Jefferson City, MO	241
OKC	Oklahoma City, OK	264
DEN	Denver, CO	430
COS	Colorado Springs, CO	433
CMI	Champaign/Urbana, IL	452
LBB	Lubbock, TX	474
LAR	Laramie, WY	499
ACT	Waco, TX	520
MKE	Milwaukee, WI	528
FAR	Fargo, ND	537
CLL	College Station/Bryan, TX	590
AUS	Austin, TX	619
IAH	Houston, TX	636
LUK	Cincinnati, OH	658
HOU	Houston, TX	659
EFD	Houston, TX	663
TUS	Tucson, AZ	936
TTN	Trenton, NJ	1,164
VCV	Victorville, CA	1,187
PSM	Portsmouth, NH	1,370

3.4.3 GENERAL AVIATION ACTIVITY FORECAST

The following four subsections forecast the activity levels for General Aviation (GA) aircraft.

3.4.3.1. GA OPERATIONS

Airport management and airport users agree that GA activity will increase over the next several years, confirming the expected growth in this segment shown in the FAA's TAF for MHK. The TAF shows itinerant GA activity increasing by 1.57 percent annually through the year 2025. Similarly, local GA activity is projected to grow at 0.79 percent. Using the TAF growth rates for the Master Plan Update, GA operations are forecasted to increase from 23,228 in the Base Year to 29,500 in 2027. This represents an average annual growth rate of 1.23 percent for total GA operations.

Because there are different growth rates for local and itinerant aircraft operations, local operations will decrease from 46 to 42 percent over the forecast period. Itinerant operations, therefore, will increase from 54 to 58 percent of total operations, consistent with a greater integration of the Flint Hills Region into the regional and national economic base.

3.4.3.2. GA BASED AIRCRAFT

The current based aircraft fleet at MHK is composed of the following 43 airplanes:

- 31 single-engine piston aircraft (representing 72 percent of the total based aircraft)
- 9 multi-engine piston (21 percent)
- 2 multi-engine turboprop (5 percent), and
- 1 jet (2 percent). This is the first jet aircraft to be based at MHK and arrived after the EA forecast was complete.

Although there are no helicopters currently based at MHK, there are operations of these types of aircraft.

Airport management and airport users agree that turboprop and business jets will comprise an increasing share of GA activity at MHK, reflecting the overall trend shown in FAA's national forecast for hours flown by these types of aircraft. To forecast the specific types of based aircraft, the current fleet mix was trended towards the FAA's national fleet mix. Table 3-6 summarizes the forecast of based aircraft.

Turboprop aircraft will increase significantly as aircraft owners look towards better performing aircraft with exceptional fuel efficiency. The number of aircraft will increase from 2 to 8 over the forecast period. Although the FAA's national forecast shows turboprop aircraft growing at a slower rate than jets, discussions with the Kansas Air Center (FBO), reflects the opposite trend at MHK.

Table 3-6: Forecast of Based Aircraft

Aircraft Type	Base Year	2012	2017	2022	2027
Single Engine Piston	31	31	32	32	33
Multi Engine Piston	9	9	9	9	9
Turboprop	2	4	5	7	8
Jet	1	1	2	2	3
Helicopter	0	0	1	1	2
Total	43	45	49	51	55

A comparison of operations (and more specifically local operations) per the number of based aircraft is a metric used to gage the reasonableness of the numbers. The baseline activity of 10,685 operations indicates that there are approximately 250 local operations per based aircraft. For the year 2027, there will be approximately 230 local operations per based aircraft. Considering airports of similar size with similar activities to Manhattan across the State and the U.S., 230 operations per based aircraft is a reasonable number.

3.4.3.3. GA TIME OF DAY

As shown in Table 3-1, it was estimated that about 13 percent of GA operations occur during the non-operating hours of the ATCT. Historic data obtained during the EA reveals many of these flights occur between 9:00 PM and 9:59 PM. It is therefore assumed about 20 percent of the after-hours operations occurred in this hour and the rest during the period defined as night for INM (i.e., between 10:00 and 6:59 AM).

3.4.3.4. GA STAGE LENGTH

Stage lengths for itinerant GA aircraft assumed for the EA forecast have been applied to the Master Plan Update. The assumptions are as follows:

- For itinerant single engine GA departures, 97 percent were assumed to travel within 499 NM of MHK (INM Stage Length 1), while three percent were assumed to travel between 500 NM and 999 NM.
- Ninety two percent of itinerant multi-engine GA departures were assumed to be destined for airports within 499 NM of MHK and eight percent between 500 NM and 999 NM.
- Itinerant turboprop GA aircraft were assigned a distribution of 87 percent within 499 NM of MHK and 13 percent between 500 and 999 NM of MHK.
- About 76 percent of GA jets were assumed to operate within 499 NM of MHK, 20 percent between 500 NM and 999 NM of MHK, and four percent between 1,000 NM and 1,499 NM of MHK.

Although these stage length assumptions were held constant for each aircraft category, the overall average stage length for the GA fleet will increase as turboprop and jets comprise a growing share of the fleet.

3.4.4 MILITARY ACTIVITY FORECAST

In general, the forecast for military aircraft was based on information provided by the Ft. Riley Transportation Officer, the Ft. Riley Aviation Division Chief, and professional judgment and was primarily driven by the anticipated increases in the various mission categories listed below. This section discusses military operations associated with the first seven categories.

At present, there are eight military-related aviation activities conducted at MHK:

1. transporting high-ranking officials to/from Ft. Riley,
2. air ambulance missions,
3. air-drop operations,
4. quick reaction force (QRF) activity,
5. division ready brigade,
6. helicopter activity,
7. miscellaneous military operations, (typically, practice activity and cross country flight refueling), and
8. charter civilian aircraft to transport military personnel to out-of-state training facilities and for direct deployment missions, which were described previously in Section 4.2.1, and are counted as commercial activity.

3.4.4.1. MILITARY OPERATIONS

Over the three calendar years of 2004 to 2006, military activity at MHK varied between approximately 1,500 and 2,000 annual operations, but in the Base Year, it is estimated that slightly more than 5,300 operations were conducted. Although the base year is considered to be an atypical year for MHK, Fort Riley officials do anticipate increasing activity based upon CRAF and other charter movements over the forecast period as well as a sizeable increase, particularly in fleet mix, once MHK becomes the APOE in 2017.

Therefore, the following military aircraft forecast for a civilian airport master plan is atypical. It is atypical in that it does forecast a change in annual activity by scenario pattern as opposed to the common practice of adopting the base year military forecast and holding it constant. In this case, the forecast was not developed by the City of Manhattan or its consultants but was provided by Fort Riley personnel. Table 3-7 below summarizes the military fleet mix.

Table 3-7: Forecast of Military Operations by Aircraft Type

Aircraft Type	Base Year	2012	2017	2022	2027
Cargo and Trainer (Fixed Wing)					
C-12	754	754	900	900	900
T-45	17	17	30	30	30
T-A4	17	17	30	30	30
UC-35A	151	151	200	200	200
C-21	17	17	20	20	20
C-37A	17	17	20	20	20
C-130	192	192	662	662	662
C-17	8	8	136	136	136
C-5	0	0	60	60	60
KC-10	0	0	6	6	6
A-10	25	25	34	34	34
Subtotal Fixed Wing	1,198	1,198	2,098	2,098	2,098
Helicopters					
UH-60	312	900	900	900	900
CH-47	117	3710	3710	3710	3710
AH-64	49	450	450	450	450
OH-58	0	540	540	540	540
Subtotal Helicopters	478	5,600	5,600	5,600	5,600
Total Military	**1,676**	**6,800**	**7,700**	**7,700**	**7,700**

3.4.4.2. MILITARY FLEET MIX

The following text summarizes the types of military aircraft that operate at MHK and what role they serve in carrying out various missions:

- The transport of military officials is primarily flown by C-12s (the military equivalent of the twin-engine turboprop King Air), UC-35As (the military equivalent to the Citation 560), C-21s (the military equivalent of the civilian Lear 35A), and the C-37A (the military equivalent to the Gulfstream G-V).
- In 2006, there were an estimated two C-130 flights (i.e., four operations) per week. The C-130 aircraft perform air drop operations, quick reaction force missions, and air ambulance operations. The Transportation Officer also indicated that C-17s would also be used for air ambulance missions by 2008.
- Helicopter activity is flown by UH-60 Black Hawks, CH-47 Chinooks, AH-64 Apaches, and OH-58 Kiowas.
- Training-related activity is expected to be conducted by T-45s and T-A4s, A-10s, and helicopters.

When MHK becomes the APOE in FY2017, increased operations of current aircraft and the addition of new aircraft will result as is reflected in Table 3-7.

3.4.4.3. MILITARY TIME OF DAY

Based on discussions with airport contacts, the estimate of thirteen percent of all military operations occurring between 10:00 PM and 7:00 AM derived as part of the EA is still a valid percentage.

3.4.4.4. MILITARY STAGE LENGTH

Most of the transporting of senior officers occurs between Manhattan and Andrews AFB (922 nautical miles east of Manhattan in suburban Washington, DC), Scott AFB (322 nautical miles east near St. Louis), and Ft. Hood (488 nautical miles south near Killeen, Texas). It was assumed that all turboprop military departures associated with senior officer transport were within 500 nautical miles of MHK (INM Stage Length 1). Assuming that the smaller turbojet aircraft used to transport senior officers were distributed fairly evenly among the three primary destinations listed above, about two-thirds would be within INM Stage Length 1 and one-third would be within Stage Length 2. It was assumed that this distribution would remain constant through the forecast period.

C-130 departures are typically destined to Illinois, Southern California, and Louisiana; there are also local C-130 operations associated with air drop drills at Ft. Riley. In addition, C-130s will be flown to the Canadian and Mexican borders as part of Quick Reaction Force activity. It was assumed that one-third of C-130 operations would occur within INM Stage Length 1, one-third would occur within INM Stage Length 2, and one-third would occur within INM Stage Length 3. This distribution was assumed to hold constant through the forecast horizon.

C-17 departures are typically destined for McChord AFB near Tacoma, Washington or overseas to theaters of war. (In the latter case, the aircraft are usually refueled en-route, about 2,500 nautical miles from MHK.) For the purposes of this forecast, half of the C-17 departures were assumed to be traveling to McChord (INM Stage Length 3) and half were assumed to be traveling overseas and refueling in-flight (INM Stage Length 5). This assumption was held constant through the forecast period.

With MHK becoming the Ft. Riley APOE in 2017, aircraft such as the C-5 could be bound for overseas locations such as Ramstein Air Force Base in Germany. Ramstein is located approximately 4,200 nautical miles from MHK (INM Stage Length 6). Of the forecasted C-5 departures, half were assumed INM Stage Length 5 and the other half INM Stage Length 6.

Based on discussions with the ATCT representative, most other military activity is destined for airports within the central

U.S. (typically to facilities in Iowa, Nebraska, Wisconsin, and Oklahoma); therefore, all other military aircraft operations were assumed to be destined to airports within 500 nautical miles of MHK (INM Stage Length 1). This assumption was held constant through the forecast horizon.

3.4.5. ANNUAL INSTRUMENT OPERATIONS FORECAST

An instrument operation is defined by the FAA as an arrival or departure operating in accordance with an Instrument Flight Rule (IFR) flight plan or an operation where IFR separation between aircraft is provided by a terminal approach control facility. The aircraft must be executing an IFR flight plan, have Special VFR (SVFR) clearance, or be provided approved standard separation while conducting practice instrument approaches. The pilot must complete the published approach and then cancel IFR.

The number of annual instrument operations is a function of the capability of the airport and the sophistication of the instrumentation onboard the aircraft. Annual instrument operations forecasts, therefore, are the basis for determining requirements for upgraded instrument approaches.

Given the type and number of military operations that operate at MHK, there are a high percentage of instrument operations as a percent of total activity, that is, an average of 27 percent based on Tower Count data since 2004. Typically, such instrument operations forecasts consider the percent of activity relative to itinerant operations but part of the mission of Ft. Riley is military training operations (i.e., local operations) of which some are instrument approaches.

As detailed in Table 3-8, annual instrument operations at MHK are estimated at 33 percent of total operations over the forecast period. Since commercial, military and high-end GA (i.e., turboprops and jets) are growing fast than piston GA operations, in increase in this percentage could be possible. However, since after-hours ATCT data is not available, the 33 percent is stable estimate. Consequently, this percentage is consistent with the FAA TAF.

3.4.6 SUMMARY OF TOTAL OPERATIONS FORECAST

Combining scheduled air carrier, charter, general aviation, and military activity, the total number of aircraft operations is forecast to increase at an annual growth rate of 0.64 percent from 32,220 to 36,600 operations over the forecast period. Table 3-8 on the following page summarizes the operational levels for the various types of activity at MHK.

Table 3-8: Summary of Total Operations Forecast													
	Enplanements			Itinerant					Local				
Year	Air Carrier (a)	Commuter (b)	Total (c)	Air Carrier (a)	Air Taxi, com-mmuter (b)	GA	Military	Total	GA	Military	Total	Total Ops.	Total Instr.
Base Year	6,930	13,343	20,273	210	3,196	12,543	1,341	17,290	10,685	4,245	14,930	32,200	10,700
2008	6,930	13,240	20,170	210	2,008	12,500	1,000	15,100	11,000	500	11,500	27,200	9,100
2009	6,930	14,940	21,870	210	2,008	12,800	1,000	15,400	11,100	5,800	16,900	32,900	11,000
2010	6,930	16,640	23,570	210	2,008	13,000	1,000	15,600	11,200	5,800	17,000	33,200	11,100
2011	6,930	18,340	25,270	210	2,008	13,200	1,000	15,800	11,300	5,800	17,100	33,500	11,200
2012	6,930	20,040	26,970	210	3,152	13,500	1,000	17,300	11,300	5,800	17,100	35,000	11,700
2013	6,930	22,120	29,050	210	3,152	13,700	1,000	17,500	11,400	5,800	17,200	35,300	11,800
2014	6,930	24,200	31,130	210	3,152	13,900	1,000	17,700	11,500	5,800	17,300	35,600	11,900
2015	6,930	26,280	33,210	210	3,152	14,100	1,000	17,900	11,600	5,800	17,400	35,900	12,000
2016	6,930	28,360	35,290	210	3,152	14,400	1,000	18,200	11,700	5,800	17,500	36,300	12,100
2017	28,510	30,440	58,950	864	3,152	14,600	1,740	20,400	11,800	5,960	17,760	38,160	12,700
2018	28,510	31,800	60,310	864	3,152	14,800	1,740	20,600	11,900	5,960	17,860	38,460	12,800
2019	28,510	33,160	61,670	864	3,152	15,100	1,740	20,900	11,900	5,960	17,860	38,760	12,900
2020	28,510	34,520	63,030	864	3,152	15,300	1,740	21,100	12,000	5,960	17,960	39,060	13,000
2021	28,510	35,880	64,390	864	3,152	15,500	1,740	21,300	12,100	5,960	18,060	39,360	13,100
2022	28,510	37,240	65,750	864	3,880	15,700	1,740	22,200	12,300	5,960	18,260	40,460	13,500
2023	28,510	38,880	67,390	864	3,880	16,000	1,740	22,500	12,300	5,960	18,260	40,760	13,600
2024	28,510	40,520	69,030	864	3,880	16,200	1,740	22,700	12,400	5,960	18,360	41,060	13,700
2025	28,510	42,160	70,670	864	3,880	16,400	1,740	22,900	12,500	5,960	18,460	41,360	13,800
2026	28,510	43,800	72,310	864	3,880	16,700	1,740	23,200	12,500	5,960	18,460	41,660	13,900
2027	28,510	45,440	73,950	864	3,880	16,900	1,740	23,400	12,600	5,960	18,560	41,960	14,000

a. Non-scheduled aircraft with more than 60 seats.

b. Non-scheduled and scheduled aircraft with 60 seats or less.

c. Scheduled aircraft with 60 seats or less.

3.5. PASSENGER ENPLANEMENT FORECAST

The forecast of passenger enplanements is based on the Turboprop Scenario outlined in Section 3.4.1.1. In summary:

- The Base Year schedule of 18 weekly departures would be increased to 29 weekly departures in 2012. This increase results from the airline adding service to a second market other than MCI. It is reasonable to anticipate that two departures per weekday and one additional departure on the weekend would be added to serve the second market.
- With a new schedule of 29 weekly departures using a 19-seat Beech 1900 aircraft, 18,000 annual enplanements are forecast. This assumes a passenger load factor of 65 percent and a 96.5 percent completion factor. The TAF for this period does not appear to increase the frequency of flights.
- For the year 2017, it is assumed the Beech 1900 would be upgraded to a 30-seat aircraft similar to the EMB-120 with the schedule of 29 weekly departures remaining unchanged. By 2022, the load factor would increase to 80 percent resulting in 37,240 passenger enplanements. Again, the TAF appears to maintain the 18 weekly departures schedule to a single market with no change in equipment type.
- By then end of the forecast period, 45,400 annual enplanements are forecasted.

It is estimated that the 346 non-scheduled aircraft operations conducted in the Base Year would equate to approximately 8,970 passenger enplanements. This estimate is derived as follows:

- Of the 238 charter operations related to Ft. Riley, 190 of these operations were performed by aircraft with more than 60 seats. According to T-100 data, an average of 33 passengers per operation was calculated. This includes ferry flights for which there are no passengers on board. Analysis of T-100 data indicates an average of 15 enplaned passengers per operation. This equates to approximately 6,990 enplanements.
- Of the 108 charter operations related to KSU, 20 of these operations were performed by aircraft with more than 60 seats and the remaining 88 operations were performed by aircraft with a seat capacity of 60 seats or less. Using the same average enplanements per operation, the estimate results in 1,980 enplanements by charter aircraft associated with KSU.

3.6. COMPARISON OF FORECASTS

The FAA is required to review and ultimately approve aviation forecasts. To assist with this effort, this section includes a side-by-side comparison of the Master Plan Update with the FAA TAF. As a reminder, a direct comparison between the Master Plan Update forecasts and the TAF for MHK is not directly comparable because the TAF does not include operations that occur when the tower is not operational.

Per FAA forecast approval criteria, the forecast for MHK is considered consistent with the FAA TAF so long as the following criteria are met:

- Forecast differs by less than a 10 percent increase in the 5-year forecast period and less than 15 percent within the 10-year period, or
- Forecast activity levels do not affect the timing or scale of an airport project.

As shown in Table 3-9 above, the total operations are within 10 percent for the initial 5-year forecast period and are therefore, by FAA definition, consistent with the TAF. For the 10-year planning period, the forecast is within 15 percent of the TAF.

3.6.1. COMMERCIAL OPERATIONS

Commercial operations are within the TAF forecast tolerance for the 5- and 10-year periods.

3.6.2. GENERAL AVIATION

The difference in General Aviation operations can be attributed to the fact that the FAA TAF does not include after-hours operations. If

Table 3-9: Comparison of Master Plan and TAF Forecast					
Activity Type (Period)		Year	Master Plan (MP) Forecast	TAF	MP/TAF (% Difference)
Total Operations					
	Base yr.	2007	32,220	32,130	0.3%
	Base yr. + 5yrs.	2012	35,000	33,795	3.6%
	Base yr. + 10yrs.	2017	38,160	35,258	8.2%
	Base yr. + 15yrs.	2022	40,460	36,574	10.6%
Commercial Operations					
	Base yr.	2007	3,196	2,901	10.2%
	Base yr. + 5yrs.	2012	3,152	2,955	6.7%
	Base yr. + 10yrs.	2017	3,152	3,010	4.7%
	Base yr. + 15yrs.	2022	3,880	3,067	26.5%
General Aviation Operations					
	Base yr.	2007	23,228	20,245	14.7%
	Base yr. + 5yrs.	2012	24,800	21,856	13.5%
	Base yr. + 10yrs.	2017	26,400	23,264	13.5%
	Base yr. + 15yrs.	2022	28,000	24,523	14.2%
Military Operations					
	Base yr.	2007	5,586	8,984	-37.8%
	Base yr. + 5yrs.	2012	6,800	8,984	-24.3%
	Base yr. + 10yrs.	2017	7,700	8,984	-14.3%
	Base yr. + 15yrs.	2022	7,700	8,984	-14.3%

TAF numbers were increase by the after-hours percentage of 13 percent (per Section 4.3), the difference between the Master Plan Update and TAF forecasts would differ by less than 3 percent for the 5- and 10-year periods.

3.6.3. MILITARY OPERATIONS

Through discussions with Ft. Riley back in 2004 and 2005, the EA forecast resulted in a significant increase in military operations in 2008 over the baseline year 2004. In 2008, military operations were forecasted to increase to around 10,700 operations from 1,650. This increase was predicated upon a build-up in Ft. Riley's population which is still anticipated to occur over the next several years.

However, data provided by Ft. Riley reveals military operations after the Base Year are expected to remain constant at 6,800 annual operations until the year 2017 at which time they will slightly increase to 7,700 annual operations. The FAA TAF shows military operations holding constant at approximately 9,000 annual operations from 2007 through the year 2025.

As discussed throughout this Master Plan Update forecast, it is difficult to forecast military operations due to their strong relationship with national security and world events. The percent differences between the 5- and 10-year periods, respectively is not surprising given the inherent uncertainty with military activity.

3.6.4. BASED AIRCRAFT

Per MHK records there are 43 based aircraft with a hangar capacity for 45 based aircraft. At this time, the TAF indicates 55 aircraft are currently at MHK. If the TAF based aircraft numbers shown in Table 3-10 were decreased by 12 to match the present number of based aircraft, the Master Plan Update forecast would within two percent of the TAF.

3.6.5. SCHEDULED PASSENGER ENPLANEMENTS

The forecast of passenger enplanements along with a TAF comparison is provided in Table 3-11 below. Clearly, there is a significant difference between the two forecasts which was explained previously in Section 6.

3.7. PEAK ACTIVITY FORECAST

Peak activity forecasts are used for airfield capacity analyses and for gauging the timing for future facilities improvements. There are several peaking parameters typically used in airport planning. These are peak month, peak day, and peak hour.

Peak Month. The Peak Month is the month in which the highest number of aircraft operations occurs. According to Tower Count data, the peak month varies considerably from year to year (refer to Table 3-12).

Typically, monthly peaking at general aviation airports ranges greatly from 10 to 20 percent. The low end of the range reflects a reasonable spread of aviation activity throughout the year. The high end of the range is more common with lower activity airports that may have one or two special community events during the year that concentrates activity over a short period and skews the average. Historically, the average peak month percentage for MHK is approximately 10 percent. This value shall be applied throughout the forecast period.

Peak Day. The Peak Day is usually calculated as the average day of the peak month. For forecast purposes, the Peak Month Average Week Day (PMAWD) is 30.4 or the value of 365 days divided by 12 months, as the future peak hour could shift between months having 30 or 31 days. However, assuming the peak month to be May, the average peak day of the peak month is 1/31 of the monthly operations.

Peak Hour. This is the most important of the peaking statistics. It is used to determine the operational capacity of the airport and

Table 3-10: Based Aircraft Comparison

Period	Year	Master Plan (MP) Forecast	TAF	MP/TAF (% Difference)
Base year.	2007	43	55	-21.8%
Base yr. + 5yrs.	2012	45	58	-22.4%
Base yr. + 10yrs.	2017	49	62	-21.0%
Base yr. + 15yrs.	2022	51	64	-20.3%

Table 3-11: Passenger Enplanement Forecast

Period	Year	Master Plan (MP) Forecast	TAF	MP/TAF (% Difference)
Base yr.	2007	11,303	10,790	4.8%
Base yr. + 5yrs.	2012	18,000	11,199	60.7%
Base yr. + 10yrs.	2017	28,400	11,627	144.3%
Base yr. + 15yrs.	2022	35,200	12,071	191.6%

to measure against aircraft delay. The statistic is important to calculate when new facilities, such as apron expansions, taxiway construction, or even new runways would need to be constructed. Or in the absence of the possibility to build new facilities, it determines the amount of delay in terms of minutes per operation that would be endured at certain times of the day.

In general, peak hour estimates often range from 9 to 15 percent. The more active the airport, the less the peak hour represents of daily activity. For MHK, a conservative peak hour estimate of 10 percent of the PMAWD will be used. Table 3-13 represents the peaking forecasts for MHK.

Table 3-12: Historic Peak Month

Year	Peak Month	Peak Month Ops.	Period Ops.	Peak Month as Percent of Year
FY 2007 (Base Year)	May	2,941	27,986	10.51 %
FY 2006	October	2,462	24,247	10.15 %
FY 2005	September	2,816	28,877	9.75%

Table 3-13: Peak Operations Forecast

Scenario Year	Month	Day	Hour
Base Year	3,222	104	10
2012	3,500	113	11
2017	3,816	123	12
2022	4,046	131	13
2027	4,196	135	14

Chapter Four
AIRPORT CAPACITY

Once forecasts of aeronautical activity for MHK are generated, it is necessary to compare the forecasted demand against the capacity of the existing airfield, terminal building, and other support facilities. The differences between accommodating the forecasted demand and existing capacity of the airport to serve forecast demand is the measure used to determine future facility requirements.

The three components of an airport are: airfield, landside, and terminal. These components each have a capacity, i.e., a maximum amount of traffic where the airport can function. All must be in balance for the airport to function efficiently.

4.1 AIRFIELD CAPACITY

An airfield capacity analysis is conducted to determine the existing capacity of the airfield and to identify any present or potential deficiencies in the airfield system. Airfield capacity was examined utilizing FAA Advisory Circular (AC) 150/5060-5, Airport Capacity and Delay.

An airfield's capacity is expressed in terms of its annual service volume (ASV). Annual service volume is defined as the maximum number of operations (i.e. aircraft arrivals, departures, and touch-and-go's) that can take place on the runway system in a year. An estimate of capacity is influenced by many factors, including the following:

- types of aircraft using the airfield,
- airfield configuration,
- preferential runway usage,
- wind and weather characteristics,
- exit taxiway locations,
- touch-and-go operations, and
- airspace constraints

Two rules of thumb pertaining to airport capacity are that when the level of operations reach 60 percent of ASV, it is prudent to plan for future capacity enhancement/facility, i.e., a new runway, and at 80 percent, construction of those enhancements/facilities should begin.

Preliminary planning values indicated MHK's multi-runway configuration can provide an ASV of 230,000 operations under ideal conditions. If the projected long range planning horizon level of 40,500 annual operations comes to fruition, the airfield's ASV will reach 18 percent of the theoretical maximum. As a result, planning for additional capacity enhancements is not an immediate or long-term need for MHK.

With that said there is a capacity issue with regard to the taxiway system associated with Runway 3-21. Because of the taxiway width, wide body aircraft chartered by Fort Riley cannot safely maneuver from the runway to the apron areas, and vice versa. For example, the B757 requires a 75-foot wide taxiway and more pavement area for wider turns. The 50-foot wide taxiways and intersection geometries need to be improved.

4.2 LANDSIDE CAPACITY

Access to MHK is via K-18, which is capable of supporting current airport traffic levels. The present daily volume of traffic on K-18 is approximately 23,000 vehicles. Improvements are programmed for K-18 to upgrade it to a freeway, from the City of Ogden to Miller Davis Drive in Manhattan, which will increase capacity significantly. With construction of the new facility, MHK will be accessed via K-18 interchanges at Scenic Drive or K-114/ Fort Riley Boulevard, for which there will be corresponding reductions in traffic. The Kansas DOT has investigated the possibility of constructing a future interchange along K-18 at the airport entrance but projected traffic does not warrant it. There are no long term access issues facing MHK.

On the other hand, the public-use parking areas associated with the Terminal Building

are in need of expansion. The Short Term Parking Lot typically reaches 50 to 60 percent capacity and the Long Term Parking Lot normally exceeds 80 percent. In addition, traffic flow into and out of the Short Term Parking Lot is inefficient and requires each vehicle to pass in front of the Terminal Building twice thereby unnecessarily increasing the likelihood of a pedestrian-vehicle conflict. A detailed analysis of the parking is presented in Chapter 6.

4.3 TERMINAL CAPACITY

This Terminal Capacity section of the Master Plan reviews terminal space needs and their ability or inability to meet current and future demand. Current passenger demand is supported by the 19-seat Beech 1900 turboprop aircraft whereas future demand, according to the Forecast Chapter, is to be accommodated by the 30-seat EMB-120 turboprop.

Although not the recommended (FAA-approved) forecast, there is real potential for MHK to be served by a 50-seat regional jet within the master plan time horizon. For simplicity, the EMB-145 aircraft will serve as the potential 50-seat commercial service jet. This aircraft is currently in service with several domestic airlines across the United States. Terminal Building improvements necessary to accommodate the EMB-145 are discussed in the following paragraphs.

In addition to scheduled air carrier service, the Terminal Building is also used to process narrow body jets chartered by the KSU Athletics Department. The Kansas Air Center, one of MHK's FBOs, can accommodate almost all private charter aircraft flights; however, their building is too small to process the larger charter aircraft. As a result, the Kansas Air Center has agreement with the City to utilize in the Terminal Building in lieu of their facility. Kansas Air Center is responsible for security screening of private charter passengers.

For planning purposes, the 164-passenger Airbus A320 similar to the one shown in Figure 4-1, will be used to assess terminal capacity for it is the most demanding charter aircraft in terms of seat capacity and passenger processing needs. The A320 has been used as a charter aircraft in the past at MHK and its continued use is expected. The next two largest charter aircraft presently chartered by KSU are the 134-passenger A319 and the 128-seat B737-300 (shown in Figure 4-2).

Figure 4-1. A320

Figure 4-2. B737-300

Built in 1996, the Terminal Building has since been modified to meet post-9/11 security requirements. These security requirements have reduced the once ample space afforded by the original design. With the added security requirements, the Baggage Claim and Departure Lounge rooms have experienced a significant decrease in available floor space.

At present, available space in the Terminal Building can only process one departing aircraft at a time. In other words, the facility is not capable of simultaneously processing Beech 1900 passengers and those associated with a large charter aircraft. To manage this constraint, large charter aircraft departures are planned between scheduled aircraft

operations. As passenger enplanements and the frequency of flights increase, however, so too will the probability that a conflict will arise. The analysis presented herein identifies the ramifications to the Terminal Building's passenger processing ability, where appropriate, should the facility be in demand by both types of aircraft.

PASSENGER TICKETING AND QUEUING

The Terminal Building provides lease area for two airlines with each airline provided a 20-foot long ticket counter. The counter length allows for two airline agents and a single bag well. As detailed in Table 4-1, this length is sufficient for current and future demand. For passenger queuing, MHK has 400 sq. ft. of space which is sufficient for the 19 and 30 seat aircraft; however, an additional 50 sq. ft. is required to accommodate a 50-seat regional jet. The airline ticket counter and queuing area are depicted in Figures 4-3 and 4-4.

Figure 4-3. Passenger (Ticketing) Queuing Area

Figure 4-4. Airline Ticket Counter

Figure 4-5. Public Waiting Area

PUBLIC WAITING AREA

This area, which is depicted in Figure 4-5, measures approximately 1,660 square feet and is large enough to accommodate current passenger and visitor levels but not future demand (refer to Table 4-2). The EMB-120's 30 passengers and associated visitors could be accommodated in the current waiting area; however, an additional 540 square feet is needed for the EMB-145 scenario.

Discussions with airline staff reveal that when a large charter airplane like the A320 departs, virtually every available public-use space in the Terminal Building is occupied by passengers. Charter passengers occupy not only the entire 1,660 square foot public waiting area but also spill over into the 1,100 square foot lobby and 1,200 square foot main corridor that runs the full length of the Terminal Building. These three areas total 3,960 square feet.

Table 4-1. Passenger Ticketing and Queuing Space Requirements				
Aircraft	Beech 1900	EMB-120	EMB-145	A320
Passengers (PAX) (a)	19	30	50	164
Ticketing				
Ticket counter length required	20 feet	20 feet	30 feet	n/a (b)
Current ticket counter length	40 feet	40 feet	40 feet	40 feet
Additional ticket counter length needed	None	None	None	None
Airline ticket processing space required	200 sq. ft.	200 sq. ft.	300 sq. ft.	n/a (b)
Current airline ticket processing space	400 sq. ft.	400 sq. ft.	400 sq. ft.	400 sq. ft.
Additional ticket processing space needed	None	None	None	None
Queuing for Ticketing				
PAX queuing area required	170 sq. ft.	270 sq. ft.	450 sq. ft.	n/a (b)
Current PAX queuing area	400 sq. ft.	400 sq. ft.	400 sq. ft.	400 sq. ft.
Additional PAX queuing area needed	None	None	50 sq. ft. (c)	None

a. Equivalent to peak-hour passengers
b. Charter aircraft passengers do not require traditional ticketing.
c. This equates to a 7-foot by 7-foot area.

In looking at the public waiting area for the A320 Charter, Table 4-2 reflects the need for an additional 5,515 square feet of public waiting (seating) area. In other words, the current public waiting area needs to be increased at least four fold. This is impractical given the very low frequency of the charter flights. But, when considering the total 3,960 square feet used by passenger "spill over", the additional area needed is considerably less at 1,600 square feet which represents a 40-ft by 40-ft square room.

AIRLINE OFFICE AND GROUND SERVICE EQUIPMENT (GSE) SPACE

The Terminal Building has 1,200 square feet of lease area per airline. Great Lakes currently leases the larger of the two spaces which measures 640 square feet. The other vacant area is approximately 560 square feet.

Air Midwest added a 100 square foot office within the 640 square foot lease area. This office is about half the size typically allocated at their other facilities. Additional office space is required to meet present demand. Air Midwest indicated they lack the appropriate amount of space for baggage cart equipment.

Table 4-2. Public Waiting Area Requirements				
Aircraft	Beech 1900	EMB-120	EMB-145	A320
PAX and visitors	34	53	88	287
Size of Public Waiting area required	850 sq. ft.	1,325 sq. ft.	2,200 sq. ft.	7,175 sq. ft.
Current Public Waiting room	1,660 sq. ft.	1,660 sq. ft.	1,660 sq. ft.	1,660 sq. ft.
Additional area needed	None	None	540 sq. ft.	5,515 sq. ft.
Approximate square room size (ft x ft)	n/a	n/a	23 x 23	74 x 74

Table 4-3. Airline Office and GSE Space Requirements (Per Airline)			
Aircraft	Beech 1900	EMB-120	EMB-145
Passengers	19	30	50
Required Office/GSE space	800 sq. ft.	800 sq. ft.	1,200 sq. ft.
Office and GSE space available per airline tenant	600 sq. ft.	600 sq. ft.	600 sq. ft.
Additional space needed	200 sq. ft.	200 sq. ft.	600 sq. ft.
Approximate square room size (ft x ft)	14 x 14	14 x 14	See Note

Note: No office or GSE space needed to support the A320 as charter airline's offices are not located at MHK.

Using a metric of ticket counter length multiplied by 40 feet, the minimum airline office and GSE space required is 800 sq. ft. An additional 200 square feet is required to meet US Airway's current operating needs. To provide the additional space, the airline could amend its lease agreement to include all or a portion of the adjacent vacant space. Modifications to the wall separating the two lease areas could be constructed to accomplish this.

The space needs for the EMB-120 turboprop and EMB-145 regional jet options are summarized in Table 4-3. Should MHK be served by a 50 seat regional jet, the airline company will most likely need to occupy both lease areas.

PASSENGER SECURITY SCREENING

Current TSA passenger screening equipment (Explosive Trace Detection) and processing space occupies 675 square feet. The single passenger lane screening configuration can accept 180 passengers per hour. This is sufficient to allow the timely screening of passengers and their baggage for present and future demand levels.

MHK has been in discussions with the TSA regarding the possible installation of an Explosive Detection System (EDS) machine to assist with passenger screening. The EDS is capable of scanning both carry-on and checked bags. The space needed to install an EDS will further reduce the size of the Hold Room. This and other options to incorporate an EDS into to the Terminal Building are presented in Chapter 5.

DEPARTURE LOUNGE

The departure lounge was originally constructed as a 1,824 square foot room to allow airline-processed passengers to wait for their flight. Included in that space were two passenger corridors - one for departing (enplaning) passengers and another for arriving (deplaning) passengers. Passenger seating was centrally located between the two corridors.

In the wake of the passenger screening requirements resulting from the 9/11 terrorist attacks, all small and non-hub airports were required perform passenger screening whereas before such screening could be performed in the connecting hub airport. At MHK a temporary wall was put in place to separate the now-sterile Departure Lounge from the pre-screening terminal area (e.g. ticket counter, lobby, etc.). The area required to screen passengers eliminated the departing passengers corridor and necessitated a second wall to delineate the sterile area from the deplaning passengers corridor.

The post-9/11 passenger screening requirements have reduced the central seating area from 840 square feet down to approximately 660 square feet. Despite this 27 percent reduction, MHK has worked cooperatively with TSA to rearrange the space to provide seating for 27 passengers and, therefore, meet current demand. The Departure Lounge is depicted in Figure 4-6.

However, the Departure Lounge will need to be expanded to accommodate the larger 30- and 50-seat aircraft as presented in Table 4-4. For the A320 charter operations, passengers go through security only after the aircraft arrives and, therefore, can board the plane once screened. They do not necessarily need a Departure Lounge as do scheduled passengers. Nonetheless, should the City desire to expand the departure lounge, the additional area required is presented in Table 4-4.

Figure 4-6. Departure Lounge

BAGGAGE CLAIM

To serve arriving passengers, a baggage claim area, located at the far south end of the Terminal Building is provided. A single flatbed, direct feed baggage conveyor unit exists. The conveyor unit, shown in Figure 4-7, provided 50 linear feet of baggage space. To meet current demand, 76 linear feet of baggage space is required. The baggage claim device is undersized and cannot accommodate existing or future demand. The length of the conveyor needed is summarized in Table 4-5.

Figure 4-7. Existing Baggage Claim Conveyor

Similar to the Departure Lounge area, the baggage claim room was reduced from it original size of 870 square feet to 570 square feet to accommodate a new TSA office. As can

Table 4-4. Departure Lounge Requirements

Aircraft	Beech 1900	EMB-120	EMB-145	A320 (b)
Passengers	19	30	50	164
Departure Lounge area required	475 sq. ft.	750 sq. ft.	1,250 sq. ft.	4,100 sq. ft.
Current room size	657 sq. ft.	657 sq. ft.	657 sq. ft.	657 sq. ft.
Additional area needed (approx.)	None	95 sq. ft.	600 sq. ft.	3,440 sq. ft.
Approximate square room size (ft x ft)	n/a	10 x 10	24 x 24	n/a

a. The Departure Lounge space requirements assume that only one aircraft is processed at a time. If, for example, an EMB-120 and an EMB-145 were to depart simultaneously, the current room size would need to be expanded by 1,340 square feet.

b. The A320 scenario is shown for comparison only. Private charter passengers board their aircraft immediately after being screened by security and do not require a departure lounge/hold room.

Table 4-5. Baggage Claim Conveyor Requirements			
Aircraft (a)	Beech 1900	EMB-120	EMB-145
Deplaning Passengers	19	30	50
Length of conveyor required (b)	76 ft.	120 ft.	200 ft.
Current length of conveyor	50 ft.	50 ft.	50 ft.
Additional conveyor length needed	26 ft.	70 ft.	150 ft.

a. A320 charter aircraft not shown. Passenger baggage associated with charter aircraft are not processed by the baggage claim conveyor. Passengers carry bags from the apron through the Terminal Building.
b. Assumes two bags per passenger with each bag measuring 2 feet in length.

Table 4-6. Baggage Claim Area Requirements			
Aircraft (a)	Beech 1900	EMB-120	EMB-145
Deplaning Passengers	19	30	50
Area needed for bag belt	304 sq. ft.	480 sq. ft.	800 sq. ft.
Area needed for deplaned passengers	570 sq. ft.	900 sq. ft.	1,500 sq. ft.
Total area required	874 sq. ft.	1,380 sq. ft.	2,300 sq. ft.
Current Baggage room area (b)	870 sq. ft.	870 sq. ft.	870 sq. ft.
Additional Baggage room area needed	None	510 sq. ft.	1,430 sq. ft.
Approximate square room size (ft x ft)	n/a	23 x 23	38 x 38
Lost Baggage Room size (ft x ft)	5 x 5	5 x 5	5 x 5

a. A320 charter aircraft not shown. Passenger baggage associated with large charter aircraft are not processed by the baggage claim conveyor. Passengers and baggage board buses on Terminal Apron and do not re-enter Terminal Building. Smaller charter aircraft passengers deplane through Kansas Air Center.
b. Area available following TSA office relocation.

be seen in Figure 4-8 there is virtually no space between the TSA office wall and bag claim device to allow passengers to collect their bags. In the near future, it is planned for the TSA office to be relocated to another building on MHK property. Following the removal of the office walls, the baggage claim room would return to its original, larger space allowing MHK to meet current demand. To process future baggage demands, the baggage claim room needs to be expanded beyond 870 square feet by 510 square feet and 1,430 square feet for the 30-seat and 50-seat aircraft scenarios, respectively.

Figure 4-8. TSA Office

RENTAL CAR

A total area of 190 square feet is leased to both rental car companies. This appears to be sufficient as typically 200 square feet is provided for rental car office space. The customer queue area is located in the main corridor resulting in some congestion. Approximately 100 square feet is needed for customer queuing and is provided by utilizing the main corridor space (depicted in Figure 4-9).

Figure 4-9. Car Rental Queuing Space (Main Corridor)

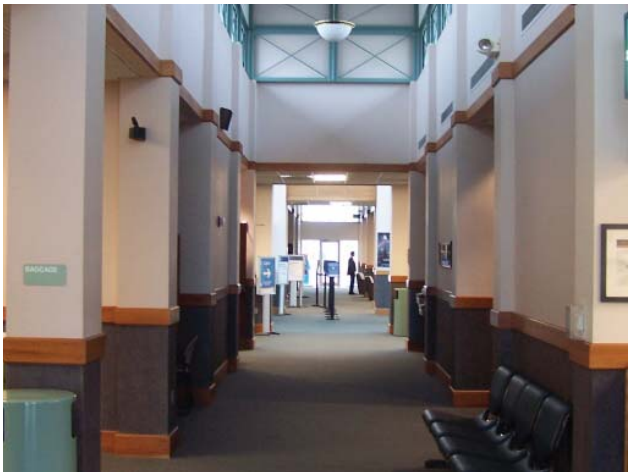


Table 4-7. Rental Car Lease Area Requirements

Aircraft (a)	Beech 1900	EMB-120	EMB-145
Deplaning Passengers	19	30	50
Rental Car Counter length required	20 ft.	20 ft.	30 ft.
Present total counter length (10 ft per lease area)	20 ft.	20 ft.	20 ft.
Additional counter length needed	None	None	10 ft.
Rental Car Office Space	400 sq. ft.	400 sq. ft.	600 sq. ft.
Current lease area	380 sq. ft.	380 sq. ft.	380 sq. ft.
Additional office space needed	None	None	220 sq. ft.

CONDITION OF TERMINAL BUILDING AND ENVIRONMENT CONTROL SYSTEM

An Airport Terminal Building HVAC System Assessment was performed as part of this Master Plan Update by Orazem & Scalora Engineering, P.A., a local mechanical engineering firm.

According to the assessment, the Terminal Building is in very good condition and it is recommended that regular preventative maintenance efforts be performed. The roof-top HVAC units may need to be replaced in five to ten years and the electronic climate control system should be modernized or replaced to optimize energy management and minimize utility expenses. A copy of the assessment is contained in Appendix A.

4.4 CONCLUSION

The airside components of MHK have sufficient ability to accommodate aviation demand for the foreseeable future without experiencing delay. With regard to landside, access to MHK is not an issue. However, the Short- and Long Term Parking Lots require expansion in the short term to meet current and future passenger demand.

The Terminal Building's structural and environmental control system are in very good condition and will serve as a solid platform for future room expansion needs. The areas of the Terminal Building that need to be enlarged to meet current and future demand are summarized as follows:

- The Passenger Queuing area is undersized and cannot meet the future demand of a 50-seat regional jet.

- The Public Waiting Area can only meet current passenger space requirements established by the Beech 1900 aircraft. Additional seating space will be required to accommodate larger commercial service aircraft.
- Additional airline office space is required by the current airline. Moreover, should MHK be served by two airlines who operate the Beech 1900 or similar equipment or an airline company using larger equipment, the lease space will need to be expanded.
- While passenger screening space within the Departure Lounge is adequate, incorporation of an EDS machine will necessitate modifications to the Departure Lounge, airline office, or another area. Regardless of the EDS machine possibility, the Departure Lounge needs to be expanded to accommodate the 30-seat EMB-120 and the 50-seat EMB-145.
- The baggage conveyor needs to be lengthened to properly process existing demand. Following the relocation of the TSA office, the baggage claim room will return to its original size; however, it will still need to be enlarged to handle any future aircraft that are larger than the current Beech 1900.
- Rental car office space and counter length are sufficient to meet the demands of a 19-seat and 30-seat aircraft but fall short of meeting the 50-seat EMB-145.

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Chapter Five
AIRSIDE FACILITY PLANNING

This chapter identifies requirements for the airfield and sets the stage for reviews of different scenario alternatives. Airfield facilities consist of runways, taxiways, airfield marking and lighting, and navigational and approach aids.

A flexible master plan should consider short-term needs and carefully examine long-term requirements such that facilities planned today will not require relocation in the future. The manner through which the plan introduces flexibility is by considering uses for today and the next few years in terms of the ultimate build-out, as well as alternative futures.

5.1 AIRPORT PLANNING CRITERIA

The Federal Aviation Administration (FAA) has established detailed guidance for specifying airport needs based upon an airport's design aircraft in Advisory Circular 150/5300-13 (Change 11), Airport Design. The key parameter for airport design is the Airport Reference Code (ARC) of the most demanding or critical aircraft expected to operate at the airport. The ARC is a coding system used to relate airport design criteria to the operational and physical characteristics of the airplanes intended to operate at the airport.

The ARC is comprised of two components, the first of which is a letter that denotes the Aircraft Approach Category that represents an aircraft's approach speed. The second component, depicted by a Roman numeral, is the Airplane Design Group (ADG) and relates to the aircraft's wingspan, as identified in Table 5-1.

Table 5-1. FAA Airport Reference Code

Aircraft Approach Category	Aircraft Approach Speed (kts.)	Airplane Design Group	Aircraft Wingspan (ft.)
A	< 91	I	< 49
B	91 to < 121	II	49 to < 79
C	121 to < 141	III	79 to < 118
D	141 to < 166	IV	118 to < 171
E	166 or greater	V	171 to < 214
F		VI	214 to < 262

5.2 CRITICAL DESIGN AIRCRAFT

The frame of reference for establishing the planning criteria for an airport is decided by the largest aircraft or family (grouping) of aircraft that uses the airport on a regular basis, i.e., 500 or more annual itinerant operations[1]. Typically for an airport, a single aircraft or family of aircraft will serve as the critical or most demanding design aircraft. However, given that both military and civilian aircraft operate at MHK, a design aircraft for each group will be selected for coordination purposes between the FAA and the Department of Defense. The design aircraft chosen depends on whether MHK becomes the Aerial Port of Embarkment (APOE) for Ft. Riley or not.

1. FAA Order 5100.38C, AIP Handbook. Paragraph 428.a.(1)(a)

5.2.1 DESIGN AIRCRAFT FOR APOE DESIGNATION

Should MHK serve as the future APOE for Ft. Riley, the military design aircraft would be the Lockheed C-130 Hercules as it is forecast to conduct approximately 660 annual itinerant operations. The C-130 aircraft is a military airlift transport with long-range performance characteristics. The airport reference code for this aircraft is C-IV. According to the Air Force, the C-130J-30 is the latest addition to the C-130 fleet and will replace the older "H" and "E" versions. The newer Version "J" has improved performance, lower operating costs, and incorporates state-of-the-art technologies.

Figure 5-1. C-310J-30

The largest civilian aircraft to conduct the greatest number of itinerant operations would be the Boeing B757 family of aircraft which are classified as ARC C-IV. The B757-200 and -300 series aircraft are projected to conduct 252 and 184 annual operations, respectively, for a total of 440 annual operations. Although this level is below the 500 annual itinerant operations threshold required, adjustment to this criterion should be made considering the supportive role the airport plays in troop deployments.

Figure 5-2. B757-300

The B757 is a twin-engine short-to-medium-range jetliner incorporating advanced technology for exceptional fuel efficiency, low noise levels, increased passenger comfort, and top operating performance. The B757-200 can accommodate up to 228 passengers whereas the B757-300 can carry up to 280 passengers. The B757-200 takeoff weight ranges from 220,000 pounds up to a maximum of 255,000 pounds for greater payload or range. The maximum takeoff weight of the B757-300 is 272,500 pounds and has a maximum range of nearly 3,400 miles.

The aircraft to operate more frequently than the B757s are those in the ARC C-III family with 510 annual itinerant operations. The C-III family includes the B737, A319, DC-9, Gulfstream V, and similar size aircraft. As the number of operations conducted by these aircraft meets the design aircraft definition, MHK could be designed to an ultimate ARC of C-III, at a minimum. The only aircraft larger than the B757 forecast to operate at MHK are the B767 and the MD11 with a combined 32 total annual operations. These aircraft do not conduct near the number of operations to be regarded as the design aircraft. The B767 and MD-11 have maximum takeoff weights of 630,500 and 450,000 pounds, respectively.

Figure 5-3. A319

Figure 5-4. DC-9

Figure 5-5. Gulfstream V

Figure 5-6. B767

Figure 5-7. MD-11

5.2.2 DESIGN AIRCRAFT FOR THE "NO APOE" CASE

In the event MHK does not become the APOE for Ft. Riley, the military design aircraft would be the C-12, the military version of the twin engine turboprop Beechcraft King Air 200, with an estimated 750 annual operations. This ARC B-II aircraft is capable of transporting six passengers and cargo a distance of 1,250 miles at 300 miles per hour. The largest military aircraft forecasted to frequent MHK is the C-130 with slightly less than 200 annual operations. Although the C-12 conducts nearly four times as many operations as the C-130 cargo airplane, the C-12 has a maximum takeoff weight of only a fraction of the 164,000-pound C-130.

For civilian use, the current FAA-approved ARC for MHK is C-II as there are approximately 560 annual itinerant operations conduced by aircraft in this code group. Business jet aircraft classified as C-II include the Gulfstream V, Cessna Citation X, and the Raytheon Hawker 800. Charter jet aircraft included in the C-II group are the Bombardier CRJ-200, Embraer 145, and the Fairchild-Dornier 328. The largest civilian aircraft to operate regularly are those classified as ARC-III. Aircraft in this group are charter aircraft such as the B737, Airbus 320 and 319, DC-9, and the Gulfstream V business jet. ARC-III aircraft conduct approximately 300 annual itinerant operations. As more troops and units relocate to Ft. Riley, it is expected that the number of operations conducted by ARC C-III aircraft would increase (regardless of the APOE designation).

Figure 5-8. King Air 200

Without APOE status, there still will be the occasional B757-200 and MD-11 charter aircraft operating at MHK but only at an average of one per month. Regardless of aircraft size, those that most frequently operate at MHK would be the LearJet series of civilian aircraft with approximately 1,050 itinerant operations. The LearJet is coded as ARC C-I.

Figure 5-9. CRJ-200

Figure 5-10. Fairchild-Dornier 328

5.2.3 DESIGN AIRCRAFT RECOMMENDATIONS

Should MHK receive the APOE designation, the recommended future Airport Reference Code is C-IV with the B757-300 serving as the civilian design aircraft and the Lockheed C-130J-30 serving as the military design aircraft. The APOE designation will necessitate improvements to the airfield to accommodate Group IV aircraft.

If MHK does not become Ft. Riley's APOE, it would, at a minimum, maintain its current ARC C-II designation based on more than 500 itinerant operations conducted per year by aircraft in this grouping. However, given the respectable level of C-III aircraft (an estimated 290 operations) and the amount of existing airfield infrastructure currently meeting C-III standards, it is recommended that MHK be designed to meet ARC C-III standards for future civilian use.

For the military, airport design standards could be set for ARC C-II as the military's version of the King Air 200 (the C-12) meets the definition for design aircraft; however, it is recommended the C-130J-30 be assigned as the military design aircraft. If the APOE eventuality does not occur, expansion of the Terminal Building and development of the general aviation facilities will still need to occur to meet civilian needs. The current configuration of the airfield will be sufficient to accommodate future demand of the non-APOE case. Design aircraft recommendations are summarized in Table 5-2.

Table 5-2. Recommended Design Aircraft

Airport Role	Airport Reference Code	Critical Civilian Aircraft	Critical Military Aircraft
APOE	C-IV	B757-300	C-130J-30
No APOE	C-III	C-III family	C-130J-30

Figure 5-11. Learjet 45

5.3 AIRFIELD FACILITY REQUIREMENTS

In determining the future facilities requirements for an airport, there are two pieces of information planners develop:

- Facility improvements that are needed to accommodate current demand and meet FAA standards, and
- Facilities that are needed in the future to meet forecasted demand.

5.3.1 AIRFIELD IMPROVEMENTS REQUIRED TO MEET PRESENT DEMAND AND MAINTAIN CURRENT FAA AIRPORT STANDARDS

This section discusses facility requirements that are needed to maintain MHK as it is in order to meet operational needs and maintain current FAA standards. These requirements do not add to the capacity of MHK, which are addressed in Section 5.3.2. Described in Table 5-3 below are the facilities improvements needed to meet current demand and FAA standards.

Table 5-3. Airfield Improvements for Current Conditions	
Facility Description	Improvements Required
Runway 3-21	
Existing ARC	C-II
Runway Object Free Area	The OFA and RSA beyond the stop end of Runway 3 do not meet current standards. A standard RSA will be constructed as part of the Runway 3-21 Shift project (AIP-35).
Runway Safety Area	
Length	None
Width	None
Pavement	Reseal pavement joints
Shoulders	None
Lighting	None
Markings	Remark entire runway. New markings will be installed as part of the Runway 3-21 Shift project (AIP-35).
Runway 3 MALSR	None
Runway 21 REIL	None
Runway 3 VASI	None
Runway 21 VASI	None
Runway 13-31	
Existing ARC	B-I
Runway Object Free Area	None
Runway Safety Area	None
Length	Lengthen by 650 feet
Width	None
Pavement	Reconstruct pavement
Shoulders	None
Lighting	Replace MIRL
Markings	Remark entire runway
Runway 13 VASI	None
Runway 31 VASI	None
Taxiway System	
ARC	C-II for Taxiways A, B, C, and D. B-I for Taxiway E
Pavement	Reconstruct portion of Taxiway E
Lighting	Replace Taxiway E edge lights
Markings	None
Signage	Re-designate all taxiways to simplify airfield and improve safety
T-Hangar Taxilanes	Reconstruct all taxilanes

Table 5-3. Airfield Improvements for Current Conditions (continued)	
Facility Description	Improvements Required
Aprons	
GA Apron	Rehabilitate asphalt pavement and remark.
Deployment Apron	None
Terminal Apron	Reseal joints and remark. Replace concrete panels adjacent to Terminal Building. Add aircraft tie downs.

5.3.1.1 RUNWAY 3-21

The following paragraphs present an analysis of the dimensions, aircraft load bearing capability, and elements associated with Runway 3-21.

Runway 3-21 Orientation

With its present northeast to southwest orientation, the primary runway provides the following all-weather wind coverage:

- 94.22 percent wind coverage for 10.5 knot crosswind
- 97.34 percent wind coverage for 13 knot crosswind
- 99.42 percent wind coverage for 16 knot crosswind
- 99.91 percent wind coverage for 20 knot crosswind

Since this runway does not provide 95 percent all-weather wind coverage for the 10.5 knot crosswind, a crosswind runway is recommended at MHK (hence the existence of Runway 13-31). When combined, both runways can provide nearly 99 percent all-weather wind coverage allowing a host of aircraft to land MHK regardless of wind direction and speed. When weather conditions deteriorate such that pilots must use their instruments (IFR), the primary runway provides more than 95 percent wind coverage for all crosswind speeds. The all-weather and IFR windroses are depicted on the ALP set located in Appendix E.

Runway 3-21 Length

FAA Advisory Circular (AC) 150/5235-4B, Runway Length Requirements for Airport Design, will be used to determine if the current length of Runway 3-21 is sufficient to accommodate present day demand. This planning document provides guidelines to determine runway length[2] and uses a five-step procedure to determine the recommended runway length. These five steps are as follows:

Step 1. Identify the list of critical design airplanes that will conduct at least 500 annual itinerant operations at the airport.

As jet aircraft typically require more runway length than piston and turboprop engine aircraft, itinerant charter and business jet aircraft operations were reviewed.

Charter jet aircraft conduct approximately 340 annual itinerant operations. Table 5-4 below summarizes the current itinerant operations by charter.

Upon analysis of this data, the number of charter jet operations does not meet the critical design airplane definition by individual airplane, family, or takeoff weight grouping. On the other hand, business jet aircraft conduct approximately 2,400 annual itinerant operations. These aircraft will be used for determining the runway length needed to meet present demand.

For the future APOE designation, the total number of charter operations does exceed the 500 operations threshold (as presented in Table 5-4); however, this is a future demand requirement and a separate runway length discussion is included later in this Chapter.

2. The use of this AC is mandatory for airport projects receiving Federal funding.

Table 5-4. Charter Aircraft Operations				
Charter Aircraft	MTOW	Approach Category	Design Group	Base Year (2007 Ops.)
EMB-145	42,328	C	II	72
B737-800	172,500	C	III	68
CRJ-200	53,000	C	II	50
B737-700	153,000	C	III	34
B737-300	138,500	C	III	25
DC-9-15	90,700	C	III	25
A320-200	150,000	C	III	15
B727-200	209,500	C	III	14
B757-200	240,000	C	IV	13
A319	154,322	C	III	13
FD-328	33,516	C	II	8
B737-200	128,600	C	III	2
MD-11	630,500	D	IV	1
Total Ops.				340

Step 2. Identify the airplanes that will require the longest runway lengths at maximum certificated takeoff weight (MTOW).

When the MTOW of the critical design airplane for runway length is 60,000 pounds or less, runway length requirements are determined according to a family of aircraft. Of the 2,400 business jet operations, approximately 2,200 operations were conducted by aircraft weighing less than 60,000 pounds. The balance of operations (less than 200) are conducted by large business jet aircraft with a maximum certificated takeoff weight greater than 60,000 pounds such as the Gulfstream IV and V.

Step 3. Determine the method that will be used for establishing the recommended runway length.

AC 150/5235-4B provides two separate groups of aircraft according to performance capability. The two groups are those "Airplanes that Make Up 75 Percent of the Fleet" and the "Remaining 25 Percent of Airplanes that Make Up 100 Percent of the Fleet". Aircraft within the 100 Percent grouping include the Citation S/II, Citation X, Learjet 55, and the Hawker 800. These and other similar size aircraft conduct approximately 790 annual itinerant operations and will be used to determine if the existing runway length can accommodate present-day demand.

Having established the critical group of aircraft, the useful load must be determined. Useful load consists of the cargo, passengers, baggage, and fuel that can safely be carried by the aircraft. At airports where there is not sufficient runway length for takeoff and landing operations, operators must reduce the aircraft's useful load. During the summer months, when air temperatures are warm, aircraft operators may have to reduce the payload or fuel to takeoff using the runway length available.

According to AC 150/5235-4B, two useful load categories are available: 60 percent and 90 percent of the total useful load. Using these two useful load categories, the next step will determine the runway length required.

Step 4. Determine the recommended runway length.

To accommodate 100 percent of the fleet at 60 percent useful load, the unadjusted runway length required is 5,800 feet. To accommodate 100 percent of the fleet at 90 percent useful load, the unadjusted runway length required is 8,950 feet.

These takeoff lengths were determined using the mean daily maximum temperature of the hottest month. For MHK, this is 92.5 degrees Fahrenheit in July. This temperature can be found in the document titled "Climatogrpahy of the United States No. 81 (Kansas)" as published by the National Oceanic and Atmospheric Administration.

At 7,000 feet, Runway 3-21 can accommodate 100 percent of the aircraft fleet operating at 60 percent useful load, but will not allow those same aircraft to operate at 90 percent useful load. This supports the Forecast Chapter's findings that approximately 76 percent of business jet travel was within 500 nautical miles of MHK. With a longer runway, business jets departing from airports more than 500 nautical miles away could utilize MHK without weight restrictions.

The landing length required is 5,500 feet for the 60 percent useful load group and 7,000 feet for the 90 percent useful load group. In other words, the current runway length provides enough landing distance to accommodate all arriving aircraft.

Step 5. Apply any necessary adjustment to the recommended runway length.

Adjusting the above takeoff lengths to account for the elevation change between the high and low points along the runway centerline, the following runway lengths result:

- 5,910 feet for 60 percent useful load
- 9,060 feet for 90 percent useful load

No further adjustments to the landing lengths determined in Step 4 are necessary as these are the maximum landing lengths allowed by AC 150/5235-4B. The present runway length of 7,000 feet can accommodate the landing distance required by 100 percent of the aircraft fleet operating at 90 percent useful load. Table 5-5 summarizes the takeoff and landing lengths required.

Runway Length - Business Jet Needs

Before a recommended runway length to meet current aviation demand can be made, a discussion of aircraft and their respective travel distances is necessary.

As discussed in Chapter 2, Forecast of Aviation Demand, the longer an aircraft's travel distance (or stage length), the heavier the takeoff weight since more fuel is required to reach its destination which necessitates a longer runway length for takeoff. At its current length of 7,000 feet, Runway 3-21 is capable of accommodating the takeoff requirements of most business jet aircraft in the fleet. This supports the Forecast Chapter's finding that nearly 76 percent of business jet travel is within 500 nautical miles of MHK.

Table 5-5. Runway 3-21 Takeoff and Landing Lengths

	75% of Fleet		100% of Fleet	
	60 percent useful load	90 percent useful load	60 percent useful load	90 percent useful load
Takeoff Length (feet)	4,960	6,910	5,910	9,060
Landing Length (feet)	5,500	7,000	5,500	7,000

Note: Takeoff lengths adjusted for elevation difference and landing lengths adjusted for wet runway condition.

Table 5-6. Base Year Itinerant Operations for Business Jets in the "Remaining 25 Percent" Category				
Aircraft	Max. Takeoff Weight (lbs.)	Operations by Stage Length		
		Stage 1	Stage 2	Stage 3
LearJet 55	21,500	80	80	79
Raytheon Hawker 800	28,000	56	56	56
Citation X	34,500	48	48	48
Total Operations		184	184	183

*These aircraft are depicted in Figures, 5-12, -13, and -14, respectively.

If a 2,060-foot extension were to be constructed, business jets departing from airports more than 500 NM away (Stage Length 2 and greater) could utilize MHK without any weight restrictions. However, as summarized in Table 5-6 below, the Forecast Chapter revealed that less than 400 current business jet operations are within Stage Length 2 and above.

As operations by these aircraft do not meet the 500 itinerant operations threshold established by FAA criteria, extending Runway 3-21 to accommodate this category of aircraft is not justifiable. Were MHK to meet the 500 operations requirement, MHK's location in the Eureka Valley appears to be a limiting factor for runway length. As discussed at the April 2008 PAC meeting, terrain, man-made features, and other airspace and runway space challenges exist and extending Runway 3-21 to provide 9,060 feet of takeoff length does not appear to be physically feasible.

Runway Length - Charter Aircraft Needs

In January 2008, HNTB discussed runway needs with various airport users including ExpressJet, a charter aircraft operator. ExpressJet operates two versions of the EMB-145 regional jet: the XR and the LR. At its present length of 7,000 feet, Runway 3-21 can accommodate the XR version without any takeoff restrictions. The LR version operates with a maximum takeoff weight restriction. Generally speaking, ExpressJet suggested

Figure 5-12. Learjet 55

Figure 5-13. Raytheon Hawker 800

Figure 5-14. Citation X

Table 5-7. Runway 3-21 Pavement Strength Rating	
Maximum Takeoff Weight and Main Gear Configuration	Representative Aircraft
270,000 pounds with dual tandem wheel (DT) loading	B757-300 (Figure 5-2)
90,000 pounds with dual wheel (DW) loading	Gulfstream V (Figure 5-3)
45,000 pounds with single wheel (SW) loading*	Embraer 145 (Figure 3-4)

* For all practical purposes, SW strength rating is sufficient for all aircraft with single wheel main gears.

that Runway 3-21 be extended to 7,500 feet to better support the takeoff needs of regional jet aircraft like the LR version.

Unfortunately the EMB-145 conducts less than 40 annual operations and does not meet the FAA design aircraft requirement of 500 itinerant operations. Even if combined with other charter aircraft weighing 60,000 pounds or less that operate in Stage Length 2 and higher, operations remain well below the FAA requirement.

Recommended Length of Runway 3-21 to Meet Present Demand
Based on present-day demand, additional runway length is not recommended at this time. Aircraft operations do not meet the 500 annual itinerant operation criteria established by the FAA so any runway extension is not eligible for FAA participation.

While a future runway length discussion is presented later in Chapter 5, it is worthwhile to note that business jet operations conducted by the LearJet 55, Hawker 800, Citation X, EMB-145 and other aircraft weighing less than 60,000 pounds are forecast to approach the 500 itinerant operations threshold by 2017 and exceed 600 operations by 2027. Given that this is 20 years in the future and considering the dynamic nature of the aviation industry, it is prudent to consider having the next Master Plan Update review the data presented herein and revisit the runway length discussion.

Runway 3-21 Width
FAA design standards for ARC C-II require a 100-foot wide runway. Runway 3-21 is 150 feet wide and exceeds this requirement but meets the standard for the recommended future civil design aircraft.

Runway 3-21 Pavement Strength
Based on a visual inspection, the runway pavement is in good condition and is performing well. This is quite remarkable since more than half of the pavement is original construction dating back to 1963. When also considering the 1979 extension and widening project, the average age of the runway is 36 years old. By comparison, when constructing airfield pavements FAA standards require a pavement design life of 20 years. By providing nearly twice the longevity it was originally intended for, Runway 3-21 has served the aviation community well.

A few areas of the runway required resealing of the pavement joints. Joint resealing should be coordinated with the FAA to determine if it could be performed as part of the Runway 3-21 Shift project's construction phase. If not, a separate joint resealing project is needed.

The last time a PCI value was calculated for the runway was in 2001 when MHK completed a Pavement Condition Report for all airfield pavements. At that time, an average PCI value of 70 was determined based on data collected in 1998. If a PCI value were calculated today it would be less than 70 as the pavement continues to age while supporting increasing aircraft operations. It is recommended that

another Pavement Management Study be undertaken within the next several years to better assess the pavement conditions and to generate a more accurate PCI value for the runway pavement.

The current runway pavement section accommodates aircraft with various weight and gear configurations. Based upon HNTB's analysis, the recommended runway pavement strength rating is detailed in Table 5-7.

MHK's proactive pavement inspection and maintenance program have contributed to the good pavement condition that exists today. Another mechanism that has helped maintain the pavement is a City ordinance requiring all aircraft with gross landing weights of 110,000 pounds or more to contact the Airport Director prior to landing. The ordinance has resulted in making the City aware of how many "heavy" aircraft are using MHK. Based on HNTB's analysis, this ordinance is no longer necessary and following adoption of the Master Plan Update by City Council, the weight ordinance should be removed from City code. Prior permission rules (PPR) for landing based on weight and gear configuration can be identified in the FAA Airport/Facility Directory (AFD) for North Central U.S.

Runway 3-21 Shoulders
Runway shoulder width of 10 feet meets C-II standards. Paved runway shoulders provide resistance to jet exhaust (blast) erosion of the adjacent turf, support maintenance and emergency vehicle traffic, and accommodate the occasional passage of an airplane veering from the runway. Paved shoulders are recommended for aircraft in Design Group III and higher. The runway's turf shoulders meet Design Group II classification and paved shoulders are not required to meet current demand.

Runway 3-21 Blast Pads
Runway 3-21 is not equipped with blast pads which provide blast erosion protection beyond the runway ends during aircraft takeoff operations. At present, the turf areas beyond the runway ends do not exhibit blast erosion characteristics.

Runway 3-21 Markings, Signage, Lighting, and Approach Lighting Systems
- With the exception of the runway threshold bar markings placed in July 2007, the runway markings are in poor condition. They will be remarked as part of the Runway 3-21 Shift project.
- The RDR signs are in good condition but will be relocated as part of the Runway 3-21 Shift project.
- The HIRL system remains in excellent condition and no improvements are required.
- The FAA-owned approach lighting system (MALSR) for Runway 3 and REIL system for Runway 21 are in good condition.

The MALSR will be relocated as part of the Runway 3-21 Shift project (AIP-35). The on/off operation of the MASLR is pilot controlled only. ATCT cannot control the approach lights which is standard at airports with Category I ILS like MHK. In discussions with the FAA, an entirely new MALSR would need to be installed in order for the ATCT to have control.

5.3.1.2 RUNWAY 13-31
As similar review of the crosswind runway is presented in the next several paragraphs. Runway 13-31 is currently classified as a B-I runway.

Runway 13-31 Orientation
From the wind analysis above, Runway 13-31 is necessary to allow MHK to provide 95 percent wind coverage for the 10.5 knot crosswind. When both runways are combined, MHK is capable of providing the following all-weather wind coverage:
- 98.78 percent wind coverage for 10.5 knot crosswind
- 99.78 percent wind coverage for 13 knot crosswind
- 99.96 percent wind coverage for 16 knot crosswind
- 100.00 percent wind coverage for 20 knot crosswind

For IMC conditions, the dual runway configuration provides greater than 99 percent wind coverage for all crosswind speed categories.

Runway 13-31 Length
Runway 13-31 is necessary to allow small aircraft (ARC B-I and smaller) to operate at MHK when the wind is not favorable to using the primary runway. Aircraft classified as B-I typically have a MTOW of 12,500 pounds or less and can carry less than 10 passengers. At MHK, there is an estimated 23,600 annual operations of B-I and smaller aircraft. For the 10.5 knot crosswind condition, the primary runway orientation allows aircraft to use the runway approximately 94 percent of the time, that is, Runway 13-31 would be utilized the remaining 6 percent of the time. The result is an estimated 1,400 annual operations being conducted by conducted by B-I and smaller aircraft.

To accommodate these aircraft, a runway length of 4,100 feet is required per AC 150/5235-4B. At its present length of 3,800 feet long, the existing runway is 300 feet short of meeting this requirement. To accommodate aircraft that can carry 10 or more passengers and have a MTOW of 12,500 pounds or less, a total runway length of 4,450 feet is needed. Therefore, Runway 13-31 should be extended by 650 feet.

In many cases, the role of a crosswind runway is not only to meet wind coverage requirements, but to also serve as a backup runway when the primary runway is closed for maintenance or reconstruction. This case is applicable to MHK as Runway 13-31 serves as a backup runway for Runway 3-21 for B-II aircraft. Runway 13-31 is planned for a 1,200-foot extension to the northwest (AIP-35 Phase 1 Only - Design) which will increase the runway length to 5,000 feet and can accommodate all aircraft weighing less than 12,500 pounds (MTOW) regardless of seating capacity.

The proposed length of 5,000 feet was based on the performance requirements of the Saab 340 aircraft (depicted in Figure 5-15) operating at 99 percent MTOW on a commercial service route to Kansas City International. A detailed discussion of how the 5,000-foot length was derived can be found in the FAA-approved EA Report.

Figure 5-15. Saab 340

Runway 13-31 Width
FAA design standards for B-I aircraft require a 60-foot wide runway. The crosswind runway is 100 feet wide and exceeds standards.

Runway 13-31 Pavement Strength
As discussed in Chapter 1, the crosswind runway is in poor condition and is restricted to aircraft weighing less than 30,000 pounds. As the runway will be reconstructed in the near future with design commencing in 2008 under AIP-35, a discussion of the Runway 13-31 pavement strength can be found in Section 5.3.2.2.

Runway 13-31 Shoulders
The runway's 10-foot wide turf shoulders meet current B-I standards.

Runway 13-31 Blast Pad
At present, blast pads are not required.

Runway 13-31 Lighting, Markings, and Approach Lighting Systems
As part of the AIP-35 project, the runway lighting, signage, and pavement markings will be replaced and the FAA-owned Runway 31 VASI will be relocated. The Runway 13 VASI will remain in its present location. The approach end of Runway 31 is equipped with a REIL but one is not present for Runway 13; however, a new REIL for Runway 13 is anticipated in the Runway 13-31 Extension project.

5.3.1.3 TAXIWAY SYSTEM

The pavement width, edge lighting, markings, and signage of the taxiway system at MHK were reviewed. Taxiways A, B, C, and D are currently assigned as Airplane Design Group II whereas Taxiway E is Airplane Design Group I.

Taxiway Geometrics

The minimum taxiway width at MHK is 50 feet which meets the FAA standard for Airplane Design Group II. Taxiway turning radii and curve geometry also meets Group II standards. Taxiway shoulder width also meets Group II standards.

Taxiway Pavements

Taxiways A, B, C, and D pavements are in good condition. Taxiway E is in excellent condition west of Taxiway A but in poor condition to the east based on visual inspection. The 2001 Pavement Condition Report confirms this inspection by assigning a PCI value of 41 for this section of Taxiway E. This 790-foot long portion of the Taxiway E pavement requires replacement.

Taxiway Lighting, Markings, and Signage

Edge lights for Taxiways A, B, C, and D are in excellent condition. Edge lights along the entire length of Taxiway E are in poor condition and require replacement. Taxiway centerline markings are in good condition. Runway Hold Position markings on Taxiways A, B, C, and D are also in good condition. The Runway 3-21 Hold Position marking at Taxiway E is in excellent condition. Enhanced taxiway centerline markings will be placed at each runway Hold Position markings in spring 2008.

In general, the 49 airfield signs associated with the two runways, taxiways, and aprons, are in good condition. Per FAA Part 139 inspection comments, the directional sign panel at Taxiway B (Sign No. 5) should be corrected from "AA" to "A". At present, the sign could be interpreted by pilots to read Taxiway AA instead of Taxiway A. Table 5-8 summarizes the current and proposed taxiway designations.

5.3.1.4 TAXILANES

The taxilanes surrounding the private and public use hangars in the GA Complex are in poor condition based upon visual inspection and require reconstruction. According to the 2001 Pavement Condition Report, the majority of these taxilanes were constructed in the early 1960s. The Report determined that all but one of these pavements had zero to five years of useful life remaining. One area of pavement was constructed in 1979 and was estimated to have 10 to 20 years of life remaining. Reconstruction of the majority of the taxilanes is warranted and will be included in the ACIP.

5.3.1.5 APRONS

The GA Apron appears due for rehabilitation given its present condition and age. A new asphalt surface will correct the areas that drain poorly. Pavement markings are in fair condition and include a non-standard compass pad painted by an aviation organization. When a new asphalt pavement is constructed, all apron markings will be replaced.

According to FAA planning criteria, approximately 6,300 square yards of apron space is required to meet current itinerant aircraft parking demand. The GA Apron measures 18,525 square yards and is capable of accommodating current itinerant aircraft demand. A copy of the FAA apron size calculations spreadsheet is included in Appendix C.

Based on the assessment presented in the Inventory Chapter, several improvements to the Terminal Apron are recommended. These improvements include replacement of concrete panels adjacent to Terminal Building. These panels are moving vertically and are preventing exterior doors from opening properly which is a fire safety. The movement appears to be the result of subgrade soil frost-heave. Figures 5-16 and 5-17 depict the existing conditions.

No other areas of the Terminal Apron pavement are exhibiting this condition (most likely because they consist of a different pavement

Table 5-8. Taxiway Redesignations		
Taxiway	Current Designation	Proposed Designation*
Parallel Taxiway to Runway 3-21	A	A
Entrance Taxiway at Runway 3 End	A	A
Bypass Taxiway at Runway 3 End	n/a	B
Exit Taxiway B	B	C
Exit Taxiway D	D	D
Bypass Taxiway at Runway 21 End	n/a	F
Entrance Taxiway at Runway 21 End	A	A
Parallel Taxiway to Runway 13-31	E	G
Entrance Taxiway at Runway 13 End	E	G
Exit Taxiway to Runway 13-31	n/a	H
Entrance Taxiway at Runway 31 End	n/a	G
Taxiway C	C	n/a

** Re-designation of the taxiways will require an update of the Part 139 Signage and Marking Plan and the ALCMS graphic in the ATCT.*

Figure 5-16. Slab Heave at Exit Door

Figure 5-17. Slab Heave at Roll-up Door

section than those adjacent to the Terminal Building). The Terminal apron concrete pavement joints need resealing and remarking of the entire apron is in order as the markings are faded and are barely visible.

Lastly, the Kansas Air Center has expressed an interest in installing aircraft tie downs that could accommodate smaller itinerant aircraft like the single-engine Cessna 182. The current tie downs are configured for larger aircraft exclusively. When the apron improvements occur, it would be cost effective to install the smaller tie downs as part of that work.

The Deployment Apron was constructed in 2007 and is in excellent condition.

5.3.2 LONG TERM AIRFIELD FACILITY NEEDS TO ACCOMMODATE FORECAST DEMAND

The needs identified in this section of the Facility Requirements chapter respond to accommodating future demand. Following the format set forth in Section 5.3, this section will compare two future possibilities for MHK: the non-APOE and the APOE designation. In the event MHK becomes the APOE, Runway 3-21 and its associated taxiway system will required additional improvements beyond the non-APOE case. The ultimate classification of Runway 13-31 and its associate taxiways are independent of whether the MHK becomes the APOE or not and are, therefore, not included in Table 5-9 and discussed separately thereafter.

5.3.2.1 RUNWAY 3-21 AND ASSOCIATED TAXIWAYS

As identified in Table 5-9, the length, pavement strength, shoulder width and material, and the blast pad elements of Runway 3-21 require improvement to meet future demand.

Runway 3-21 Length

Should MHK serve as the APOE, charter jet operations are projected to increase significantly from 340 to nearly 1,000 annual itinerant operations. In this scenario, the critical aircraft is the B757 family as it is expected to conduct nearly 440 itinerant operations per year. The B737 is the second busiest aircraft with approximately 390 operations. Table 5-10 summarizes the operations changes from the Base Year to the APOE Year.

Beginning in the year 2017, there are projected to be the following annual operations:

- 130 operations conducted by C-II aircraft,
- 400 operations by C-III aircraft,
- 440 operations by C-IV aircraft, and
- 32 operations by aircraft larger than C-IV.

As discussed in Section 5.2.1, the B757 family is critical design aircraft and to determine the ultimate runway length required to support this aircraft, HNTB sought input from Fort Riley, the aircraft users. In response, Fort Riley prepared a memo identifying the optimum runway length and other airport improvements needed to meet their operational needs.

In short, an ultimate length of 8,000 feet for Runway 3-21 is desired along with 1,000-foot long paved overruns at each end of the runway to further increase the takeoff weight capabilities. This would allow the pilot to use a value of 9,000 feet in his takeoff weight calculations. A copy of the Ft. Riley Runway Memo can be found in Appendix C.

In the scenario where MHK does not become the APOE for Ft. Riley, projected itinerant operations by business jets and charter aircraft remain virtually unchanged from Base Year numbers. In the "no APOE" scenario, approximately 470 operations are forecasted to be conducted in the year 2027 by aircraft weighing more than 60,000 lbs. Of this total, aircraft operations by ARC are as follows:

- 14 operations by C-IV aircraft
- 326 operations by C-III aircraft
- 130 operations by C-II aircraft

As such, justification for increasing the runway length in the future does not exist as no grouping combination of aircraft meets the FAA design aircraft/family threshold of 500 itinerant operations. Given the dynamic nature of the aviation industry, it is prudent to have the next Master Plan Update review the data presented herein and revisit the runway length discussion.

Table 5-9. Ultimate Runway 3-21 and Associated Taxiway Improvements		
	Ultimate Designation	
	No APOE	APOE
Ultimate ARC	C-III	C-IV
Design Aircraft (civilian)	C-III Family	B757-300
Design Aircraft (military)	C-130J-30	C-130J-30
Runway 3-21	Needed Improvements	
Runway to Taxiway Separation	None. Meets requirement of 400 feet.	
Runway to Aircraft Parking Separation	None. Meets requirement of 500 feet.	
RSA width	None. 500 feet meets standard.	
RSA length prior to threshold	None. 600 feet meets standard.	
RSA length beyond runway end	None. 1,000 feet meets standard.	
Runway OFA width	None. 800 feet meets standard.	
Runway OFA length beyond runway end	None. 1,000 feet meets standard.	
Length	None. Maintain 7,000 feet to accommodate C-III aircraft operations.	Extend to 8,000 feet with 1,000-foot paved overruns at each end.
Width	None. Current width exceeds requirement of 100 feet.	None. Current width meets requirement of 150 feet.
Pavement Strength	270,000 (DT), 90,000 (DW)	270,000 (DT), 90,000 (DW)
Shoulder Width	Widen from 10 feet to 20 feet.	Widen from 10 feet to 25 feet.
Shoulder Material (1)	Currently turf, recommend paving.	Currently turf, recommend paving.
Runway Blast Pad	A 140-foot wide by 200-foot long pad is recommended.	A 200-foot wide by 200-foot long pad is recommended.
Taxiways	Needed Improvements	
Taxiway to Taxiway Separation	None. Parallel taxiways do not exist at MHK, but 152-foot centerline separation is required for Group III.	None. Parallel taxiways do not exist at MHK, but 215-foot centerline separation is required for Group IV.
Taxiway Centerline to Object Separation	None. Meets requirement of 93 feet.	None. Meets requirement of 129.5 feet.
Taxiway Safety Area Width	None. Meets requirement of 118 feet.	Increase to meet 171-foot requirement.

Table 5-9. Ultimate Runway 3-21 and Associated Taxiway Improvements (Continued)		
	Ultimate Designation	
	No APOE	APOE
Taxiway OFA Width	None. Meets requirement of 186 feet.	Increase to meet 259-foot requirement.
Taxiway A (Parallel) width and turn geometry	None. 50-foot width (2) and turn geometry meets standard	Widen to 75 feet and upgrade turn geometry.
Taxiway A (Runway 3 End) width and turn geometry	None. 65-foot width and turn geometry meets standard.	Widen to 75 feet and upgrade turn geometry. Turn geometry to be improved as part of Runway 3-21 Shift (AIP-35).
Taxiway A (Runway 21 End) width and turn geometry	None. 70-foot width and turn geometry meets standard.	Widen to 75 feet and upgrade turn geometry. Turn geometry to be improved as part of Runway 3-21 Shift (AIP-35)
Taxiway B width and turn geometry	None. 65-foot width and turn geometry meets standard.	Widen to 75 feet and upgrade turn geometry.
Taxiway C width and turn geometry	None. 50-foot width (2) and turn geometry meets standard	Widen to 75 feet and upgrade turn geometry.
Taxiway D width and turn geometry	None. 75-foot width and turn geometry meets standard.	Width meets standard but need to upgrade turn geometry.
Pavement Strength	Match Runway 3-21 strength.	Match Runway 3-21 strength.
Shoulder Width	Widen from 10 feet to 20 feet.	Widen from 10 feet to 25 feet.
Shoulder Material (1)	Currently turf, recommend paving.	Currently turf, recommend paving.

1. The FAA recommends paved runway and taxiway shoulders for Airplane Design Group III and higher. For the purpose of developing a conservative capital improvement program, paved shoulders shall be incorporated into the future airport configuration. Paved runway and taxiway shoulders are required for Airplane Design Groups V and VI.
2. The standard taxiway width for airplanes in Airplane Design Group III is 50 feet; however, for airplanes in that group with a wheelbase of 60 feet or longer, the standard taxiway width is 60 feet. The B727 is the only aircraft presently operating at MHK with such a wheelbase; however, it is being phased out for more efficient equipment and is not expected to operate at MHK the future. Therefore, the future taxiway widths shall meet the 50-foot standard.

Runway 3-21 Pavement Strength

The pavement strength loadings recommended in Section 5.3.1.1 remain appropriate for the ultimate runway needs. As mentioned in that same section, the age of the runway suggests planning for its eventual reconstruction is sensible. The future runway pavement section will support aircraft weighing 100,000 pounds or more and, if reconstructed with concrete, shall include a stabilized subbase as required by FAA pavement design standards. Stabilized subbase material includes cement treated base, econocrete, or asphalt. The existing Runway 3-21 pavement section includes a 6-inch thick crushed aggregate subbase which is not classified as stabilized.

Table 5-10. Charter Aircraft Operations					
Charter Aircraft	MTOW	Approach Category	Design Group	Base Year (2007 Ops.)	APOE (2017 Ops.)
EMB-145	42,328	C	II	72	72
B737-800	172,500	C	III	68	240
CRJ-200	53,000	C	II	50	50
B737-700	153,000	C	III	34	136
B737-300	138,500	C	III	25	10
DC-9-15	90,700	C	III	25	0
A320-200	150,000	C	III	15	5
B727-200	209,500	C	III	14	0
B757-200	240,000	C	IV	13	252
A319	154,322	C	III	13	5
FD-328	33,516	C	II	8	8
B737-200	128,600	C	III	2	0
MD-11	630,500	D	IV	1	24
B767-400	450,000	D	IV	0	8
B757-300	270,000	C	IV	0	184
Total Ops.*				340	994

*Per the Forecast Chapter, Table 3-4, total operations are six operations higher than those reflected as EMB-120 it is a turboprop and was removed.

Runway 3-21 Shoulders

Ideally, widening and paving the runway shoulders should coincide with the next major rehabilitation of the runway edge lighting system. In this way, the shoulder's pavement section could be constructed in phases as the various edge light components are installed and a lower construction cost will result. The next major runway edge light system rehabilitation is planned for the year 2020 (15 years after its installation date). Paving the runway shoulders in 2020 will serve to meet future demands at the appropriate time as MHK could serve as Ft. Riley's APOE in 2017.

Runway 3-21 Blast Pad

Installing a blast pad at each end of Runway 3-21 has less logistical concerns as there are only a few runway (threshold) lights within the blast pad area. For the purposes of timing, it is assumed that erosion off each runway end can be managed by airport maintenance staff and construction of the blast pad will coincide with the construction of the paved runway shoulders.

Taxiway A Width

All taxiways exceed the standard width and turn geometry for Airplane Design Group III. To meet Airplane Design Group IV requirements for the APOE case, however, all taxiways associated with Runway 3-21 will be required to be 75 feet wide and will require larger turning radii, fillets, and lead-in dimensions. Widening of Taxiway A could be accomplished in three ways:

- **Widen by 25 feet to the west (runway side).** This would undesirably move the taxiway centerline to the west and reduce the distance between the taxiway and

runway centerlines below the minimum 400-foot separation. A westward widening of Taxiway A is not an option for it would bring MHK below FAA standards.

- **Widen by 25 feet to the east (terminal side).** This alternative would increase the runway-taxiway centerline separation and exceed FAA standards. To accommodate the one-side widening, the taxiway edge lights would need to be moved 25 feet to the east to remain 8 feet from the new edge of pavement.
- **Width both sides.** Half of the 25 feet would be place on the west and east sides of the taxiway. This option would retain the 400-foot runway-taxiway separation. However, as new pavement would be needed on both sides of Taxiway A, repositioning of the edge lights on the east and west side would be necessary. Should the new pavement be constructed with concrete pavement, the new slab dimensions will be smaller than existing and the concrete joint patterns will not match. There are several pavement design challenges associated with a "both sides" widening. Lastly, this option will result in a higher construction cost compared to a one-sided widening due to the relocation of the edge lights on both sides and the two separate paving areas.

For planning purposes, widening to the east will be incorporated. This will place the ultimate Group IV OFA limit 142 feet from the current taxiway centerline. At present, the Group II OFA limit is located at 66 feet. The wider OFA will not impact the newly constructed Army Deployment Ramp as non-movement area markings are located 162 feet from the current taxiway centerline. Similarly, the Terminal Apron will not be affected as the ultimate Group IV OFA limit is located within the grass island.

Taxiway C Signage
Taxiway C connects Taxiway A to the Terminal Apron. With the military's new Deployment Apron built south of and contiguous to Taxiway C and the future plan to expand the Terminal Apron to the west towards Taxiway A, the pavement/grass delineation of Taxiway C will no longer exist. Reconfiguration of the Part 139 guidance signs should be performed when the Terminal Apron is expanded or when Taxiway A is widened to 75 feet.

Taxiway Pavement Strength
The pavement strength of the taxiway system shall be set equal to the runway pavement strength.

Taxiway Shoulders
Taxiways shoulders will require widening to meet Group III and IV standards. Taxiway shoulders should be upgraded from turf to a paved surface to guard against erosion due to aircraft propeller wash and jet engine exhaust. Paved are planned for the year 2020 to coincide with a taxiway edge light rehabilitation project.

5.3.2.2 RUNWAY 13-31 AND TAXIWAY E
The ultimate length, width, classification, and pavement strength are discussed in this section along with a synopsis of extending Taxiway E to the northwest to the ultimate approach end of Runway 13.

Runway 13-31 Length
As discussed in the previous section, the crosswind runway serves a dual purpose: serve as a backup runway for commercial service in the event Runway 3-21 is temporarily unavailable and meet wind coverage requirements for smaller aircraft. When Runway 13-31 is extended to a length of 5,000 feet and its width reduced to 75 feet, it will be upgraded from a B-I to a B-II classification and with a new pavement section it will be capable of supporting the current commercial service aircraft, the Beech 1900, and its potential replacement, the EMB-120.

With a maximum runway length of 5,000 feet and adjusting for the effective runway gradient, 4,790 feet would be available for takeoff. At this length, the EMB-120 would be limited to a takeoff weight of approximately

4,000 pounds[3] which is approximately 95 percent of the MTOW which limits the range of the aircraft. However, reducing load capability from 100 percent to 95 percent of the MTOW may reduce the loading capability but may not limit its usage at MHK due to the stage lengths that the aircraft would perform. This runway length analysis would need to be confirmed with the airline as MHK's "mean daily temperature of the hottest month" is more than 3 degrees F. higher than published by the airplane manufacturer. Should the EMB-120 be used to provide service to another airport besides MCI, takeoff restrictions could be necessary. The EMB-120 would be capable of landing on a 5,000-foot long runway at maximum landing weight.

As discussed in the Forecast Chapter, there is real potential for MHK to be served by a regional jet such as the EMB-145 or similar C-II aircraft. The Chief Engineer at ExpressJet (who operates the EMB-145) indicated that on days when the 5,000-foot long runway was required for use (most likely due to crosswind limitations on the main runway) the EMB-145LR and EMB-145XR would not be able to operate at a full passenger complement (to DFW for example). The realistic loads would be between 30 and 40 passengers on an EMB-145LR and 35 to 42 passengers on an EMB-145XR, but it would depend entirely on the obstacle profile of the runway to determine which end of the passenger spectrum the actual number would fall.

Consequently, the benefit of having Runway 13-31 extended to 5,000 feet is significant. It would enable an increase for arrivals during inclement wind situations as well as departures during most times of the year when weather and temperature conditions do not impose a payload penalty.

3. Per Embraer manufacturer data, the basic operating weight of the EMB-130 with a full 30-passenger compliment equates to an airplane weight of approximately 21, 800 pounds.

Runway 13-31 Width

The Beech 1900, EMB-120, and Saab 340 are classified as B-II aircraft and require a runway width of 75 feet. As previously mentioned, the ultimate width shall be 75 feet.

Runway 13-31 Classification

The 5,000-foot by 75-foot runway is the optimum length and width for Runway 13-31 as it accomplishes the most objectives in terms of capacity, efficiency, and environmental and capital cost as demonstrated in the EA for Runway Safety Area Improvements/ Runway Extension (AIP-24). Due to several constraints, it appears highly improbable to upgrade Runway 13-31 to ARC C-II standards to serve as a full substitute runway for regional jets. The following issues are revealed when analyzing the possible runway upgrade:

- The runway length is limited by terrain to the northwest and the bluff east of the Kansas River. This terrain adversely impacts aircraft approach and departure climb-out gradients. The ultimate length of 5,000 feet appears to be the maximum achievable for Runway 13-31.
- On the ground, the runway is bounded by the Eureka Valley Tributary on the north and K-18 on the south. Based on the EA, relocation of the Eureka Valley Tributary does not appear likely and relocation of K-18 is even less practical. The distance between these two features along the existing extended runway centerline is approximately 6,075 feet. Subtracting out the standard 1,000-foot long by 800-foot wide runway safety area for each runway end, results in a runway length of 4,075 feet at best. Even if the Eureka Valley Tributary were to be enclosed or relocated, the runway length is limited by the bluffs surrounding MHK.
- If Runway 13-31 were to be moved towards the ATCT, a runway length of 4,500 feet would result which is still less than the 5,000-foot length provide by the lower B-II classification.
- The 7H:1V Transitional (Part 77) surface would be penetrated by the ATCT to the west and several hangars located east of Taxiway E.

- The minimum distance from the runway centerline to aircraft parking would be increased from 200 feet to 400 feet. This increase would eliminate all aircraft parking positions on the GA Apron and new aircraft parking would be required.
- The detention pond located west of the Approach End of Runway 13 would need to be regraded to provide a standard Runway Safety Area and possibly relocated.
- The "westward" runway move would significantly reduce the amount of developable area east of the Terminal area and eliminate any possible hangar or building construction thereby reducing revenue potential.

Runway 13-31 Pavement Strength
Pavements for light aircraft are defined as those intended to serve aircraft weighing less than 30,000 pounds. The heaviest aircraft forecast to use Runway 13-31 is the EMB-120 with a MTOW of 25,353 pounds; however, from the runway length discussion above, the takeoff weight would be restricted to approximately 24,000 pounds. The next heaviest aircraft is the Beech 1900 with a 16,950-pound MTOW. The runway pavement should also be capable of accepting arrivals of EMB-145. Therefore, the runway pavement strength rating should be 30,000 pounds DW loading. This strength will be able to accommodate all single wheel aircraft classified as ARC B-II or lower.

For a concrete runway, a 6-inch thick pavement would be required to support these and lighter aircraft based on FAA pavement design criteria. Concrete was used for planning purposes; however, the actual runway pavement material used (concrete or asphalt) will be determined through a cost-benefit analysis performed during AIP-35.

Taxiway E
The operational forecast for Runway 13-31 is less than 20,000 per year, which is a commonly held trigger point for consideration of a full parallel taxiway to facilitate movement on the airfield. An extension of Taxiway E towards the approach end of Runway 13 is not required during the 20-year planning period; however, an aircraft turnaround pad should be constructed at the approach end of Runway 13 to improve runway safety. With an aircraft turnaround, aircraft would be provided a dedicated area to turn around rather than on the runway. This is an important element as the runway width will be reduced in the near future. The aircraft turnaround pad should be designed to B-II standards and to the same load bearing capacity as Runway 13-31.

In the ultimate airport configuration, area has been reserved for a full-length parallel taxiway to Runway 13-31 in the event MHK is presented with an opportunity for expansion that is beyond today's expectations. The parallel taxiway to Runway 13-31 is depicted in the ALP Set.

5.3.2.3 APRONS
GA Apron
According to FAA planning criteria, approximately 8,440 square yards of apron space is required to meet future itinerant aircraft parking demand. The GA Apron measures 18,525 square yards and is more than capable of accommodating future itinerant aircraft demand. A copy of the FAA apron size calculations spreadsheet is included in Appendix C.

Terminal Apron
Given the aprons use by military, commercial and GA aircraft and coupled with the lack of apron space during peak periods, it is desirable to expand the Terminal Apron to provide addition space to segregate commercial, charter, and FBO customer aircraft. Expansion of the Terminal Apron capacity will be explored in more detail later in the Master Plan when discussing the possibility of adding a passenger boarding bridge to the Terminal Building.

5.3.2.4 WILDLIFE FENCE
As discussed in Section 2.18 of the Inventory Chapter, the additional wildlife fence is programmed in order to fully enclose MHK property. Full build-out of the wildlife fence will prevent wildlife (especially the deer and

elk population) from entering the aircraft operations areas (AOA).

5.4 SUMMARY OF AIRFIELD FACILITY REQUIREMENTS

Airfield improvements needed to meet present-day demand and maintain current FAA airport design standards were outlined in Table 5-3 but are presented here again as follows:

- Extend and remarking Runway 3-21,
- Extend and reconstruct Runway 13-31,
- Rename taxiways,
- Updating the Pavement Management System/PCI value,
- Reconstruct a portion of Taxiway E
- Rehabilitate the GA Apron,
- Replace Terminal Apron concrete pavement adjacent to the Terminal Building and install additional transient aircraft tie downs,
- Reseal and remark the Terminal Apron,
- Reconstruct T-hangar taxilanes, and
- Install Wildlife Fence (Phase 2)

As summarized in Table 5-8, the airfield improvements needed to accommodate future demand for the APOE and non-APOE cases do not differ greatly. For both cases, an extension of Runway 3-21 is required, runway turf shoulders need to be widened (and possibly paved), and a runway blast pad is needed at each end. Construction of several corporate aircraft hangars is also necessary. For the APOE designation Taxiways A through D need to be widened from 50 to 75 feet to support large charter aircraft operations.

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Chapter Six
LANDSIDE FACILITY PLANNING

Similar to Chapter 5, this chapter identifies several fundamental requirements for landside development. Landside facilities include those facilities that are needed for passengers such as the Terminal Building and public parking. Landside facilities also include hangars and fueling systems needed for aircraft. MHK's Terminal Building, public parking, and aircraft hangars all need to be improved or expanded to accommodate current and future demand.

6.1 PUBLIC PARKING

As indicated in Chapter 4 (Section 4.2), the short- and long term parking lots have capacity challenges and need to be expanded to meet current and future demand. In total, MHK has 132 parking stalls divided among the following areas:

- 40 paved stalls in the center of the terminal road (Short term parking),
- 40 paved stalls partitioned in the area north of the terminal building (Long term parking),
- 52 paved stalls located in the parking area on the south end of the terminal road (Rental Car parking lot) with 30 stalls marked for Hertz and Enterprise use and the remaining 22 available for public use.

A fourth parking area is located between the Terminal Building and the ATCT which is used for airport employees, ATCT staff, and FBO employees and their customers. This parking can accommodate approximate 40 vehicles but only has four striped stalls.

To access the short term parking lot, vehicles must first circle in front of the Terminal Building. Upon exiting, vehicles again pass in front of the Terminal Building. This configuration not only creates unnecessary congestion but is also a safety concern as it increases the potential for pedestrian-vehicle conflicts. Because of its configuration, the short term parking lot is typically less than 40 percent full.

As a result, the long term parking lot typically exceeds capacity. MHK has addressed long term parking demand by providing a gravel lot east of the paved parking spaces for overflow. On average, 10 to 15 vehicles can be found in the overflow lot.

To improve public safety and better utilize the short term parking lot, modifications to its access and egress infrastructure are recommended. A project to reconfigure and expand the short term parking lot is included within the short-term planning period. When completed, this project would expand the short term parking lot capacity from 40 to 148 stalls.

6.2 AIRCRAFT HANGARS

Currently all 43 based aircraft reside in individual or community hangars and MHK intends to continue its trend of providing hangars for all based aircraft. Given the projected demand for hangar space is for sophisticated aircraft, it is highly unlikely that aircraft owners will park their aircraft on an apron. Instead, owners prefer to hangar their aircraft (a major financial investment) and protect it and the sensitive electronic navigation equipment contained within against the elements of weather. Aircraft are also stored for security reasons and to obtain lower insurance premiums. Therefore, the option to provide additional hangars (as opposed to apron storage) will be the only avenue explored.

Hangar conditions vary at MHK. The 7-unit T-hangar (Building 12) and the 10-unit T-Hangar (Building 14) are in poor condition and require

replacement. In 2008, the City demolished Building 14 due to its long-standing poor condition. The City intends to replace this 10-unit T-hangar in the future. Given the existing condition of the remaining hangars and the projection of based aircraft presented in Chapter 3 (Table 3-6), MHK will need to provide capacity for additional based aircraft.

Excluding the recently removed Building 14, MHK is capable of meeting future aircraft storage demand for small single- and multi-engine airplanes. To meet future "corporate" hangar demand, MHK will need to construct hangars for six turboprop aircraft, two jets, and two helicopters. New hangar constructions should be performed according to the following schedule:

Short-term (2007 - 2011)
- Replace existing Building 12 with equivalent 7-unit T-Hangar.
- Replace existing Building 14 with equivalent 10-unit T-Hangar.

Intermediate (2012 - 2016)
- Replace existing Building 8 with one small hangar (60 ft. x 60 ft.).
- Replace existing Building 9 with equivalent 7-unit T-Hangar.
- Two Small Hangars (60 ft. x 60 ft.) for twin-engine turboprop storage.

Long-term (2017 - 2027)
- Two Large Hangars (75 ft. x 75 ft.) for business jet storage.
- Four Small Hangars (60 ft. x 60 ft.) for twin-engine turboprop storage
- Two Small Hangars (60 ft. x 60 ft.) for helicopter storage.

The total public use hangar space needed over the 20-year planning horizon is 40,050 square feet. MHK should also plan for a new hangar to accommodate commercial service aircraft such as the current Beech 1900 as well as possible future aircraft similar to the EMB-120, Saab 340, and EMB-145. With the severe and quick-changing weather patterns witnessed in the Midwest, it is important to have a facility of this type to store large itinerant aircraft. This hangar would be located north of the ATCT.

Several factors must be analyzed to make informed decisions on where to locate future hangars. These factors include: aircraft access routes, vehicular access, potential for aircraft-vehicle conflict, available utilities, impacts on other airport development, and proximity to the Terminal Building (for the commercial aircraft hangar). While these parameters will be finalized during the preliminary engineering phase of each hangar project, HNTB has analyzed general site and planning considerations and utility locations for the proposed hangars as part of this Master Plan Update.

Replacement and installation of new T-hangars in the vicinity of existing T-hangars does not present any major challenges. Typically, the one utility included with T-hangar construction is electrical power which is readily available from a existing overhead power lines. Construction of new small/large hangars during the Intermediate and Long-term phases is planned for two areas: north of the ATCT Building and west of the Vehicle Maintenance Building. Water, sanitary sewer, gas, electric, and communications lines are in place providing service to existing buildings and are within reach of the proposed hangar locations.

1939 Stone Hangar Assessment

In June 2008, representatives from Bowman Bowman Novick, Inc. and Orazem & Scalora Engineering, P.A., subconsultants to HNTB, toured the 1939 Stone Hangar with the Airport Director and discussed the condition of the existing building, which is depicted in Figure 6-1.

From the visual inspection, the overall condition of the hangar building is generally good and it appears structurally sound. The mechanical and electrical systems are outdated and in need of replacement. Architecturally, the building is an important landmark of the airfield and one that merits preservation.

To allow the building to continue to function as a leased aircraft service/storage facility or be

Figure 6-1. 1939 Stone Hangar

adaptively reused for some related function, a preservation/renovation project is proposed. This project would include stabilizing the existing structure and replacing windows, finishes, plumbing fixtures, and the HVAC and electrical systems. A cost estimate to renovate the Stone Hangar has been prepared and included in the Airport Capital Improvements Program outlined in Chapter 7. Specific improvements include the following:

- Approximately 30% of the stone is in need of tuck pointing with lime mortar. All of the stone should receive a clear sealant.
- The exterior is in need of painting where painted surfaces exist.
- The roof of the building was damaged in a 2008 hail storm and is scheduled for replacement. The renovation cost estimate includes roof improvements.
- The windows of the building are badly damaged and in need of replacement. The estimate includes replacement windows of the same general sight line of the divided lights and includes insulating glass and aluminum frames.
- Interior finishes in the tower areas are in need of plastering and painting and the costs of these improvements are included in the estimate.

6.3 ANCILLIARY FACILITIES

As discussed at the April PAC meeting, expansion of the fuel farm should be planned to accommodate the expected increase in larger aircraft operations related to Ft. Riley troop deployments under the APOE scenario. In 2007, there were an estimated 115 operations conducted by B737 and B757 aircraft. For 2017, these same aircraft are forecasted to conduct more than 800 annual operations.

According to the KAC, an average of 500,000 gallons of aviation fuel is sold annually to meet current demand. Based on this and using the ratio of charter aircraft operations to Jet A fuel tank capacity, it is recommended that space be set aside for four more 20,000 fuel tanks to accommodate future Jet A fuel demand. The area adjacent to and south of the existing fuel farm should be reserved for future expansion. Lastly, fuel is typically delivered via tractor trailer trucks with fuel delivery capacity of 7,500 gallons. As such, any fuel farm expansion should be designed to accommodate these larger vehicles. The existing fuel farm roadway geometrics should be reviewed and improved to maintain a safe operating environment.

6.4 BUILDINGS

Most of the on-airport buildings are in fair to good condition. In reviewing the buildings, the following actions are recommended over the master plan update's planning period:

- Replace GATTS Building. This building was built in 1955 and is in fair condition. It is foreseeable that in the next 20 years it will require replacement with a more energy efficient structure.
- Maintain Stone Hangar. The Stone Hangar was built in 1939 by the Works Progress Administration and it is eligible for listing on the National Register for Historic Structures. Given the Stone Hangar's history and reference as a visual landmark, it is recommended that no major exterior modifications be made to the point that it is no longer recognized as the "stone" hangar.
- Replace Maintenance Shop/Storage. Although in fair to good condition, this building is 45 years old and it is prudent to plan for its replacement. This building is connected to the 7-unit T-hangar (Building

25b). If the T-hangar is replaced in the short term, it may be necessary to provide space between the two structures to meet fire codes. This may necessitate relocating the Maintenance building, the replacement T-hangar, or providing a shorter T-hangar length.

- Replace Airport Vehicle Maintenance Building. The 5-bay, 54-year old structure currently houses all airport maintenance vehicles and meets MHK's basic needs. Although a formal assessment of the building's condition and energy efficiency has not been performed, it is conceivable that within the next 20 years, the building could require replacement.
- Replace SRE Storage Building. In early 2008, the City completed renovations of the former Air National Guard Armory building to store its entire fleet of SRE. Renovations to the office and bathroom spaces were also completed. While these renovations were made to extend the useful life of the 50-year-old facility, planning for its replacement towards the end of the 20-year master planning period is sensible.

Given the need to eventually replace the Maintenance Shop/Storage and Vehicle Maintenance buildings, it is recommended that a single, dual-purpose facility be constructed.

6.5 TERMINAL BUILDING

As detailed in Chapter 4, several areas within the Terminal Building are undersized making it difficult to meet current and forecasted passenger demand. Based on that facility analysis, two preliminary concepts were developed to depict how the Terminal Building could be reconfigured to meet capacity. One concept investigated the renovation and repositioning of the interior spaces while maintaining the original exterior dimensions whereas the other included both interior renovation and expansion.

These concepts were presented and discussed at the first PAC meeting on April 7, 2008.

Current Process for Passenger Check-in and Security Screening

Passengers check in at the airline counter. Checked bags are taken by Airline employee (Airline) and placed behind counter for TSA personnel (TSA). TSA will inspect the bag behind the ticket counter using the Explosive Trace Detection (ETD) device. This is one of two ETD devices with the second one located in the security check point. Once inspection is completed, the passenger's bag is either returned to a location behind the ticket counter or carried through a door into the Airline's back room. The Airline will then place the bag on a luggage cart located in the back room of the airline space.

Passengers are called to the Screening Check Point approximately 20-30 minutes prior to scheduled departure. Screening of passengers and their carry-on bags are conducted through a single point of entry into the secure area. Bags are inspected with the X-Ray machine and passengers pass through a metal detector. MHK has one carry-on baggage X-Ray machine on site. Enplaning passengers will exit the secure area to the aircraft through a single exit. Deplaning passengers enter the secure area through a separate door. The terminal was originally designed to have two boarding gates, but has evolved into one "gate" being used for enplaning and the other "gate" being used for deplaning.

Following this meeting and subsequent discussions with airport administration, these two preliminary concepts were finalized to incorporate an Explosive Detection System and a passenger boarding bridge. The final concepts are illustrated in Figures 6-2 and 6-3.

6.5.1 EXPLOSIVE DETECTION SYSTEM (EDS)

TSA will be successful at providing a new EDS at MHK in 2008 or early 2009. Because of the EDS machine's ability to screen both carry-on and checked baggage, the current passenger check-in and security screening process, which is explained in the sidebar, will be changed.

The near term intent is for the EDS to be installed at the Check Point and replace the

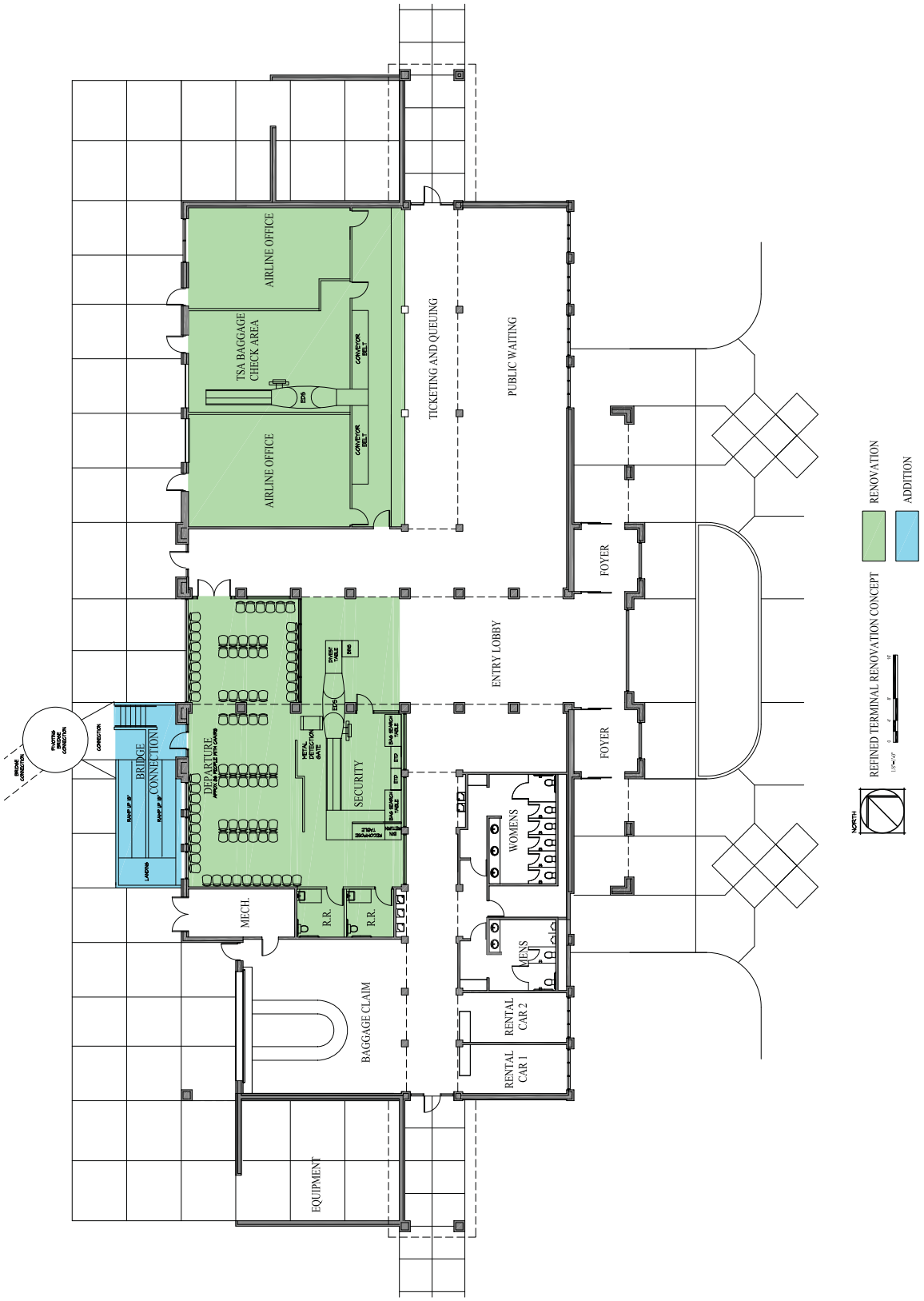


Figure 6-2. Terminal Building Renovation Concept

HNTB

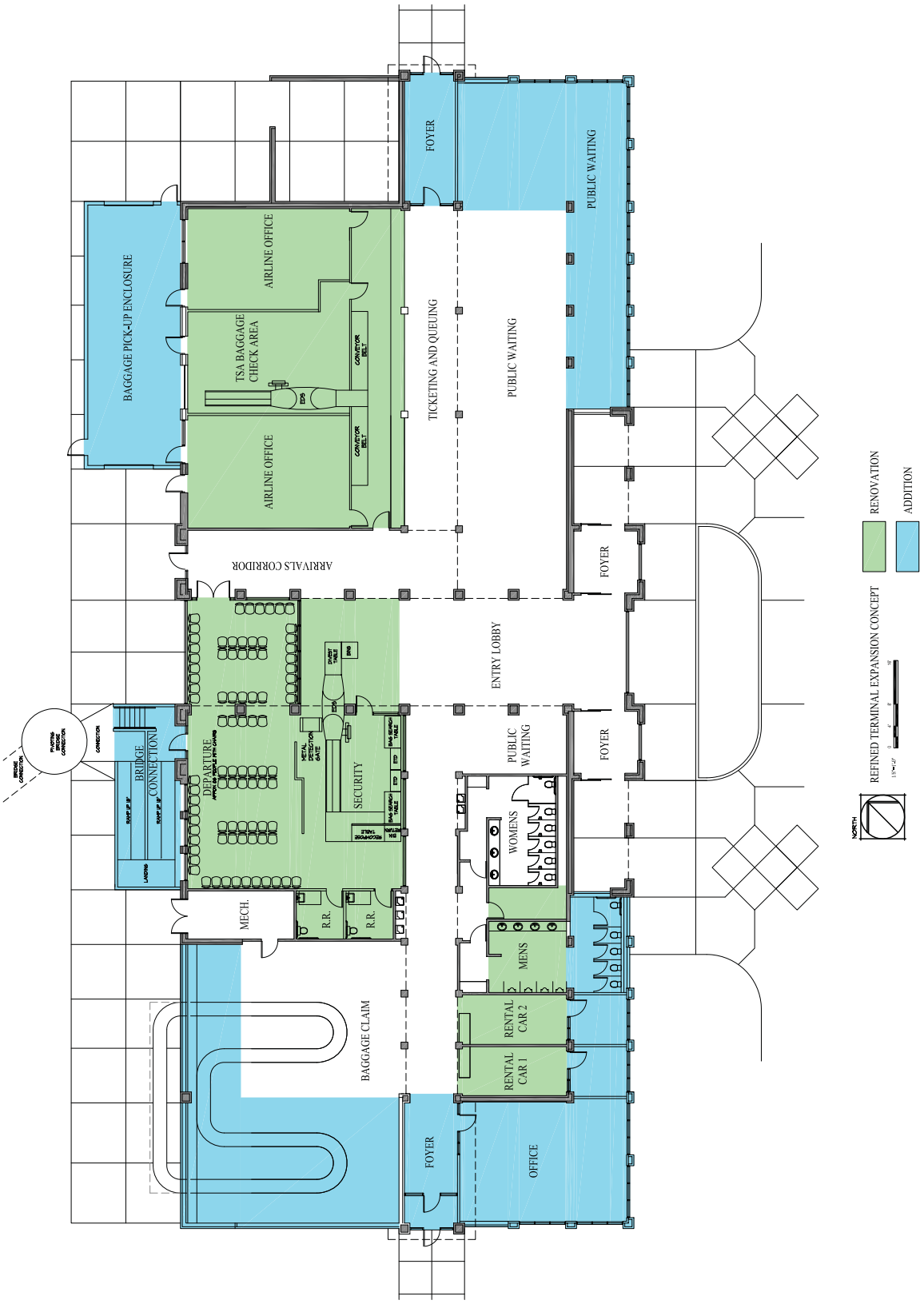


Figure 6-3. Terminal Building Expansion Concept

X-Ray machine. It is expected that once passengers check in with the airline, they will be required to take their checked bag to the TSA at the Check Point. TSA will run the bag through the EDS. When boarding time approaches, passengers will be called to the Check Point as is done currently. Carry-on bags will be inspected through the EDS. The near term EDS arrangement is depicted within the Departure Lounge of both Figures 6-2 and 6-3.

In the long term, the EDS will be used to screen checked baggage. It will be located between the two airline lease areas with a conveyor belt system feeding passenger baggage from both airline counters. Figures 6-2 and 6-3 also depict this long term arrangement. To make this configuration possible, however, the airport administrative office would be relocated. The Terminal Building Concept of Figure 6-2 assumes the airport administrative office would be located in a separate building whereas Figure 6-3 expands the building to retain the administrative office.

6.5.2 TERMINAL BUILDING RENOVATION

The concept depicted in Figure 6-2 reconfigures the interior spaces of the Terminal Building while maintaining the current exterior dimensions. Reconfigured spaces are summarized as follows:

Departure Lounge and Security Renovations. The Departure Lounge would be expanded by converting the Eatery and its kitchenette into additional security, passenger seating, and restroom space. Features of this new space are as follows:

- The area would be renovated to compliment the security needs required by the Transportation Security Administration (TSA). The security checkpoint will occupy a portion of the renovation including new interior storefront walls for enclosing the secure area and maintaining visibility through the space.
- This concept provides approximately 2,260 square feet for departing passengers and security checkpoint operations. This renovated space is greater than the 1,250 square feet identified in Table 4-4 due to the space required by the EDS.
- Approximately 86 seats can be provided for passengers in the renovated Departure Lounge area. Boarding passengers will reside in the departure area after going through the security check point until passengers are allowed to board the airplane.
- The kitchenette would be remodeled to provide restrooms in the secure area for added passenger convenience.
- The departure area also serves as the arrival space for incoming flights and passengers will exit through a secure set of exit doors avoiding departing passengers as much as possible.

Bridge Connection Addition. To accommodate a possible Passenger Boarding Bridge (PBB), the departure area includes a new Bridge Connection addition. Because the PBB's pivot point (rotunda) will be approximately three feet above the Departure Lounge finished floor elevation, this 410 square foot addition includes a ramped ADA section and ADA stair to connect the PBB to the Terminal Building. The area will be enclosed to provide protection from weather and also provide a secure connection while boarding the airplane. Arriving passengers will use this area to deplane into the Departure Lounge and out through secure exiting doors to the Arrivals Corridor.

Passenger Ticketing, Airline Office, and TSA Baggage Check Area Renovation. This 2,320 square foot renovation provides flexibility for several Terminal Building processes. It provides room for two airline companies along with their offices. By relocating the airport administrative offices to another building, the airline space can be expanded. As depicted in Figures 6-2 a two-airline configuration would afford 2,320 square feet which essentially meets the 1,200 square feet per airline estimate presented in Chapter 4 (Table 4-3).

As mentioned previously, the long term plan for the EDS is to use it to screen checked baggage. It will be located in an area occupied by the TSA located between the two airline lease areas (see Figure 6-2). The airline company will check baggage from passengers and place the baggage onto a conveyor belt behind them (one from each airline counter) that feed into the EDS equipment for scanning by TSA staff. Screened baggage would be collected by the airline. To make this airline-TSA arrangement possible, the airport administrative office would be relocated to another on-airport building.

In this concept, the current passenger ticket counter length of 40 feet would be maintained while the ticketing queue space would increase to 580 square feet. This would exceed the space needed by the 50 passenger EMB-145 scenario.

Although the Baggage Claim room was not modified in Figure 6-2, this concept removes the TSA office and returns the Baggage Claim room to its original size. This improves passenger circulation around the baggage conveyor. The current baggage conveyor length was maintained.

6.5.3 TERMINAL BUILDING EXPANSION

In addition to reconfiguring the same interior spaces as the Renovation Concept, Figure 6-3 expands the Terminal Building to meet all space requirements identified in Chapter 4. The expanded building concept also maintains the symmetry intended by the original architectural plan. Improvements provided by this concept include:

Baggage Pick-up Enclosure Addition. Once baggage goes through the EDS, it is collected by airline personnel as described in the previous section. The Expansion Concept however includes a weather-proof location to allow the loading and storage of baggage onto carts. This 860 square foot enclosure would also allow for the parking of airline equipment when not in use.

Public Waiting Addition. This 1,190 square foot addition will accommodate an additional 48 persons (passengers and visitors) using a metric of 25 square feet per person. With this additional space, a total of 2,385 square feet would be allocated for public waiting or a total of 98 people. This would allow the Terminal Building to meet the demand of the EMB-145 aircraft scenario presented in Table 4-2 of Chapter 4.

This additional area could include vending/ lounge area due to the Departure Lounge renovation absorbing the Eatery Room space area. The additional area will provide more public waiting area for passengers before going through the security checkpoint and a location for family or friends to see passengers off or await arriving passengers.

In concert with the Public Waiting addition, the Northeast Foyer would be enclosed and will help delineate the side entrance with the new public waiting area. The Northeast Foyer represents an additional 230 square feet.

Southwest (Office) Addition. This 1,030 square foot addition includes additional office space for airport administration or TSA, rental car office space, and men's restroom expansion itemized as follows:

- As a result of the airline office and TSA baggage check area renovations, airport administrative offices required a new location. The new 660 square foot office space could be used as the new airport administrative offices (or the TSA office should airport administration be located in a separate building). If both offices were located off-site, the office space could be used as a lounge area since the current lounge area (Eatery) would be occupied by the Departure Lounge and Security Renovations.
- Rental car office space was increased another 95 square feet for each tenant and should meet their needs based on the analysis presented in Chapter 4.
- The men's restroom would be increased

180 square feet to provide more fixtures for the possible increase in passengers and visitors per local building code.

In concert with the Office Addition, the Southwest Foyer would be enclosed and will help delineate the side entrance with the office. The Southwest Foyer represents an additional 230 square feet.

Baggage Claim Room Addition. Increasing this area will help facilitate the forecasted increase of passengers and the possibility of larger aircraft with increased baggage capacity. The baggage claim room was expanded to provide an additional 1,270 square feet to provide for a total of 2,085 square feet. A total of 125 linear feet of baggage conveyor is provided.

The baggage claim addition meets the space and conveyor length requirements for the 30-seat EMB 120 scenario. However, the 50-seat EMB-145 scenario requires an estimate 2,300 square feet and 200 linear feet of baggage conveyor. As this concept falls just short of being adequate, a more analysis beyond the master plan level of the baggage room and system is required to determine the exact system configuration needed.

6.5.4 TERMINAL BUILDING SUMMARY

The Terminal Building can be renovated and/or expanded to accommodate the forecasted passenger demands. Table 6-1 summarizes the renovations/additions based on the commercial aircraft type. Terminal Building improvements will be phased over several years in the Airport Capital Improvement Program.

Table 6-1. Terminal Building Renovation/Expansion Schedule

	Aircraft Scenario		
Room Description	Current Demand	30-seat EMB 120	50-seat EMB-145
Departure Lounge and Security Renovations	X	X	X
Construct Bridge Connection Addition			X
Add Passenger Ticketing Counter Length			
Add Passenger Queuing Space			X
Renovate Airline Office Space	X	X	X
Expand Public Waiting Room			X
TSA Space (for checked baggage screening)*	X	X	X
Remove TSA Office from Baggage Claim	X	X	X
Expand Baggage Claim Room		X	X
Lengthen Baggage Conveyor	X	X	X
Add Rental Car Office Space	X	X	X

X = Additional space required to meet demand.
**This would accommodate the long-term plan to locate the EDS between the airline offices.*

6.6 PASSENGER BOARDING BRIDGE IMPACTS TO TERMINAL APRON

To improve the passenger experience, MHK desires to install a passenger boarding bridge (PBB) during the intermediate planning period (2013-2018). Installation of a passenger boarding bridge will improve boarding/deplaning efficiency, enhance airport security, and reduce aircraft emissions when power and preconditioned air system are included. A typical boarding bridge is depicted in Figures 6-4 and 6-5.

Figure 6-4. Typical PBB

Figure 6-5. Aircraft Connected to PBB

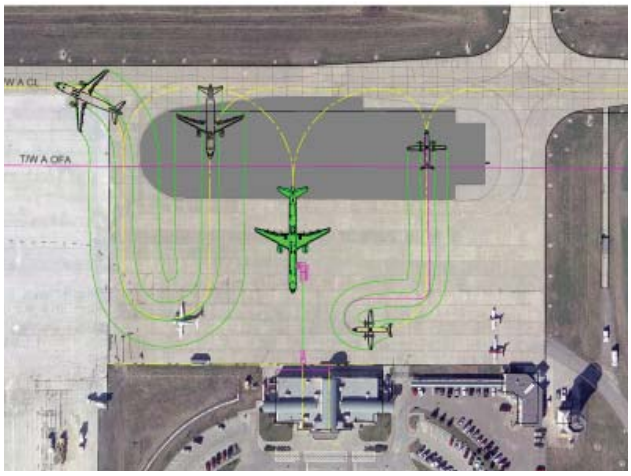
The PBB device has the capability of providing a safe transition for passengers from the terminal building to an aircraft ranging in size from a 50-seat regional jet such as the EMB-145 to the 240-passenger Boeing 757. It is planned that the PBB would be equipped with a 400 Hz converter and an air-handling unit that will provide electrical power and heating/cooling to the aircraft while parked on the ground.

The PBB will require improvements to the Terminal Building. At the interface with the Terminal Building, a pedestal and foundation for the PBB will need to be installed. As the PBB would be several feet above the interior floor elevation, a ramp or switch-back infrastructure would be required. The ramp infrastructure is depicted in the aforementioned terminal building renovation/expansion concepts (Figures 6-2 and 6-3).

HNTB has analyzed how a future PBB would impact the Terminal Building and the Apron by developing two terminal apron scenarios. The first scenario assumes that the grass island (the area bounded by the Apron and Taxiway A) would remain as is. The second scenario considers what would happen if this area were to be paved. Each scenario is depicted in Figures 6-6 and 6-7 with the details of each summarized thereafter.

Figure 6-6. Grass Island Scenario for PBB

Figure 6-7. Paved Island Scenario for PBB



The current taxilane located at the west edge of the Apron allows for the overnight parking of charter aircraft. As shown in Figure 6-6, maintaining this taxilane will still provide commercial service aircraft room to maneuver on the Apron. However, should a B757, which is the most demanding aircraft in MHK's fleet mix, be parked as shown along with an A320, a wingtip clearance issue could arise.

If the A320 were to taxi southward past the B757, the distance between the two aircraft's main wing tips would decrease below the minimum wingtip clearance limit per FAA standards. This could present a safety concern. The charter airline would likely provide personnel to oversee the wingtip clearances if this situation were to occur.

The U.S. Army Corps of Engineers has recently begun a project to construct a Deployment Operations Building and pave the grass island. With the grass island paved, additional aircraft parking opportunities would be available to MHK. In this scenario, the PBB could be set perpendicular to the Terminal Building as is typical of most PBB configurations at other airports (refer to Figure 6-7). In this parking configuration, the B757 would have to pull nose-in to the ramp and the City would need to arrange for an aircraft tug to push back the aircraft from the boarding bridge.

With a perpendicular PBB orientation, it would essentially cut the Apron into two. Assuming the Deployment Ramp to the south cannot be used; the A320 parked to the south of the boarding bridge could still be able to power in and out. The EMB-120 can also maneuver under its own power. Even with the apron cut in half, there appears to be space remaining to park several GA aircraft on the north end. The tail and wingtips of the B757 would be located outside of the Taxiway A Object Free Area and would therefore meet FAA airport standards. At approximately 573' east of the Runway 3-21 centerline, the tail of the B757 still penetrates the 7:1 Transitional Surface (by nearly 35 feet) and the airspace issue would remain.

In summary, a PBB can be incorporated into the Terminal Building with the Terminal Apron providing sufficient space. Parking the B757 will present airspace issues regardless of how the PBB is orientated relative to the Terminal Building. With the grass island paved, the PBB could be angled to minimize the amount of 7:1 Transitional Surface penetration and the overnight charter aircraft could be parked in such a way to provide the proper wingtip clearance.

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Chapter 7
CAPITAL IMPROVEMENTS PROGRAM

This chapter of the Master Plan report details the 20-year development plan for MHK as presented in Chapters 5 and 6 and identifies the proposed schedule for its implementation.

Chapter 7 is for planning purposes only and neither the City of Manhattan nor the FAA are obligating themselves to fund any projects called for within the development plan. The airport development program is designed to provide for a logical and cost-effective plan based upon the needs identified in the two previous chapters.

The improvements recommended for MHK are organized by phase (short term, intermediate range, long-term) and represent development which will yield a safe, efficient, unconstrained, and attractive public facility. A total cost overview for the 20-year plan period is given in Table 7-1. Individual projects for each short, intermediate, and long term phase is presented in Appendix D as Tables D1, D2, and D3 respectively. A detailed estimate of cost for each project is also included in Appendix D.

Cost information was collected from HNTB's recent airport construction project experience at MHK and similarly sized airports in the four-state FAA Central Region. Cost estimates for each planning period are presented in 2008 dollars and include construction cost contingencies for all projects. Funding for airport improvement projects would primarily come from the FAA and the City of Manhattan. Additional sources of funding may include KDOT, Riley County, and private enterprise.

Table 7-1. Summary of Capital Improvement Costs of the 2008-2027 Development Plan

Phase	FAA	Local	Total
Short-term (2008-2012)	$25,069,550	$2,315,450	$27,385,000
Intermediate-term (2013-2017)	$22,514,050	$2,491,950	$25,006,000
Long-term (2018-2027)	$88,060,564	$4,634,767	$92,695,330
Total	$135,644,164	$9,442,167	$145,086,330

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Chapter 8
REVENUE ENHANCEMENT

In today's environment, as airports face rising costs to operate and maintain adequate and secure facilities, there is increased pressure to enhance the level of revenue obtained from non-airline and other non-aeronautical sources. As a result, airports are becoming more creative in the ways they generate revenue and are becoming active as business concerns and partners in the community. At MHK, the desire to generate revenue is equally high, as the City continues to move toward the position of a self-sustaining operation.

Revenue enhancement at MHK is possible in a number of ways:

- Increasing rates and charges on leases and business deals that are currently below market rates
- Developing new revenue sources from non-terminal advertising or sponsorships
- Commercial land development

The greatest opportunity for MHK lies with the possible development of excess land for non-aeronautical uses. Each of these three revenue enhancement opportunities is addressed in the sections below.

8.1 RATES AND CHARGES

Revenue from aeronautical sources is typically an airport's primary focus. At an airport such as MHK, these aeronautical sources include: landing fees, hangar rentals, tie-down rentals, transient aircraft parking, and revenue sharing from other related uses such as fuel sales or rental car concessions. The revenue generated is typically determined by two key factors – activity levels (discussed in Chapter 3 - Forecast of Aviation Demand) and the system of rates and charges (including lease terms) used by the airport operator. These rates and charges are sometimes determined by law/ordinance, and sometimes by managerial policy. Because activity levels have been discussed previously, this section will focus on an analysis of the Airport's rates and charges, the leases that govern tenants, and any improvements that could be made to enhance the Airport's revenue stream.

MHK currently receives revenue from tenants and users according to the following:

- **Landing Fees: for aircraft operating under Part 121 and/or 135, with 19 or more seats**
  - Aircraft with gross landed weight between 12,500 and 60,000 lbs, $0.40 per 1,000 pounds
  - Aircraft with gross landed weight greater than 60,000 pounds, $1.50 per 1,000 pounds
- **Tie-down Fees**
  - Based aircraft, $25.00 per month
  - Transient aircraft (first day waived with fuel purchase), $7.50 per day
- **Fuel Flowage** – $0.07 per gallon
- **FBO Building Rental** – $0.00 per sf
- **Corporate Hangar Rental** – $2.00 - $2.90 per sf
- **T-hangar Rental** – $95 - $200 per month

An evaluation of these rates and charges, and three sample lease documents, was performed in order to assess the efficiency of the current system, and identify any improvements that might increase revenues for the City. This evaluation used a comparative approach in which rates, charges, and lease terms for MHK were compared to a sample of airports throughout the United States to determine MHK's relative position. Qualitative assessments of these factors were also made.

Comparative Assessment

To provide a basis for comparison, a comprehensive assessment of data from other general aviation and small commercial service airports was performed. These data were accumulated from a cross-section of airports of different sizes and from various regions of

the United States. Data compiled for other projects proved instrumental in expanding this database for use in this study. Chief among these were *General Aviation Airport Funding Strategies*, by the FAA's Center of Excellence for General Aviation Research, the *Wyoming Airport Rates and Charges Guide, Update – 2006, the Vermont Airport System and Policy Plan*, and the Wisconsin DOT's *2006 Airport Rates & Charges Survey*. Each of the rate categories above was evaluated with respect to the airports for which data was gathered.

Landing Fees

For comparison purposes, landing fee data for other small and non-hub airports was considered. In general, landing fees for these comparable airports are difficult to compare to MHK's rate structure. This is primarily due to the fact that MHK's landing fee structure is tiered to ensure a more affordable rate to regional carriers and other operators utilizing turboprops and small jet aircraft. Most data available do not reflect tiered structures. Of those that do, the break point for the tiers is at 12,500 pounds, instead of the 60,000 pound break point as it is for the Airport.

For those airports where comparisons were possible, there were some discernible trends worth noting. Among twelve primary airports in the midwestern and northwestern United States, the minimum landing fee reported was $0.65 per 1,000 pounds. The maximum at these airports was $2.64. At four non-primary airports surveyed, the range of landing fees was $0.42 to $0.98. In all, each of the fifteen airports had a minimum landing fee that was higher than that charged by the City. This suggests that the Airport is lagging behind its peers with regard to the landing fees it charges.

At an airport that sometimes struggles to retain reliable commercial passenger service, though, raising rates should be done with caution. To raise rates (and Airport revenue), there are several options to be considered:

- Add a third tier to the City's structure to increase the landing fee for mid-sized commercial aircraft. Currently, a regional jet would pay the same $0.40 rate as the 19-seat turboprops. It is reasonable to assume that any operator, whether private or commercial, would be willing to pay a higher rate for larger aircraft because that fee would be a very small percentage of its overall operating expenses. A sample rate table under this approach would be:

Maximum Gross Landed Weight	Rate per 1,000 pounds
12,500 – 30,000	$0.40
30,000 – 60,000	$0.75
60,000 +	$1.50

- Establish a minimum landing fee to be applied to all aircraft required to pay. Currently, the rate formula sets the landing fee at $6.72 for a Beech 1900, $10.55 for a EMB-120, and $21.20 for a CRJ-200. In order to better establish a minimum revenue stream from commercial activity, the City could set a minimum fee of $10.00 or $15.00, and require that all aircraft required to pay landing fees remit the greater of the minimum or the actual fee calculation.
- A third option, which could be applied to commercial operators but is not widely used, would be to tie landing fees to passengers or seats (or, in theory, cargo tonnage). This may be a good choice for the City because it allows users and the City to share in the upside of operations. Examples of such an approach would be to set the fee at $0.50 per departing seat or $1.00 per departing passenger. Such an approach could be combined with a minimum fee approach as described above, to protect the City's guaranteed revenue stream.

In addition to these strategies, the City may also wish to evaluate the possibility of charging landing fees for large corporate operators that currently do not pay a fee, or have the fee waived if they purchase fuel. To do so would require additional cooperation from an FBO,

but there is precedent for such an approach. If this is determined to be not feasible, the City could consider such a fee that would only be applied during peak periods, when the City and FBO expend more effort to accommodate the increased transient traffic.

Tie-Down Fees

A total of 14 airports were evaluated as comparables for the review of tie-down fees. There was a wide variety of rates charged for both overnight and monthly tie-downs, and a significant number of them had tiered structures that increased fees as aircraft size increased. While three airports had rates that were similar to or lower than the rates charged by the City, the median and mean rates for these airports were well above the City's. The average monthly tie-down fee was $44 for single-engine aircraft, $53 for multiengine aircraft, and $75 for jet aircraft.

Even airports much smaller than MHK currently have higher rates for monthly tie-downs. These rates typically must be set at a level relative to the cost to hangar aircraft. Given that some t-hangars at MHK are available for as little as $95, raising the monthly tie-down rate may not be possible. However, the City should consider, at least, raising the amount permissible under ordinance, especially for larger aircraft. A tiered structure is recommended, with the rate for single-engine aircraft remaining at $25, increasing to $35 or $40 for multiengine aircraft, and $50 for corporate jets.

The analysis of overnight tie-downs resulted in similar findings. Of the comparables for which data were available, overnight fees ranged from $2-$10 for single-engine aircraft, $2-$15 for multiengine aircraft, and $2-$20 for jets. The average (mean) rate was $5.25 for single-engine aircraft, $8.00 for multiengine aircraft, and $14 for jets. A majority of the comparable airports used a tiered structure. These findings suggest that the current MHK rate of $7.50 is a reasonable rate for smaller aircraft, but that an increase for larger aircraft, particularly corporate jets, is likely warranted. A logical rate structure would be $7.50 for aircraft of 12,500 pounds or less, and $15.00 for larger aircraft. The allowance for waiving the fee with a fuel purchase is fairly standard in the industry, so no change to that element is recommended.

Fuel Flowage Fees

The fuel flowage fee currently charged by the City was compared to those charged at airports in all parts of the country. Data for these airports was collected as part of a study conducted by the FAA Center of Excellence for General Aviation Research (CGAR), which partnered with Embry-Riddle Aeronautical University (ERAU) to conduct a comprehensive study of revenue enhancement strategies for general aviation airports ("General Aviation Airport Funding Strategies", or, the Study).

More than 450 airports provided complete or partial information related to the fueling business(s) at their facility. Of these airports, 290 of them reported that one or more FBOs were responsible for fueling activities (the remaining airports handled fueling themselves). Of these 290 airports, a wide variety of fuel flowage fees were in use, summarized as follows:

Rate per Gallon	No. of Airports	Share
$0.01 through $0.04	62	21.4%
$0.045 through $0.08	119	41.0%
$0.085 through $0.12	35	12.1%
$0.125 through $0.85	31	10.7%
None	43	14.8%
Total	290	100%

As shown, more than 77 percent of the responding airports currently have a fuel flowage fee between $0.00 and $0.08 per gallon. The City's current rate of $0.07 is at the upper end of this range, suggesting that the City currently charges a rate that is in line with the market. However, there is also a slowly growing number of airports that are converting fuel flowage fees to a percentage of sales, rather than a flat rate per gallon. Agreements that stated fees in terms of

cents-per-gallon have recently been devalued as fuel prices soared. A $0.05 per gallon rate when fuel sold for $2.50 per gallon earned the airport a fee of 2% of gross sales. With fuel at $4.50 per gallon, the fee is effectively reduced to 1.11% of gross. Given that the City will be developing a new FBO lease in the near future, it is recommended that the City consider an approach to fuel flowage that is primarily based on a percentage of sales, and secondarily on a minimum rate per gallon. An example of such an approach would be to charge the FBO "2% of gross sales, but never less than $0.07 per gallon."

FBO Building Rental

A comparison of FBO building rental rates revealed little usable information, as many airports do not specifically charge rent for the building if an FBO is paying other fees. It is often presumed that the building rent is included in the fuel flowage fees, hangar rental fees, or other fees paid to the airport by the FBO(s). Of the airports that did receive rent for an FBO building, the rent ranged from $200 - $47,000 annually, and from $0.05 to $4.00 per square foot annually. The City currently receives nearly $23,000 per year from Kansas Air Center, as well as fuel flowage revenue. Given the number of comparable airports that receive no building rent, the City is in a relatively good position with regard to building rent revenue. No change from this structure is recommended.

Corporate Hangar Rental

The City recently commissioned a comprehensive appraisal for Hangar E-2, which now provides the basis for determining the rate at which that hangar is offered for lease, and presumably, the rate at which to begin determining offering rates for other corporate hangars on-Airport. The appraisal presents an accurate assessment of the comparables, and identifies a reasonable market rental rate. No data from other comparable airports suggested that a change from this basis was required.

T-hangar Rental

T-hangar rental rates at U.S. airports vary widely, and are related to hangar size, economic conditions, differences in regional cost-of-living indices and physical condition, and perhaps most importantly, to competitive factors both on-airport and at competing facilities. General aviation airports have historically been very competitive with other nearby airports. Often, that competition drives an airport to market itself as a leader in one or more product/service offerings. One airport may try to have the lowest fuel prices in a defined area, while another may be known as one where hangar rent is the least expensive. As such, T-hangar rents are not always indicative of the true market.

For this analysis, though, it was important to examine a sample of airports (22 were evaluated) to determine if the City's rate structure is generally reflective of what the market will bear. Of the airports sampled, half of them had a wide range of monthly rental rates based on size, condition, and location. Ranges of rates were as low as $68-$171, as high as $214-$412, and most commonly between $100 and $250 per month. The City's rates are primarily between $95 and $155, with a select few in the "H" row at $175 or $200 per month. Compared to the sample airports, the City is in the lower third with regard to average monthly rent and the highest possible rent.

Typically, if an airport is under-pricing its hangar products, it will have a long waiting list for hangar space. The City's waiting list, though, totaled just 13 persons (as of August 2008). In addition, it is likely that some of these 13 are also on waiting lists at other nearby airports, suggesting that the unmet demand is currently less than 13 aircraft. At such a level, it is not likely that an airport could justify an increase in rates without a corresponding increase in hangar size or improved condition. It is therefore recommended that the City maintain its current rate structure until T-hangars are modernized or new ones are built.

8.2 NON-TERMINAL ADVERTISING AND SPONSORSHIPS

Because the Airport currently has annual enplanement levels that are below those typically required for a full-scale in-terminal advertising program, a separate assessment of non-terminal advertising and sponsorship opportunities was performed in order to identify any new opportunities for revenue generation at the Airport. In order to complete this assessment, it was important to develop an understanding of the trends currently impacting these businesses at airports.

Airport Advertising Trends

In order to assess which non-terminal advertising mediums might be used at the Airport, trends that are occurring at other airports throughout North America were evaluated. Some of the focus of this analysis remained on in-terminal advertising media in order to fully understand the most current trends in advertising. The highlights of the information collected are outlined below.

- Educated Media Buyers. Media buyers are becoming more knowledgeable about the types of media available at airports and specifically their placement with regard to passenger flows. They specifically want to understand key attributes about the audience and have the ability to measure the exposure, retention and response/ effectiveness of their advertisements/ media. These educated media buyers are requiring enhanced passenger demographic data and do not settle for arbitrary airport media placement.
- Location is Paramount. Because media buyers are more in-tune with passenger demographics and passenger flows, location has become the leading factor contributing to a sale (rather than unit type). The mindset is "less is more," with the strategic placement of advertising units more important than the actual quantity of units. Advertisers who want access to business travelers associate this closely with proximity to airline clubs/ VIP clubrooms, business centers and other retail establishments such as wine bars, table service restaurants/eateries or gadget retailers (i.e. Airport Wireless, Palm, etc.). Other valued locations include those with high passenger volumes and longer dwell times, such as at FIDS, BIDS, baggage makeup areas, security checkpoints (where lines form) and the terminal curbside where passengers are dropped off or await their meeters/greeters.
- Larger Displays. Fewer, larger displays (instead of many smaller ones) is the general trend at airports. As space is at a premium, large, high-impact locations are increasingly popular with advertisers. Often, they will opt for one larger display (for example a 6 foot x 6 foot spectacular) rather than numerous smaller dioramas. This suggests that for outdoor, non-terminal advertising, a focus on one or two significant locations may be the most effective approach.

Figure 8-1. Larger Displays

- Technology. Technology is extremely important in reaching the target airport audience. Research has shown that frequent flyers have sophisticated taste in high-tech computing gadgets and are passionate about trying new products and services. While only 9% of average Americans consider themselves "early adopters" when it comes to technology, frequent fliers are more than twice as likely to do so, with 17% considering themselves to be the first of their family and friends to try a new product or service. They are knowledgeable about the latest high-

tech gadgets and are easily bored with outdated technology. Advertising displays using newer technology help attract these early adopters and have a greater chance at holding their attention. This fact is important when considering in-terminal advertising; for non-terminal advertising, however, it more important to consider the buying habits of the general public, as the majority of the audience for much of that advertising will not be limited to frequent flyers.

- Sponsorship / Naming Rights. Airports are partnering with suppliers of equipment that is commonly used in airport terminals and allowing sponsorships of the equipment. Las Vegas McCarran International Airport (McCarran) had Rolex sponsor the clocks throughout the airport and in turn, all airport clocks contain the Rolex brand name. McCarran also allowed a provider to sponsor the wireless technology equipment used at the gate counters and in return allowed the company to display a small logo on the gate counters. Airports are also selling naming rights in addition to providing in-kind sponsorship opportunities. At Dallas-Ft. Worth International Airport, the airport partnered with Samsung, HMSHost, and Starbucks to build eight passenger lounges. Samsung provides the "Samsung Mobile Travel Center" where they display their products rather than sell them. In exchange, they were provided with the naming rights of the lounges and in-kind advertising for flat-panel televisions throughout the airport and the airport hotel. Additionally, a 10-foot tall bronze sculpture featuring a hand holding a wireless cell phone, named "World in Your Hand," is showcased in terminal D at a passenger congregation point. Finally, the Wayne County Airport Authority, operator of Detroit Metro Airport, is currently in the process of selling the naming rights for its new North Terminal. When completed, this will represent the first time an entire terminal's naming rights (other than airline names or logos) have been sold or leased in the United States.
- Exteriors. Airports are getting more aggressive with outdoor advertising. Airports such as Miami International and Philadelphia International prominently display exterior advertising on their parking garages that cannot be missed during a drive through the airports. Airports in Australia have even gone as far as to allow advertising on non-marked/non-directional portions of the airfield such as grassy portions between runways and taxiways.

Figure 8-2. "World in Your Hand" Sculpture

Figure 8-3. Rolex Clock

Figure 8-4. McCarran Wireless Sponsor

Figure 8-5. Exterior Advertising

Advertising in Public Spaces

The most common underlying element among advertising trends within commercial facilities and public spaces is the notion of connectivity with customers through interactive elements. Advertisers are increasingly seeking innovative methods to interact directly with the customers. Technology often includes interactive components that allow customers to tailor the experience to their specific needs, while allowing marketers to tailor their specific message to a customer's preferences.

A discussion of public space advertising is relevant here because even in the absence of significant revenue generation, these high-tech forms can greatly enhance the customer service provided at an airport.

- Digital Touch-Screen Directories. Retail centers are now reaching customers through digital directories that provide coupons and advertising in addition to directions. Shopping center management company, Simon Property Group, Inc. utilizes digital directories with which the customers can interface. The customers can access and print information regarding tenant locations, directions, and available coupons. The machine is called a "HotSpot" and functions similar to an ATM in that it requires human interaction. It is a touch-screen directory and uses a 42-inch high-definition monitor on which 30-second commercials can be viewed. An obvious application of this technology would be the creation of a "visitors directory" that would enable people to find local hotels, restaurants, ground transportation, and attractions in the Manhattan region.
- Mobile Phone Advertising. Advertising on mobile phones is increasing in popularity as mobile phone usage has significantly increased throughout the world, to approximately 2.5 billion users. While most mobile phone advertising in the past has taken the form of text messages, advertisers have recently started delivering advertisements in formats including video clips, web pages, and music and game downloads. Companies such as Virgin Mobile and Britain's "Blyk" have offered programs that provide mobile phone subscribers free minutes of talk time and free text messages in exchange for viewing a select number of advertisements on their phones.
- Smart Screens. The Adspace Mall Network is a national network of digital displays called "Smart Screens" located through U.S. shopping centers. The displays are eight-foot and nine-foot plasma screens that show programming that combines a mix of top sale items in the shopping center along with mall events and local and national advertising. Over 300 participating retailers submit their best deal of the week and the Network determines the top 10 deals for each mall and produces and runs 12-second spots for each special, at no charge to the retailer.
- Point-of-Sale Television Advertising. Simon Property Group launched a mall-based digital broadcast channel at over fifty of its malls during summer 2006. Dubbed "OnSpot Digital Network," this channel offers news and entertainment programming in addition to shopping center and consumer advertising. The monitors are positioned in high-traffic areas including entrances, food courts, and escalators. More recently, this same concept was adopted by national gas station chains.
- Free Wireless Hotspots. Wireless hotspots are being deployed at cafes, restaurants, hotels, and shopping centers to offer patrons free broadband access. Advertisers are able to purchase advertising space

on the broadband wireless networks and target mobile Internet users at their point of consumption.

The trends in advertising and sponsorship reveal two primary opportunities for the City to consider. The City should note that "value," as it relates to these opportunities, may be in the form of solid revenue streams for the City, while others may produce increased customer service offerings or other types of benefits.

Sponsorships represent one possible revenue-generating source. While long-term advertising concessions may not be possible at the Airport due to the relatively low level of enplanement activity, sponsorships may be a way to help fund improvements, as they essentially are an alternative that earns advertising revenue for the City in the form of an up-front, lump sum payment. Sponsorships could be considered for holdroom chairs, bag claim repairs/improvements, ramp equipment, or other improvements that require City investment. At New York's Kennedy International, the rights to advertise on the exterior of loading bridges have been sold; it may be possible to sell the rights to aircraft stairs at MHK.

Some airports offer display advertising opportunities to locally based firms wishing to impact their arriving customer base or clients. The potential also exists to capitalize on one-time local events such as corporate relocations through the direct targeting of home-builders and real estate developers/agencies to target arriving new residents relocating from outside of the community. Similar, targeted time sensitive/specific advertising opportunities may exist corresponding to military troop relocations, deployments, or realignments; and/or college student arrivals during the beginning of a new school term.

Outdoor advertising may be possible depending on the availability of land or facilities upon which the advertising could be placed. Exact locations would need to be coordinated further to ensure that the project creates no conflicts with aviation uses. Possible locations include various points along K-18, or the tops and/or sides of buildings (one of the City's T-hangar rows has the word "Manhattan" on its roof; it certainly could be converted to an advertisement.

8.3 COMMERCIAL LAND DEVELOPMENT

Revenue from commercial land development is possible when the local and regional economic environments suggest that market conditions are suitable for development. As such, it was necessary to perform a cursory evaluation of the economic conditions prior to identifying potential real estate improvements at MHK.

8.3.1 MANHATTAN MICROPOLITAN AREA

The Airport is located in the city of Manhattan, Kansas, in Riley County, which is one of three counties in the Manhattan micropolitan area.[1] Approximately 113,629 people currently live in the micropolitan area, of which approximately 69,083 reside in Riley County. This region is home to a diversified economy that has particularly strong bases in business and industry that supports the military (Fort Riley) and academia (Kansas State University).

When charting the future for the Airport, it is important to consider the characteristics of the surrounding community as a baseline from which to assess future wants and needs of the local and regional market. A thoughtful development plan will be complementary to and supportive of the surrounding community and create a cohesive operating environment. The following characteristics of the region are summarized in this section:

- Demographics and population trends
- Spending patterns and lifestyle trends
- Residential, retail, industrial, and office development
- Transportation infrastructure
- Tax climate

1. According to United States Department of Commerce, the Manhattan micropolitan area consists of Riley, Geary, and Pottawatomie counties.

8.3.2 DEMOGRAPHICS AND POPULATION TRENDS

Population projections help predict the direction of economic growth near the Airport over the next 20 years. This information assists with assessing the potential labor force to work at or near the Airport, the potential consumer market for commercial ventures developed on airport property, and the local residential population that could patronize these commercial ventures.

Recent historical data for Riley County and the three-county Manhattan micropolitan area indicate that while the County has experienced considerable population fluctuations since 2001, recording minimal growth, the micropolitan area has exhibited growth of more than four percent. The total population of the micropolitan area grew from approximately 108,900 in 2001 to nearly 113,400 in 2006. During this period, growth was relatively consistent, with a decline of just 200 persons from 2003 to 2004 the only negative growth experienced (see Table 8-1).

The geographic position of Fort Riley in Riley County makes living in Geary County an obvious nearby choice for many military households. Accordingly, Geary County is projected to experience higher population growth than Riley and Pottawatomie counties. As a result, the micropolitan area population on the whole is projected to grow at a faster rate than Riley County's population (see Table 8-2).

With respect to employment and personal income levels, current projections indicate that these measures will grow in some ways similar to that of population, with Geary County exhibiting the strongest growth between

Table 8-1. Historical Area Population

	2002	2003	2004	2005	2006	2007
Riley County	61,183	63,125	63,132	61,846	62,527	69,083
Percent Change	*-1.04%*	*3.17%*	*0.01%*	*-2.04%*	*1.10%*	*1.05%*
Micropolitan Area	108,901	110,704	110,503	111,539	113,386	113,629
Percent Change	*0.03%*	*1.66%*	*0.18%*	*0.94%*	*1.66%*	*0.21%*

Source: United States Department of Commerce, 2007 Census

Table 8-2. Population Projections

	2006	2010	2015	2020	2025
Riley County	62,527	64,315	64,420	64,345	65,696
Compounded Annual Growth		*0.71%*	*0.03%*	*-0.02%*	*0.42%*
Geary County	29,754	36,839	42,713	47,028	49,353
Compounded Annual Growth		*5.48%*	*3.00%*	*1.94%*	*0.97%*
Pottawatomie County	21,105	21,913	22,910	23,837	24,506
Compounded Annual Growth		*0.94%*	*0.89%*	*0.80%*	*0.55%*
Micropolitan Area	113,386	123,067	130,043	135,210	139,555
Compounded Annual Growth		*2.07%*	*1.11%*	*0.78%*	*0.63%*

Sources: Strategic Action Plan and Growth Impact Assessment for the Flint Hills Region, RKG Associates, October 2006; AirProjects analysis

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2006 and 2025. Table 8-3 illustrates that total employment in Geary County is expected to grow at a rate that is nearly double the rate expected for Riley County, and triple the rate expected for Pottawatomie County in the short term. Beyond 2010, employment growth is expected to be more consistent between the three counties in the micropolitan area.

Currently, more than half of the personal income in the micropolitan area is generated in Riley County. Through 2020, however, the majority of the growth in personal income is expected from Geary and Pottawatomie counties. As presented in Table 8-4, growth is expected to be strong, averaging in excess of 4.1 percent per year for this period.

This brief assessment of socioeconomic data suggests that even in uncertain economic times, the presence of Fort Riley and KSU supports the notion that the regional economy will be partially insulated from broader negative economic impacts. With this greater economic stability, it is reasonable to expect that there may be additional development opportunities on Airport property during the Master Plan Update planning period.

Table 8-3. Employment Projections

	2006	2010	2015	2020	2025
Riley County	34,822	36,689	37,866	37,917	38,096
Compounded Annual Growth		*1.31%*	*0.63%*	*0.03%*	*0.09%*
Geary County	24,334	26,865	28,113	28,475	28,543
Compounded Annual Growth		*2.50%*	*0.91%*	*0.26%*	*0.05%*
Pottawatomie County	12,965	13,421	13,873	14,077	14,225
Compounded Annual Growth		*0.87%*	*0.66%*	*0.29%*	*0.21%*
Micropolitan Area	72,120	76,975	79,852	80,469	80,864
Compounded Annual Growth		*1.64%*	*0.74%*	*0.15%*	*0.10%*

Sources: Strategic Action Plan and Growth Impact Assessment for the Flint Hills Region, RKG Associates, October 2006; AirProjects analysis

NOTE: Column totals may not add due to rounding.

Table 8-4. Personal Income Projections (in $ millions)

	2006	2010	2015	2020	2025
Riley County	1,727	2,174	2,721	3,303	4,029
Compounded Annual Growth		*5.92%*	*4.59%*	*3.95%*	*4.05%*
Geary County	741	997	1,279	1,581	1,918
Compounded Annual Growth		*7.70%*	*5.11%*	*4.33%*	*3.94%*
Pottawatomie County	590	736	942	1,188	1,499
Compounded Annual Growth		*5.68%*	*5.06%*	*4.75%*	*4.76%*
Micropolitan Area	3,058	3,907	4,942	6,072	7,446
Compounded Annual Growth		*6.32%*	*4.81%*	*4.20%*	*4.16%*

Sources: Strategic Action Plan and Growth Impact Assessment for the Flint Hills Region, RKG Associates, October 2006; AirProjects analysis

NOTE: Column totals may not add due to rounding.

8.3.3 SPENDING PATTERNS AND LIFESTYLE TRENDS

A community's spending patterns offer a glimpse at the habits and lifestyles of those that reside there. For the purposes of this project, we assessed data for three defined areas surrounding the Airport. These areas were set at four, eight, and twelve mile radius limits of the Airport. Figure 8-6 illustrates the areas covered within these radii.

Spending patterns were analyzed on a per capita basis to understand average spend rates per person and to prevent data discrepancies resulting from significant population fluctuations within the described area. The 2007 estimates and projections for 2012 were generated in June 2008 and based on U.S. Bureau of Labor Statistics and Consumer Expenditure Survey data. The most notable expenditure categories and trends are presented in Table 8-5 and highlighted below.

- **Health care expenditures will increase dramatically**. Given the increasing costs of health care in the U.S. as a whole, it is not surprising that total health care expenditures in this area are projected to increase. Sales of prescription drugs, specifically, are projected to increase dramatically, growing by over 50% per person in the next five years.

Figure 8-6. Map of Analysis Areas for Consumer Spending Patterns

Source: Claritas, Inc.

HNTB

- **Gasoline spending will continue to increase.** Gasoline spending per person is anticipated to increase by approximately 35% over the next five years. It should also be noted that the data in Table 5 do not reflect the increase in fuel prices experienced in CY 2008.
- **Breakfast and lunch out will increase in popularity.** Expenditures for food consumed outside of the home were broken down by meal segment. The breakfast/brunch and lunch segments were significantly more popular than dinner with the population surrounding the Airport. Breakfast/brunch expenditures are expected to increase by 34% per person and lunch expenditures are expected to increase by approximately 28%. Spending on snacks and non-alcoholic beverages are also expected to rise by approximately

Table 8-5. Consumer Spending Patterns 2007 - Per Capita

	4-mile Radius around MHK			8-mile Radius around MHK			12-mile Radius around MHK		
Annual Expenditures	2007	2012	Growth	2007	2012	Growth	2007	2012	Growth
Total Apparel:									
Girl's Apparel	75	97	28.9%	81	103	27.6%	85	104	23.1%
Boy's Apparel	64	79	23.5%	69	84	22.1%	72	85	18.3%
Other Apparel Prods/Serivces	407	512	25.7%	393	497	26.4%	356	453	27.4%
Entertainment:									
Sports and Recreation	530	678	28.0%	519	665	28.2%	484	619	27.9%
TV, Radio and Sound Equip.	794	991	24.8%	772	970	25.7%	707	893	26.4%
Travel	539	652	21.0%	522	635	21.5%	475	581	22.5%
Food at Home:									
Fish and Seafood	36	47	29.5%	37	48	29.4%	35	46	29.6%
Health Care:									
Total Health Care	1,226	1,682	37.2%	1,260	1,731	37.4%	1,162	1,609	38.5%
Medical Services	527	645	22.5%	541	663	22.6%	502	619	23.3%
Prescription Drugs	647	974	50.5%	666	1,004	50.7%	611	931	52.3%
Medical Supplies	52	63	20.8%	53	64	21.0%	49	60	21.9%
Household Equipment:									
Total Household Textiles	199	244	22.7%	195	240	22.9%	177	219	23.9%
Domestic Textiles	99	121	21.9%	96	118	22.4%	87	108	23.3%
Window and Funiture Covers	100	123	23.5%	99	122	23.4%	89	111	24.5%
Total Furniture:	259	323	24.5%	261	325	24.3%	242	302	24.7%
Bedroom	73	89	21.0%	74	90	20.9%	69	84	21.3%
Living/Dining Room	111	133	20.0%	112	134	19.8%	104	125	20.2%
Other	75	100	34.7%	75	101	34.6%	69	94	34.9%
Small Appliance/Houseware	246	294	19.7%	244	292	19.8%	223	269	20.6%
Misc. Household Equipment	175	211	20.2%	180	217	20.4%	164	199	21.4%
Misc. Personal Items:									
Personal Expense, Services	491	603	22.8%	490	601	22.7%	447	554	23.9%
Miscellaneous Items:									
Total Education	1,370	1,653	20.7%	1,153	1,398	21.3%	987	1,213	23.0%
Room and Board	130	123	-5.8%	103	98	-5.0%	86	83	-3.2%
Tuition/School Supplies	1,239	1,531	23.5%	1,050	1,300	23.9%	901	1,130	25.5%
Pet Expenses	137	178	29.8%	147	189	28.6%	136	176	29.0%
Day Care	75	98	30.7%	77	101	30.3%	81	102	25.7%
Other Misc. Expenses:									
Total Food away from Home	1,935	2,345	21.2%	1,915	2,321	21.2%	1,760	2,144	21.8%
Breakfast and Brunch	161	216	33.8%	161	216	33.8%	148	200	34.4%
Lunch	563	720	27.9%	556	711	27.9%	513	659	28.4%
Snacks, Non Alcoholic Bev.	277	388	39.8%	271	379	39.8%	250	351	40.4%
Total Alcoholic Beverages:	577	704	22.0%	562	688	22.4%	507	626	23.5%
Alcoholic Beverages at Home	399	500	25.4%	387	488	26.0%	352	446	26.9%
Shelter and Related Expenses:									
Household Services	175	224	27.9%	173	221	27.6%	156	201	28.2%
Transportation Expenses:									
Total Transportation Expenses	3,089	3,900	26.2%	3,132	3,956	26.3%	2,908	3,684	26.7%
Used Vehicles	1,064	1,391	30.7%	1,082	1,413	30.6%	1,003	1,312	30.8%
Gasoline	682	924	35.6%	710	962	35.4%	665	903	35.7%
Auto Maintenance/Repair	674	827	22.7%	681	835	22.7%	628	774	23.2%
Total per Capita Expenditures	18,684	22,611	21.0%	18,465	22,386	21.2%	16,993	20,701	21.8%

Source: Claritas, Inc.

40%. These meal and snack purchase increases could potentially be attributed to more people working away from home in dual-income families, or to the continued growth of the full-service gas station facilities that now include branded, quick-serve restaurants. The fact that the dinner segment will not increase as much as the other meal segments could suggest that a home-cooked family meal is still a staple practice for the families surrounding the Airport.

- **Entertainment spending will continue in popularity**. Expenditures on sports and recreation; television, radio, and sound equipment; and travel are projected to increase by at least 20%. This is reflective of the general trend in the U.S. toward the increased importance placed on leisure time.
- **Pet Care will increase significantly**. Pet care spending is projected to increase at above average rates. Longer hours spent at away from home at job sites may be a contributing factor to the growth in this consumer segment.
- **Household Services/Shelter & Related Expenditures**. Expenditures on Shelter and Household Services are projected to increase at rates approximating 28%, well above the average consumption spending increases projected at 21% to 22%. With an increase in household size and/or income, many micropolitan families may be required or choose to increase the size and quality of their domiciles.

8.3.4 RETAIL DEVELOPMENT

Consistent with the general shift of the population toward Pottawatomie, and in particular Geary, counties, commercial development has expanded in these directions as well. Retail trends were evaluated for the same three radii described above. These radii capture trends in the region immediately adjacent to the Airport (4-mile), the region more completely containing downtown Manhattan (8-mile), and an area containing Fort Riley (12-mile). Total retail sales in the 4-mile radius around the Airport totaled nearly $565 million in 2007. An additional $274 million of retail sales were recorded in the band between four and eight miles around the Airport, and $128 million more were recorded in the outer band between eight and 12 miles surrounding the Airport.

The area to the northeast of the Airport (closer to downtown Manhattan) has experienced strong growth in retail development within the past five years. Major retailers, shopping centers, restaurants, and entertainment alternatives are more readily available in most areas in the micropolitan area than they were just five years ago. Big-box retailers including Wal-Mart, Target, Best Buy, and Home Depot have invested $23.7 million recently to enter or expand in the Manhattan market.

The region is also expected to benefit greatly from a renewed effort to revitalize downtown Manhattan. A recently completed market feasibility study for the downtown core detailed significant potential for improvements in the retail, hotel, and professional office sectors.[2] The study noted that through 2012, the downtown core could absorb between 50,000 and 90,000 square feet of retail space, 14,000 to 20,000 square feet of office space, and at least one additional hotel property.

Taking into consideration the recent retail development that the area has undergone, further investigation of the current retail opportunity gap/supply and demand to assess potential opportunities for retail growth was performed. The analysis was performed for the area within a 12-mile radius of the Airport. Table 6 illustrates the key findings from this analysis with regard to unmet demand in various retail categories along with retail categories that are currently over-supplied. (The difference between demand and supply represents the opportunity gap or surplus for each type of retail within the 12-mile radius. A

2. Market Feasibility Study - Manhattan, Kansas Downtown Core, August 2007, Canyon Research Southwest, Inc.

positive value indicates an opportunity gap, while a negative value indicates a surplus.)

The data illustrate that there is currently a substantial level of un-met demand for non-store retailers, building material and supply dealers, and stand-alone gas stations, while at the same time there is an excess supply of general merchandise stores, lawn and garden equipment stores, and foodservice and drinking establishments. The three segments that represent the greatest retail opportunities are discussed in further detail below.

Non-Store Retailers. Non-store retailers include companies that use merchandising methods such as infomercials, direct-response advertising, paper and electronic catalogs, door-to-door solicitation, in-home demonstrations, selling from portable stalls, and distribution through vending machines. Within the non-store retailing category, further detail provided in Table 8-7 indicates that opportunities specifically exist within the electronic shopping/mail-order houses and direct-selling establishment subcategories. Within the vending subsegment, there is currently a surplus.

Building Materials and Supply Dealers. This is a subcategory of the larger Building Material, Garden Equipment Stores category. The larger category includes hardware stores, lawn and garden centers, building materials stores (including lumber yards), nurseries, and paint stores. Building Materials and Supply Dealers are establishments primarily engaged in retailing new building materials and supplies. This category's surplus is largely the result of a bigger surplus in one of the category's sub-subcategories (Home centers). Home centers are establishments that specialize in retailing a general line of new home repair and improvement materials and supplies, such as lumber, plumbing goods, electrical goods, tools, housewares, hardware, and lawn and garden supplies, with no one merchandise line predominating. The merchandise lines are

Table 8-6. Retail Opportunity

Retail Stores	Demand (Consumer Expenditures)	Supply (Retail Sales)	Opportunity Gap/Surplus
UN-MET DEMAND			
Non-Store Retailers	$59,996,067	$14,525,567	$45,470,500
Building Material and Supply Dealers	$78,193,022	$52,519,346	$25,673,676
Gasoline Stations (non-convenience store)	$26,379,991	$8,557,522	$17,822,469
Furniture and Home Furnishings Stores	$22,782,579	$16,161,027	$6,621,552
Sporting Goods, Hobby, Book, Music Stores	$22,674,790	$17,254,773	$5,420,017
Electronics and Appliance Stores	$23,926,293	$19,780,609	$4,145,684
SURPLUS			
General Merchandise Stores	$113,828,770	$248,119,657	($134,290,887)
Lawn, Garden Equipment, Supplies Stores	$8,657,110	$59,559,818	($50,902,708)
Food and Beverage Stores	$106,850,008	$134,940,872	($28,090,864)
Gasoline Stations with Convenience Stores	$80,043,172	$101,398,758	($21,355,586)
Motor Vehicle and Parts Dealers	$210,796,108	$227,618,401	($16,822,293)
Foodservice and Drinking Places	$96,066,922	$104,911,219	($8,844,297)

Source: Claritas, Inc. "RMP Opportunity Gap - Retail Stores" June 17, 2008

Table 8-7. Non-Store Retailers

Retail Stores	Demand (Consumer Expenditures)	Supply (Retail Sales)	Opportunity Gap/Surplus
Non-Store Retailers	$59,996,067	$14,525,567	$45,470,500
Electronic Shopping, Mail-Order Houses	$44,460,557	$4,890,557	$39,570,000
Vending Machine Operators	$2,466,243	$6,930,000	($4,463,747)
Direct Selling Establishments	$13,069,267	$2,705,011	$10,364,256

normally arranged in separate departments. The larger category, and its surplus, is made up of several distinct surpluses and a large segment of un-met demand in the Home Center sub-subcategory (see Table 8-8). Without the $50+ million surplus in the Nursery and Garden Center sub-subcategory, there would be an overall gap in this category. As it is, though, the opportunity appears to be in home centers that would not rely on significant nursery, garden, or hardware sales to drive its success.

Stand-alone Gas Stations. The data show that while gasoline stations on the whole are currently at a surplus, there is unmet demand for stand-alone stations that do not have associated convenience stores (see Table 8-9). This does not suggest, however, that potential customers always make their choice based on whether a gas station has a convenience store or not. For gas stations, it may be that current demand levels and surpluses are reflective of the supply, and the fact that the majority of gasoline purchases are not made specifically within a geographic area – rather, they are made when they are needed, regardless of where the vehicle and its owner reside.

The data evaluated suggest that overall, the growth potential in the region surrounding the Airport is limited to a few key retail categories. In considering these categories further, there are additional factors to be considered when evaluating the potential for commercial land development at the Airport:

- In the near term, significant improvements will be made to the K-18 highway corridor. These improvements will significantly improve the level of service on the stretch of highway that serves as the primary access road to the Airport. With these improvements, real estate businesses that flank the highway will benefit from increased exposure, which should translate to improved chances for success.
- The ongoing build-up of troops and associated civilian employment at Fort Riley will continue to drive an increase in traffic on K-18, as it is the primary connector between the installation and downtown Manhattan. This increase, which will very likely outpace the growth suggested in current projections, may not be fully reflected in the projected retail opportunity gaps described above.
- The Fort Riley expansion will also have a beneficial impact on the micropolitan area's employment and income base, which also may not be reflected in the opportunity gaps discussed. According to the Strategic Action Plan and Growth Impact Assessment, the expansion will have an associated infrastructure investment of more than $500 million on-post, and will support indirect employment growth of nearly 7,000 jobs in the area. This new influx of labor may create conditions attractive to the development and location of non-store retailers, such as mail-order or internet procurement and direct sales opportunities. Additionally, other non-location dependant businesses could also be attracted to the area. Telephone call centers, data processing and other similar

Table 8-8. Building Materials, Garden Equipment Stores			
Retail Stores	Demand (Consumer Expenditures)	Supply (Retail Sales)	Opportunity Gap/Surplus
Building Material, Garden Equipment Stores	$86,850,132	$112,079,164	($25,229,032)
Building Material and Supply Dealers	$78,193,022	$52,519,346	$25,673,676
Home Centers	$30,437,269	$65,774	$30,371,495
Paint and Wallpaper Stores	$2,013,731	$2,613,000	($599,269)
Hardware Stores	$6,783,487	$14,858,999	($8,075,512)
Other Building Materials Dealers	$38,958,535	$34,981,572	$3,976,963
Building Materials, Lumberyards	$13,290,335	$11,929,107	$1,361,228
Lawn, Garden Equipment, Supplies Stores	$8,657,110	$59,559,818	($50,902,708)
Outdoor Power Equipment Stores	$1,195,460	$1,228,929	($33,469)
Nursery and Garden Centers	$7,461,650	$58,330,889	($50,869,239)

Table 8-9 Gasoline Stations			
Retail Stores	Demand (Consumer Expenditures)	Supply (Retail Sales)	Opportunity Gap/Surplus
Gasoline Stations	$106,423,163	$109,956,281	($3,533,118)
Gasoline Stations with Convenience Stores	$80,043,172	$101,398,758	($21,355,586)
Other Gasoline Stations	$26,379,991	$8,557,522	$17,822,469

businesses that would benefit from a readily available and competitively priced local labor market could be attracted to the area.

8.3.5 POTENTIAL COMMERCIAL LAND DEVELOPMENT

Future commercial land development at the Airport should focus on a balance of revenue generation for the City and flexibility to respond to future changes that might force recapture of the developed land for aviation uses. The market research presented above provides an overview of the current Airport community and forecasts the direction of the regional economy. By identifying trends and projections, the Airport can be positioned to function in a complementary manner to the community and emerge as a vital business partner for the future, thus securing its important role in the community and the national aviation system. Ideally, any development that occurs at the Airport will be complementary to, and not disruptive toward, the primary aviation use.

Regardless of the project(s) pursued, there are key evaluation criteria that should be used when assessing potential development sites and scenarios:

- **Location.** Location is a key driver of any real estate development. A site's location is evaluated by factors, including proximity to transportation such as highway, rail, and mass-transit; proximity to a potential employee base; access to critical infrastructure (e.g., utilities), the cost of developing the site (i.e. grading, stability, environmental impacts and similar factors)

and the amount of available land for the proposed use.

- **Timing**. Developers like to stay one step ahead of their competitors and earn a return on their investment as quickly as possible, so timing is extremely critical. They must recognize trends in the national and global aviation markets and project future long-term needs. For example, China and India are currently targeted as developing economies with huge potential in the near future. When considering various development scenarios, one must stay abreast of global and domestic market trends, forecasts, successes and failures and respond in an active manner.
- **Local market**. The first essential component in evaluating any potential real estate project is analyzing and understanding the local market in terms of unmet needs and excess supply. Knowledge and understanding regarding the potential competition are also vital. Additionally, the local market economy and what it will support in terms of development and the associated sales or rental rates are also key elements to consider. Finally, as airports are such a vital part of communities, good cooperation with the local government municipalities and community organizations is essential for developments to succeed. Accordingly, the City should make it a priority to lead the cooperation effort with potential developers to ensure they are not intimidated by the prospect of leasing land from a government entity.
- **Financing opportunities**. Financing is a critical component of any development scenario, as it can help determine whether a project will be financially feasible or not. When assessing airport development specifically, there are resources that can potentially be tapped for financial support, including federal and local government funds and grants, lower financing rates, and tax incentives. However, many of these resources carry along with them restrictions and tedious reporting mandates. Projects financed through private funding sources must also carefully consider the length of the lease term to ensure that financing can be obtained. Lenders prefer to have properties with residual value. Leased properties pose a particular challenge in this regard so the tenants will be seeking longer term leases to alleviate lender concerns and make the projects feasible. As potential projects are assessed in the future, various financial arrangements and alternatives should be carefully considered to weigh the short and long-term benefits and disadvantages of each financing alternative and the impacts on the projects.

There are a number of commercial land uses that could be pursued in the near term that would be consistent with the opportunity gap data, or are reflective of the potential demand anticipated from the expansion of Fort Riley. These uses, together with certain recommendations for future action, are summarized below:

- A small (or group of small) retail establishment that satisfies some of the demand gap described above may be possible in the near term. The analysis of retail data shows that there may be opportunities for a mobile phone store, specialty book store (a used bookstore, for example), or other specialty electronic store (GameStop, a used video game store, for example). This sort of development could be accomplished either through a series of leases, or by contracting with a developer for a small shopping center development.
- A full-service gas station/convenience store may be possible, pending additional analysis. The gap analysis above suggested that the market may be saturated with these types of businesses; however, the growth associated with the Fort Riley expansion suggests that there may soon be significantly more daily traffic passing the Airport on K-18. The City is encouraged to monitor the traffic counts on K-18 and to begin discussions with local developers

to ensure that they are ready to advance such a project if the demand materializes.

- The data above regarding retail dining options, and the expected growth in spending in these establishments (by 2012, a 34 percent increase in spending per capita is expected on breakfast/brunch options, and a 28 percent increase is expected on lunch options), suggests that a restaurant specializing in these meal times may be a viable option. Such an establishment would need to have frontage along K-18 to maximize its visibility and chance for success. The City should carefully monitor trends in this category, as the continued growth in fuel prices may yet impact the likelihood of success for these businesses.
- The data regarding spending rate growth shows that Americans continue to exhibit increasing interest in owning and caring for pets (pet-related expenses are expected to grow by approximately 30 percent per capita by 2012). One way to meet some of that demand is through the development of kennel facilities, which may include newer development options, such as pet hotels and pet day-care. These developments can be compatible with airport operations because their building structures can be fairly low in height, and the services provided are often desired by air travelers.
- The opportunities that exist for non-store retail development are within the electronic shopping/mail-order houses and direct-selling establishment subcategories. These uses typically are implemented in large-scale structures encompassing tens of thousands of square feet. Given the limited parcel size at MHK, the likelihood of these types of uses occupying space on Airport land is low. This does not suggest that the City should ignore this use type when pursuing land development projects; it suggests that it focus on potential uses which can more easily be implemented on the Airport's available parcels.

Chapter 9
FINANCIAL PLAN

The purpose of this chapter is to demonstrate the Airport's ability to finance the projects recommended in the Master Plan Update. Much of the emphasis is placed on the first phase of the program, where realistic projections can provide the most meaningful analysis. This emphasis is not intended to determine the feasibility of bond issuance, which would require a more extensive analysis. Rather, it is intended to show the accessible sources of capital – Airport Improvement Program (AIP) grants, etc. – available to fund the projects recommended during the planning period and to identify shortfalls, if any. This chapter is divided into the following sections:

- Existing Airport Financial Structure
- Available Funding Sources
- Proposed Capital Program
- Financial Analysis
- Conclusion

Please note that Tables D4 through D10 referenced throughout Chapter 9 are contained in Appendix D.

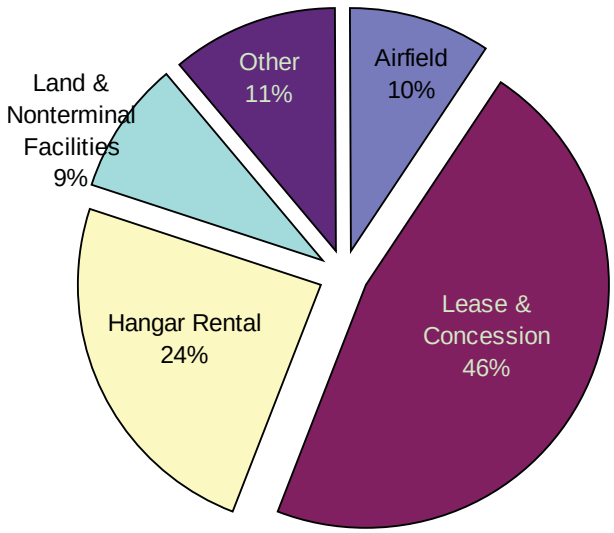
9.1 EXISTING AIRPORT FINANCIAL STRUCTURE

Manhattan Regional Airport (MHK) is owned and operated by the City of Manhattan, Kansas and services the City, the Flint Hills region and operates in support of Fort Riley. MHK is run by the Airport Director who in reports to the City Manager. Day-to-day management is executed by the Director and a staff of approximately 7 employees.

MHK has a use agreement with Great Lakes Airlines who has a code share agreement with United and Frontier airlines to provide service to the area. Rental car service is provided by The Hertz Corporation, which has an office in the Terminal Building, and Enterprise Rent-a-Car. Rental car concessions historically make up a large portion of the non-aeronautical revenue generated at MHK. Other than vending machines, there are no concessions within the terminal. Due to this, concessions revenue is minimal to non-existent.

Recently, total operating revenues at MHK have reached an estimated $296,100 in FY 2008. The following components constitute airport operating revenues based on the FY 2008 budget:

Figure 9-1. Airport Revenues



Expenses consist primarily of Operating and Maintenance (O&M) expenses and debt service. In FY 2008, O&M expenses were budgeted to be $584,923, excluding depreciation. Existing debt service is presently in excess of $174,000 annually.

9.2 RECOMMENDED CAPITAL PROGRAM

In determining project financial feasibility, the critical elements to analyze are project costs, project priority, funding sources, and the ability of the City to leverage funding sources by issuing bonds. These elements manifest themselves in the year-by-year phasing of construction expenditures.

Delaying a project can provide time to accumulate funding and allow the City to exploit additional bonding capacity in future years. However, project costs tend to escalate while needed improvements are deferred. Delaying expansion may also constrain MHK activity and prevent it from generating the revenues necessary to finance the planned improvements. Delays could also adversely affect the safety and operational efficiency of the airport.

Tables D4 and D5 present the recommended capital program, first in constant 2008 dollars, and then in escalated dollars using the forecast consumer price index (CPI) as an escalation factor. Both tables present projects fully-loaded with contingencies and all architecture, engineering, and planning fees.

It is important to note that these two tables present the expected capital requirements in the years required if projects are phased according to when they should be implemented in order to meet demand. At this stage in the analysis, no revisions to the program have been made to facilitate their implementation.

9.3 AVAILABLE FUNDING SOURCES

MHK has five potential sources of funding for capital projects at this time:

- Passenger Facility Charges (PFC)
- Airport Improvement Fund (AIP) funds
- Third-Party sources (private, etc.)
- The Airport's retained earnings

Projected PFC and AIP grant funds are based on the Master Plan forecast of enplaned passengers and are provided in Table D6.

9.3.1 PASSENGER FACILITY CHARGES

The FAA currently authorizes the collection of $4.50 per passenger enplanement to fund certain approved projects at ROA for a defined collection period.

Beginning in July of 2008, and going until June 2018, MHK has received authorization to charge PFC's in order to pay back the City of Manhattan for money borrowed for projects. It is assumed that the PFC's collected during this time period will go towards paying the city until the debt has been completely retired. This is projected to occur early in 2014. After that point, PFC's will be available for use towards capital improvement projects at MHK.

Eligible projects for PFC use include those projects which preserve or enhance safety, security, or capacity; reduce or mitigate noise; and/or enhance competition among air carriers. It is projected that MHK will collect over $4.1 million in PFC's between FY 2008 and FY 2027 to assist in paying for project costs. Collections will range from approximately $92,000 to $312,000 thousand annually based on projected passenger enplanements during this time period. MHK's primary use of PFC's is to pay for terminal and airfield projects that cannot use AIP grant funding, as well as for capital-intensive projects that cannot be implemented using only grants and airport surplus revenues.

9.3.2 AIP FUNDS

Funding is also provided to airports through the AIP as awarded by the FAA. AIP funds are divided into two categories: discretionary funds and entitlement funds. Discretionary funds are awarded at the discretion of the FAA based on certain eligibility criteria, while entitlement funds are distributed to airports on a per enplanement basis using the formula below:

- $7.80/enplanement for the first 50,000
- $5.20/enplanement for the next 50,000
- $2.60/enplanement for the next 400,000
- $0.65/enplanement for the next 500,000
- $0.50/enplanement thereafter

Beginning in 2003, in accordance with federal legislation[1], the figure resulting from this formula has been doubled in any year where the total national AIP appropriation is at least $3.2 billion. The total appropriation has been surpassed this threshold since 2003, and it is expected to continue to exceed $3.2 billion in the foreseeable future.

Federal entitlements for MHK have been amounting to $1.0 million per year. This level of funding is the minimum amount the FAA gives out to Primary commercial airports. MHK receives this amount because the enplanements do not currently reach a level that would provide an entitlement larger than the minimum. This level consists of only passenger entitlements since MHK does not currently have any all-cargo operations. MKH needs to continue to exceed 10,000 passengers annually to retain its Primary Airport designation funds each year. To continue to receive the $1.0 million minimum entitlement, Congressional reauthorization and appropriations would also have to be maintained above the $3.2 billion threshold. As previously indicated, it is widely anticipated that AIP funding will be maintained above this critical threshold. Available AIP entitlement funds are expected to total nearly $20.0 million through FY 2027.

9.3.3 KANSAS DEPARTMENT OF TRANSPORTATION

Funds are available from the Kansas Department of Transportation, Division of Aviation, to cover airport project costs. However, since MHK is designated as a primary airport, by statute, it is not eligible for supplemental State grants.

9.3.4 THIRD-PARTY SOURCES

Third-party sources, such as tenant-funded projects, may be factored into the financial plan for many of the new hangar projects. However, there has been no indication that third-party sources will be used to fund any of the projects. Therefore this analysis does not assume any projects will be funded by the private sector or other third-party.

9.3.5 AIRPORT REVENUES

After exhausting all present sources of external funding, it is assumed that the City will use Airport revenues to fund the remaining project costs. This creates some funding challenges for the City, as it strives to keep airline rates as low as possible while providing superior customer service, enhancing facilities, and complying with Department of Homeland Security (DHS) requirements.

As will be discussed below, the Commission will ultimately be responsible for approximately $81 million of capital improvements if the federal, PFC, and private funding assumptions described previously come to pass.

9.4 PROPOSED CAPITAL PROGRAM AND FUNDING

Tables D7, D8, and D9 summarize the master plan program by funding source eligibility and assumed funding source. The eligibility assumptions are based on the eligibility criteria for the alternative funding sources and comments from Airport officials.

Projects eligible for AIP entitlement or PFC funds were assumed to be financed from these sources to the extent that funds are available. Carryover options are more limited for AIP entitlements than PFC funds except in cases where the Airport is collecting the PFC to reimburse their capital reserve fund, repay outstanding bond debt or City funds provided in advance of fully collecting the authorized PFC project amounts. Therefore, it was assumed that in any given year, a project would draw from potential funding sources to the extent available from: AIP entitlement first, then PFC. MHK plans to apply for AIP discretionary funds for airfield projects that provide significant safety and/or capacity improvements, such as runway and taxiway rehabilitation.

1. Vision 100 - Century of Aviation Reauthorization Act - 49 USC 40101 - Public Law 108-176, 108th Congress; December 12, 2003

The total projected cost of the CIP projects developed as part of this Master Plan Update is estimated to exceed $183 million for the period FY 2008 through 2027 (in annually inflated dollars). AIP entitlement and discretionary funds are expected to fund approximately $120.0 million or 65.6% of the total costs. PFC's will contribute to fund over $2.2 million of the CIP costs. It is assumed that neither Airport tenants nor any other third parties would contribute any direct funding. Under the proposed funding scenario, the City of Manhattan would be responsible for approximately $81 million or 44% of the CIP, and would need to issue new debt in the form of four separate general obligation bond issues. The City may decide to consolidate or change the implementation time frame of certain projects in this analysis in order to minimize the number of bond issues and reduce issuance costs.

9.5 FINANCIAL ANALYSIS

Table D10 presents the estimated Airport cash flow analysis during the project construction period. The analysis includes projections of project funding, general obligation bond issues, Airport revenues, operating and maintenance and capital costs, and net Airport revenue. The analysis follows the Airport's accounting and rates and charges procedures to the extent practical.

9.5.1 OPERATING REVENUE PROJECTIONS

In fiscal year 2008, operating revenues were budgeted at approximately $296,100. The dominant sources of revenue are airfield charges (9.5 percent), leases and concessions (46.2 percent), hangar rentals (24.3 percent), land and non-terminal facilities (8.8 percent), and other (11.2 percent). As shown in Table D10, operating revenue is projected to increase to $1.17 million by 2027.

The following assumptions were used to develop the estimates of operating revenue:

- Landing fee revenue was assumed to increase at the same rate as the increase in commercial operations, along with inflation. Landing fees are set to cover a proportionate share of airfield costs, and are typically reduced to the extent possible in order to keep airline rates competitive with other regional airports.
- The current methodology for FBO rental rates was assumed to continue. FBO rental rates are driven by GA operations and are also indexed for inflation.
- The current methodology for airline terminal building rentals was assumed to continue. Airline terminal rents are calculated to offset terminal building operating costs and local capital costs. Terminal rental rates are driven by commercial operations and are indexed to inflation.
- Since most of the concessions revenue in the analysis comes from car rentals, it was assumed that it would increase at the same rate as enplaned passengers, along with inflation.
- Tie-down fees and hangar rental revenue were assumed to grow with inflation, with corresponding increases to account for an increase in based aircraft.
- De-icing services revenue is assumed to grow with commercial operations and is indexed for inflation.
- Fuel flowage fee revenue was assumed to grow at the rate of total operations and is also indexed to inflation.

9.5.2 OPERATING EXPENSE PROJECTIONS

O&M expenses are allocated among two cost centers: general airport administration, and general airport operations. General airport administration accounts for 30 percent of the O&M expenses while general airport operations account for 70 percent. Personnel costs such as salaries and fringe benefits account for 50 percent of O&M expense. As shown in Table D10, O&M costs are projected to increase from $584,923 million in FY 2008 to $1.13 million in FY 2027.

The following assumptions were used in developing the O&M cost estimates:

- Salaries and Fringe benefits were assumed to increase at 1 percent per year above inflation to account for real wage growth.
- Commodities and contractual services were assumed to grow at the rate of inflation and the growth rate of total operations.
- All other O&M expenses were assumed to increase at the rate of inflation.

9.5.3 BOND ISSUES

Four general obligation (GO) bond issues are assumed necessary in this analysis. A GO bond is a common type of municipal bond in the United States that is secured by a state or local government's pledge to use legally available resources, including tax revenues, to repay bond holders. The first issue is a 2009 GO bond for $9.8 million which will assist in paying for several projects. Most notably is the construction of a commercial hangar and apron, reconstruction of Taxiway E, and replacement of many T-hangars.

The second issue is a 2014 GO bond for $18.6 million. This bond will help finance many projects such as the reconstruction and expansion of GA apron west, construction of an FBO complex, and the construction of a cargo apron. The third GO bond issue in 2018 is for $6.75 million and will finance such projects as the installation of a passenger boarding bridge and the extension of Runway 3/21. The fourth and final GO bond will be issued in 2020 for $20.9 million. This bond will finance projects until 2024 such as the expansion of the fuel farm, renovation of the terminal building, construction of a vehicle maintenance building, and the reconstruction of Runway 3/21.

A 20-year repayment period and an interest rate of 4.125 percent is assumed for all of the GO bond issues based on the terms of a recent GO bond issued by the City on May 6, 2008. In addition, it is assumed that 4 percent of the issue amounts would go towards financing costs such as insurance, financial advisory and legal counsel. It is also assumed that reinvestment of remaining GO bond proceeds will occur until the funds are expended, earning a return of 75 percent of the borrowed rate.

It is important to note that these GO bond issues are only required because the phasing program places projects in a time frame where airport revenues and PFCs will not provide sufficient financial capacity. The City may elect to postpone some of these projects if it believes a new debt issue is not the best solution at the time.

9.5.4 TOTAL REVENUES AND EXPENSES

Based on the financial projections airport-related net revenue is projected to be negative throughout the forecast period. It is anticipated to further erode from a deficit of $478,060 in 2008 to a deficit of approximately $6.55 million by 2027. This is due to the issue of the 4 GO bonds previously discussed. In each year the GO bonds are issued (2009, 2014, 2018, and 2020) the net revenue deficit increases sharply as additional debt service payments are incurred. Net revenue is projected to be negative for the entire analysis period.

9.6 CONCLUSIONS

The analyses presented in this chapter highlight the financial challenges faced by Manhattan Regional Airport and most other small U.S. airports in these times of increased Security mandates and depressed and often negative airline margins. The findings of these analyses are summarized as follows:

- Generally, the development program is financially feasible; however, assistance from the City will be required. The most critical projects can be implemented as demand warrants.
- The feasibility of the program depends on the availability of federal funding; however, this feasibility exists while assuming that the City of Manhattan receives some level of discretionary funding during the planning period. Still, should discretionary funding fail to materialize, the City may need to re-phase or postpone projects further into the future.

- Four debt issues supported by the faith and credit of the City are required to make the entire program financially feasible. They were assumed to have 20-year terms and interest rates of 4.125 percent.
- PFC's were assumed to fund a portion of the program. It was assumed that the Airport would be able to start using PFC's towards new projects in 2014 after previous debt to the City had been paid using PFC's collected from July 2008 on.
- The Airport may want to explore development of the more expensive general aviation and corporate facilities through agreements with private developers. While there are currently no plans to further investigate this approach; it may be desirable in order to reduce the airports capital requirements for some of these projects, but could result in reduced revenue to the airport.
- The assumed inflation rate is 2.3 percent per year. A lower inflation rate would slightly reduce the nominal costs of capital projects.

Chapter 10
AIRPORT LAYOUT PLAN

Typically the most recognized part of airport documentation, more than the master plan report itself, is the set of drawings which graphically depict the existing and ultimate facilities at the airport, airspace associated with the runway system, land use, and airport property data. Commonly referred to as the Airport Layout Plan (ALP) set, these federally-approved drawings serve to guide airport development over the 20-year planning horizon in conformance with guidance provided by FAA Advisory Circular 150/5300-13, Airport Design.

Until the FAA approves airspace for the airport based upon the ALP set, the drawings are considered to be in draft form. Once meeting a variety of requirements, the elements depicted on the document are considered to be conditionally approved, based upon aviation demand levels and funding availability.

The subsequent sections of this chapter will present a brief discussion on each of the 23 drawings in MHK's ALP set. Full size drawings are produced at a size of 22" x 36" but for a half-scale ALP Set is contained in Appendix E.

Drawing 1: Cover Sheet
This drawing is the cover to the ALP set and includes basic information such as the list of drawings included in the ALP set and airport location and vicinity maps.

Drawing 2: Airport Layout Drawing
The Airport Layout Drawing is the most important graphic prepared as part of this study. Most people identify an airport in association with this specific drawing of the ALP set. The drawing is used to illustrate three important items:

- Factual information about the airport as it is today and as it is ultimately proposed;
- Future improvements; and,
- Existing facilities and proposed improvements to correct situations that are not in compliance with current FAA standards or deficiencies.

The FAA and the City of Manhattan will use the information presented on the Airport Layout Drawing to program future funding assistance and to monitor MHK's compliance with design standards and federal grant assurances. A number of projects are identified for the full program period, i.e., present through 2027. Typically, the master plan and its associated ALP set are updated regularly every 5-10 years.

Drawing 3: Airport Data Tables
This drawing contains several tables containing pertinent data regarding the existing and ultimate airport features such as runway and wind data.

Drawing 4: Airport Airspace Drawing
Imaginary surfaces surround all airports in the United States. The purpose of these imaginary surfaces is to notify the Sponsor of any penetration of the airspace surrounding an airport which could result in being considered a hazard to air navigations. A hazard to air navigations is defined as any obstruction, natural or man-made, that penetrates an imaginary surface to a point that a "substantial adverse effect" on air navigation occurs. As the surfaces get close to the airport, their respective elevations are lower.

The criteria used to prepare the airspace drawing, and which are used to regulate obstruction within the vicinity of the airport, are contained in 14 Code of Federal Regulations Part 77. These regulations establish standards for determining obstructions to navigable airspace, set forth the requirements for notice to the FAA Administrator of certain proposed construction or alternations, provide for aeronautical studies of obstructions to air navigation, and determine their effect on the safe and efficient use of airspace. Part 77

defines five imaginary surfaces, which are: primary, approach, transitional, horizontal, and conical.

This drawing illustrates these five imaginary surfaces of MHK based upon ultimate runway lengths. Part 77 surfaces are overlaid onto a topographic map background.

Drawings 5 and 6: Runway Centerline and Approach Profiles
This drawing depicts profiles of existing and ultimate runway centerline elevations as well as profiles of each runway approach surface. The runway centerline profile is used to identify any line-of-sight issues between various points along the runway. There are no line-of-sight issues for either runway at MHK.

The runway approach surface profiles illustrate the terrain along the extended runway centerline and objects that penetrate said surface. These objects are numbered and correspond to the objects listed on Drawing 4, Airport Airspace

Drawings 7 through 12: Inner Portion of the Approach Surface Drawings
In order to provide a complete illustration of the approaches to the runway, a plan and profile drawing is prepared separately for Runways 3 and 21 and for Runways 13 and 31. These drawings are intended to depict the areas surrounding each runway end and to what degree these areas should be protected from potential obstructions that could create hazards to air navigation.

The Plan view depicts the approach surfaces from a "bird's eye view", showing the land below the approach surface. The Profile drawing shows a side-view of the approach surface that helps determine the elevation of the approach surface at any given point below the approach surface such as runway protection zones, approach zones and surfaces, existing obstructions. These drawings also proposed the measures that will be taken to mitigate obstructions.

Drawing 13: Approach Surfaces Obstruction Data Tables
This drawing contains obstruction data for Drawings 7 through 12. The information presented includes obstruction height, amount of penetration above or clearance below the approach surface, and the disposition of each object.

Drawing 14: Terminal Area Plan
The Terminal Area Plan represents a larger-scale detail for the construction of landside facilities to meet existing and future requirements. This drawing presents general plans for those facilities located within the portion of the airport defined as the terminal area. The major facilities included are general aviation, Terminal Building, terminal area parking and circulation, airport maintenance, and ARFF. The primary feature of this plan is the additional aircraft hangar facilities located east of Taxiway A.

Drawing 15: Land Use Plan
This plan identifies land uses on and adjacent to the airport, showing future aviation and non-aviation–related land uses, where they may exist. The principal factors influencing land use in the vicinity of an airport are runway protection zone areas, obstructions to flight, aesthetic features, and factors relating to potential industrial development near the airport, where such opportunities exist.

The purpose of the land use plan is to guide development on the airport and, to the extent feasible, provide for an orderly transition between airport activities and activities adjacent to the airport. The plan focuses on identifying the best spatial arrangements of airport activities so that the land on the airport is used most effectively and efficiently. For example, land located centrally to the runway and taxiway system is more advantageous for terminal and fixed based operator activities than for storage of aircraft.

Generally, activities of a similar nature should be placed adjacent one another with certain areas of the airport identified to separate

activities that may lead to airside delay, terminal or landside congestion.

While the plan focuses on airport relationships, the long term viability of an airport may be threatened by incompatible land uses located in airport approaches and sometimes adjacent to the airport. The land use plan provides a mechanism to identify adjacent relationships and for the airport owner to proactively engage with surrounding municipalities to develop planning that best addresses the transition from airport to off airport land uses. Graphically, the airport land use plan designates general types of land uses both on and off the airport.

Drawing 16: Exhibit A Property Map
This drawing presents information showing property ownership or interest in each tract within the existing and ultimate airport boundaries.

Drawing 17 through 22: Inner Portion of the Departure Surface Drawings
Similar to the approach surfaces drawings, these inner portion drawings depict existing and ultimate departure surfaces from each runway end. Approaches with positive vertical guidance are desired for all four runways at MHK. Specifically, a "Localizer Performance with Vertical Guidance" (LPV) type of approaches are desired. Inclusion of the departure surfaces in the ALP Set is an airport planning requirement.

Drawing 23: Approach Surfaces Obstruction Data Tables
This drawing, the last one in MHK's ALP Set, presents the same type of object information as Drawing 13 but for the departure surfaces drawings (Drawings 17-22).

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LOC I-MHK	APP CRS	Rwy Idg	6600
111.3	034°	TDZE	1054
		Apt Elev	1056

ILS RWY 3
MANHATTAN REGIONAL (MHK)

Circling not authorized west of runway 3-21.

MALSR

MISSED APPROACH: Climb to 2000 then climbing right turn to 3000 via MHK R-141 to ALMAS Int/MHK 7.7 DME and hold.

ASOS	KANSAS CITY CENTER	MANHATTAN TOWER ★	GND CON
119.075	127.35 257.975	118.55 (CTAF) L	121.85

NC-2, 02 AUG 2007 to 30 AUG 2007

ADF or DME REQUIRED

R-275 117.8 TOP Chan 125

R-040 MICOL INT MHK 10.6

1680

MANHATTAN 110.2 MHK Chan 39

R-3602B

3800 to Ramze Int 213° (17.7)

1483

1787

LOCALIZER 111.3 I-MHK

1729

1127±

R-106

HATAN OM MHK 6.7

R-141

ALMAS MHK 7.7

(IAF)

1634

1767

117.8 TOP Chan 125

Marshall AAF

3000 (2.5)

R-258

141°

321°

1799

IAF SALINA 117.1 SLN Chan 118

1890

CAVALRY 314 CVY MHK 9.3

MSA CVY 25 NM 3400

3800 (8.4)

034°

LR-204

3800 NoPT MHK 13 Arc

3800 NoPT 084° (33.9)

214°

1 min

034°

214°

R-084

(IAF) RAMZE INT MHK 17.7

10 NM

3800 NoPT to Ramze Int 309° (4.5) and 034° (2.6)

MHK R-213

KAKEL

ELEV 1056 Rwy 3 ldg 6600′

1056

3800 X 100 0.3% UP

7000 X 150

21

3

31

1074

TWR 1111

1084±

TDZE 1054

HIRL Rwy 3-21

MIRL Rwy 13-31

REIL Rwys 21 and 31 L

034° 5.8 NM from FAF

FAF to MAP 5.8 NM

Knots	60	90	120	150	180
Min:Sec	5:48	3:52	2:54	2:19	1:56

One Minute Holding Pattern

RAMZE INT MHK 17.7

NDB MHK 9.3

HATAN OM MHK 6.7

3800

214°

034°

2985

3000

034°

MHK 0.9

GS 3.00°

TCH 49

8.4 NM 2.6 5.8 NM

2000	3000	ALMAS
	MHK R-141	MHK 7.7

CATEGORY	A	B	C	D
S-ILS 3	1254-½ 200 (200-½)			
S-LOC 3	1440-½ 386 (400-½)			1440-¾ 386 (400-¾)
CIRCLING	1600-1 544 (600-1)	1700-1 644 (700-1)	1700-1¾ 644 (700-1¾)	1760-2¼ 704 (800-2¼)

39° 08′ N-96° 40′ W

MANHATTAN REGIONAL (MHK)
ILS RWY 3

RNAV (GPS) RWY 3
MANHATTAN REGIONAL (MHK)

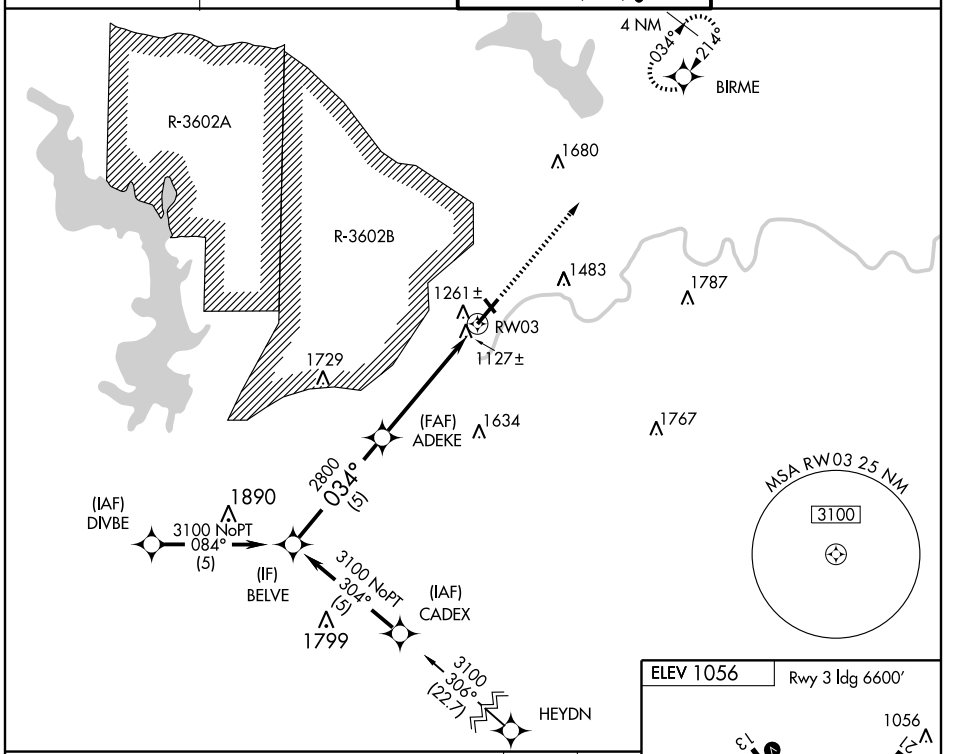
APP CRS	Rwy Idg	6600
034°	TDZE	1054
	Apt Elev	1056

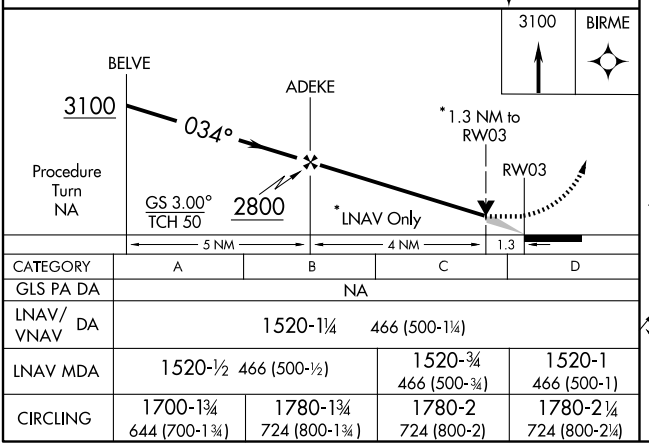
BARO-VNAV NA below -17°C (2°F)
GPS or RNP-0.3 required. DME/DME RNP-0.3 NA.
NA Circling not authorized west of runway 3-21.

MALSR

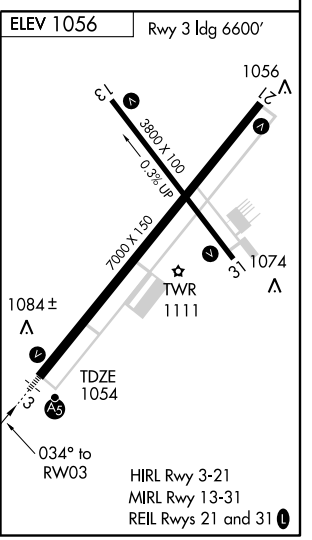
MISSED APPROACH: Climb to 3100 direct BIRME and hold.

ASOS	KANSAS CITY CENTER	MANHATTAN TOWER ★	GND CON
119.075	127.35 257.975	118.55 (CTAF) L	121.85





CATEGORY	A	B	C	D
GLS PA DA	NA			
LNAV/VNAV DA	1520-1¼ 466 (500-1¼)			
LNAV MDA	1520-½ 466 (500-½)		1520-¾ 466 (500-¾)	1520-1 466 (500-1)
CIRCLING	1700-1¾ 644 (700-1¾)	1780-1¾ 724 (800-1¾)	1780-2 724 (800-2)	1780-2¼ 724 (800-2¼)



NC-2, 02 AUG 2007 to 30 AUG 2007

VOR/DME MHK	APP CRS	Rwy Idg	6600
110.2	027°	TDZE	1054
Chan 39		Apt Elev	1056

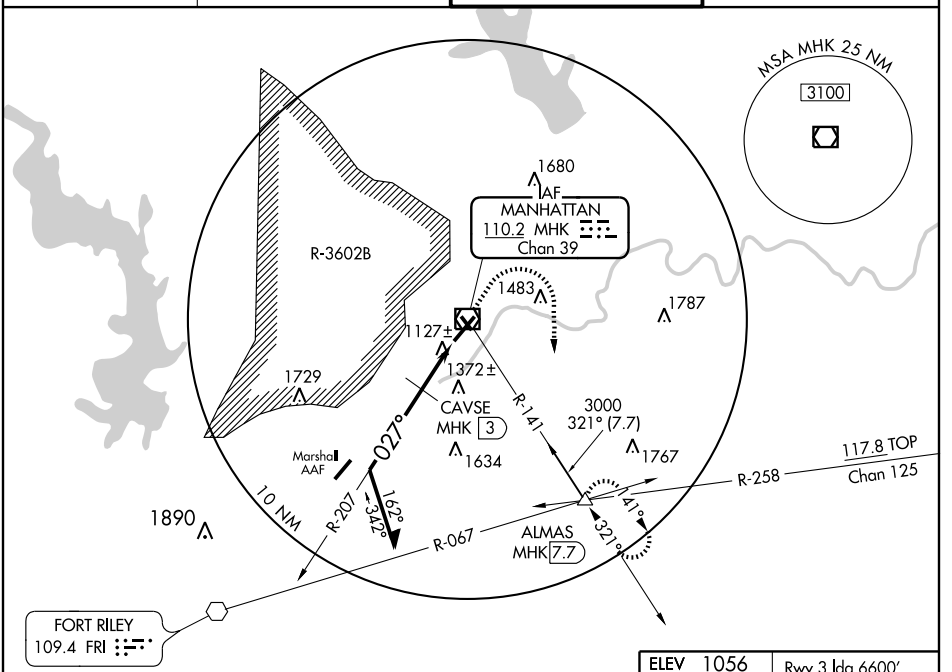
VOR RWY 3
MANHATTAN REGIONAL (MHK)

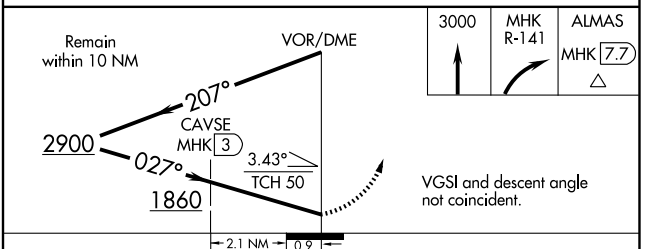
Circling not authorized west of runway 3-21.
NA

MALSR

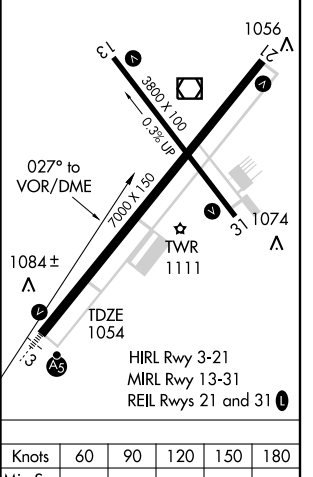
MISSED APPROACH: Climb to 3000 then right turn via MHK R-141 to ALMAS Int/MHK 7.7 DME and hold.

ASOS	KANSAS CITY CENTER	MANHATTAN TOWER ★	GND CON
119.075	127.35 257.975	118.55 (CTAF)	121.85





CATEGORY	A	B	C	D
S-3	1860- ¾	806 (900-¾)	1860-1¾ 806 (900-1¾)	1860-2 806 (900-2)
CIRCLING	1860-1 804 (900-1)	1860-1¼ 804 (900-1¼)	1860-2¼ 804 (900-2¼)	1860-2½ 804 (900-2½)
DME MINIMUMS				
S-3	1640-¾	586 (600-¾)	1640-1 586 (600-1)	1640-1¼ 586 (600-1¼)
CIRCLING	1700-1 644 (700-1)	1780-1 724 (800-1)	1780-2 724 (800-2)	1780-2¼ 724 (800-2¼)



Knots	60	90	120	150	180
Min:Sec					

NC-2, 02 AUG 2007 to 30 AUG 2007

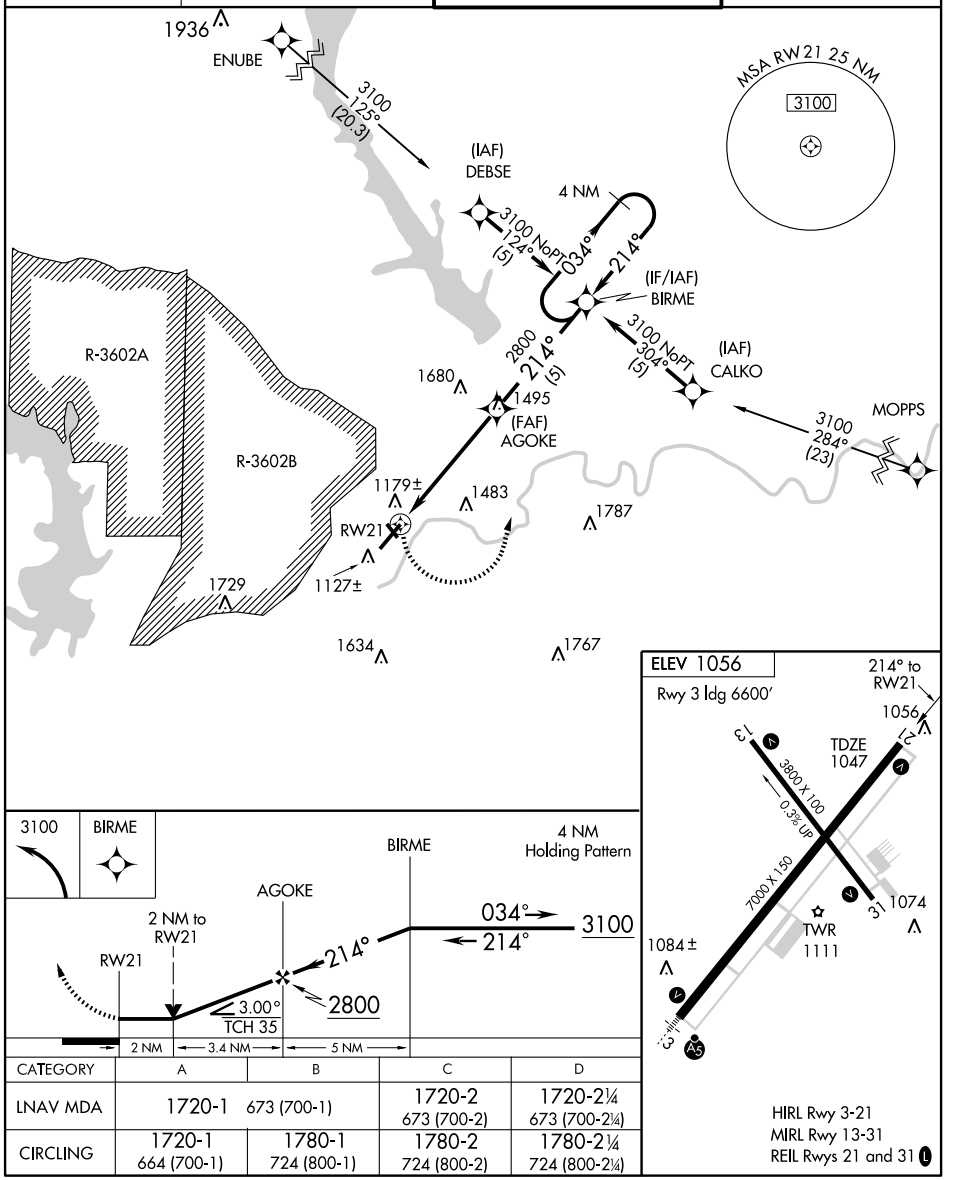
RNAV (GPS) RWY 21
MANHATTAN REGIONAL (MHK)

APP CRS	Rwy Idg	TDZE	Apt Elev
214°	7000	1047	1056

GPS or RNP-0.3 required. DME/DME RNP-0.3 NA.
NA Circling not authorized west of runway 3-21.

MISSED APPROACH: Climbing left turn to 3100 direct BIRME and hold.

ASOS	KANSAS CITY CENTER	MANHATTAN TOWER ★	GND CON
119.075	127.35 257.975	118.55 (CTAF) L	121.85



CATEGORY	A	B	C	D
LNAV MDA	1720-1 673 (700-1)		1720-2 673 (700-2)	1720-2¼ 673 (700-2¼)
CIRCLING	1720-1 664 (700-1)	1780-1 724 (800-1)	1780-2 724 (800-2)	1780-2¼ 724 (800-2¼)

HIRL Rwy 3-21
MIRL Rwy 13-31
REIL Rwys 21 and 31 L

NC-2, 02 AUG 2007 to 30 AUG 2007

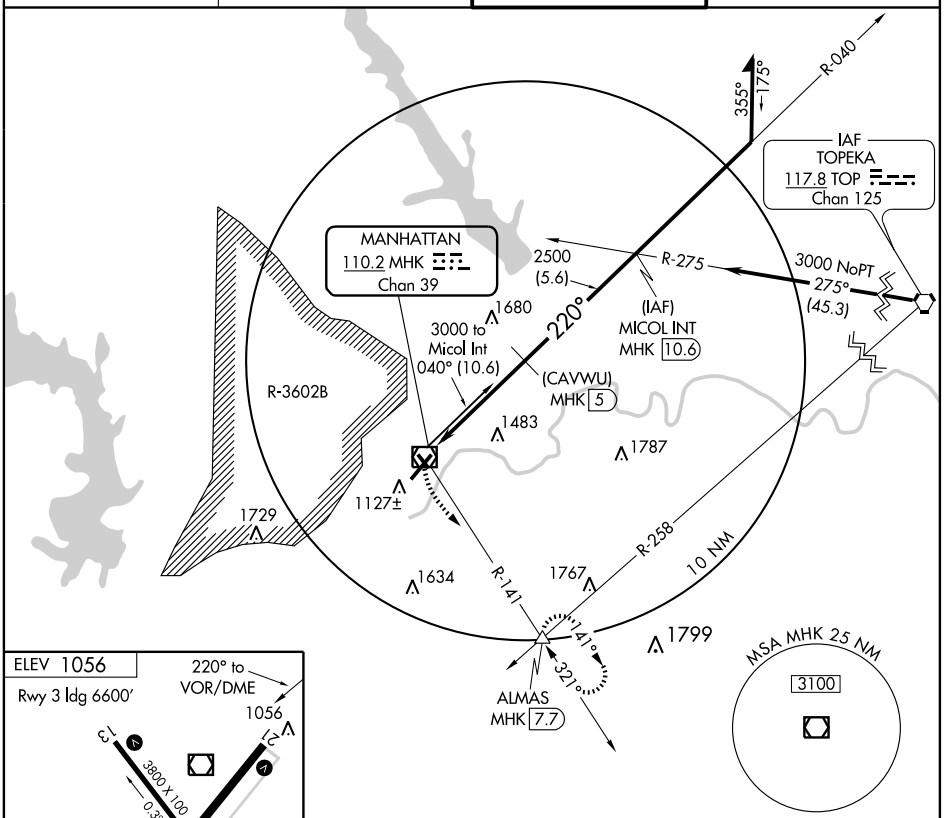
VOR/DME MHK	APP CRS	Rwy Idg	N/A
110.2	220°	TDZE	N/A
Chan 39		Apt Elev	1056

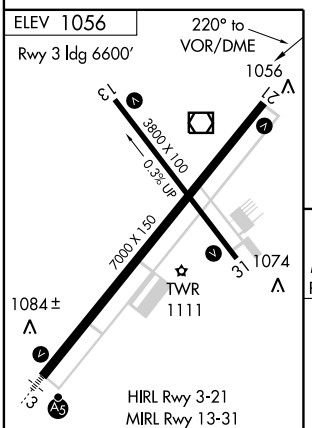
VOR/DME or GPS-F
MANHATTAN REGIONAL (MHK)

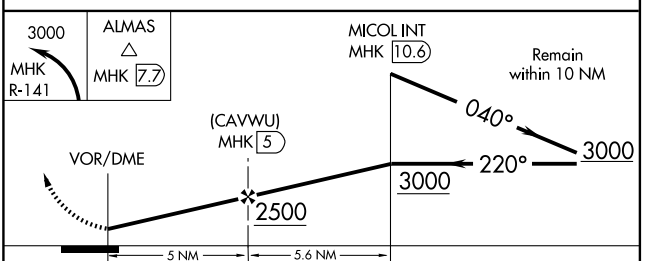
Circling not authorized west of runway 3-21.

MISSED APPROACH: Climbing left turn to 3000 via MHK R-141 to ALMAS Int/MHK 7.7 DME and hold.

ASOS	KANSAS CITY CENTER	MANHATTAN TOWER*	GND CON
119.075	127.35 257.975	118.55 (CTAF) L	121.85







Knots	60	90	120	150	180
Min:Sec					

CATEGORY	A	B	C	D
CIRCLING	1700-1	644 (700-1)	1700-1¾ 644 (700-1¾)	1760-2¼ 704 (800-2¼)

NC-2, 02 AUG 2007 to 30 AUG 2007
NC-2, 02 AUG 2007 to 30 AUG 2007

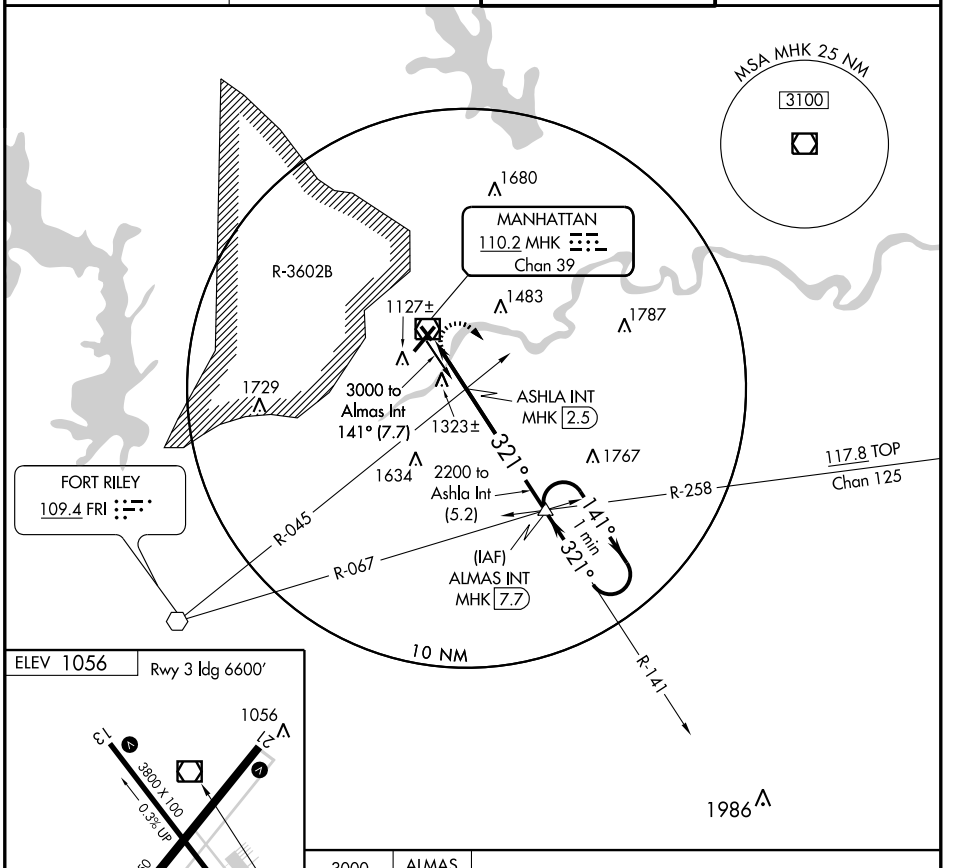
VOR/DME MHK	APP CRS	Rwy Idg	N/A
110.2	321°	TDZE	N/A
Chan 39		Apt Elev	1056

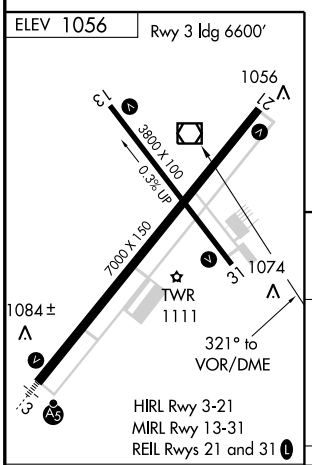
VOR-H
MANHATTAN REGIONAL (MHK)

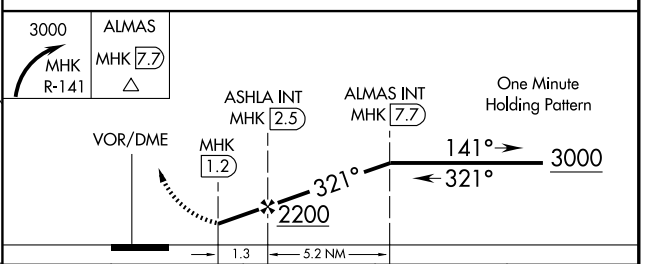
Circling not authorized west of runway 3-21.

MISSED APPROACH: Climbing right turn to 3000 via MHK R-141 to ALMAS Int/7.7 DME and hold.

ASOS	KANSAS CITY CENTER	MANHATTAN TOWER★	GND CON
119.075	127.35 257.975	118.55 (CTAF) L	121.85







FAF to MAP 1.3 NM					
Knots	60	90	120	150	180
Min:Sec	1:18	0:52	0:39	0:31	0:26

CATEGORY	A	B	C	D
CIRCLING	1680-1	624 (700-1)	1680-1¾ 624 (700-1¾)	1760-2¼ 704 (800-2¼)

NC-2, 02 AUG 2007 to 30 AUG 2007

ORAZEM & SCALORA ENGINEERING, P.A.
2312 Anderson Avenue ■ Manhattan, Kansas 66502 ■ (785) 537-2553

MANHATTAN AIRPORT HVAC SYSTEM ASSESSMENT

October 2007
OSE 07093

Prepared for: HNTB
Project No. 44703-PL-001

Prepared by: Orazem & Scalora Engineering, P.A.
2312 Anderson Avenue
Manhattan, Kansas 66502

Objective

This investigation was undertaken to assess the general condition of the HVAC systems serving the Airport Terminal building in Manhattan, KS.

Methodology

1. The original building design drawings prepared by Brent Bowman Associates Architects, P.A., Manhattan, Kansas, February, 1995 were reviewed.
2. General operation and maintenance of the HVAC systems were discussed with the Airport operations personnel; Mr. Peter Van Kuren and Mr. Charlie Weeks.
3. The systems were observed and photographed during a visit to the building.
4. Discussions were held with the service contractor that currently maintains the heating system. Our contact persons were Eric Jaeger and Shane Good with Thermal Comfort Air, Inc.
5. The energy utility records for the past three year's operation of Airport Terminal building were reviewed. The energy consumption of the terminal was compared to historical weather data supplied by the Kansas State University weather station for the same period of time. The relation between the overall monthly temperatures and the energy consumed was analyzed in order to assess the response of the building's conditioning systems to ambient conditions.

Findings

1. Existing system - The existing heating system comprises the following equipment:
   A. Seven gas-fired rooftop heating and cooling units that serve most building areas. One 3 ton unit serves the Administration area, three 10 ton units and one 13 ton unit serve the main terminal areas, one 6 ton unit serves the vending area, and one 4 ton unit serves the baggage claim area.
   B. Two 1.58 ton split direct expansion cooling systems with and two gas-fired, 50 MBH unit heaters serve the two airline tenant spaces.
   C. Two electric heaters serve the entrance vestibules.
   D. A rooftop centrifugal exhaust fan serves both toilet rooms.

2. Controls:
   A. The rooftop heating and cooling units are controlled by a Johnson Controls Metasys direct digital control system. During the past several years this system has been problematic for reasons ranging from failure of the Owners computer that provided the user interface to the control system, a need to update the obsolete user interface display, loss of operator training due to attrition, and a reported general lack of local technical support for the system.
   B. The split cooling system, unit heaters and electric heaters are controlled by stand-alone, non-programmable thermostats.
3. General condition:
   A. The equipment in this building is about ten years old. In general, the appearance of the equipment is good. It is apparent from dents on the tops and straightened coil fins that the units have suffered past hail damage. This type of damage is not unusual and has been adequately corrected.
   B. According to Thermal Comfort Air, the maintenance for the building equipment over the past 10 years has been routine. Maintenance has included replacement of air filters, belts, motors and refrigeration components. No major equipment failures have been experienced.
   C. The Johnson Controls system front-end is obsolete and the system should be modernized or replaced.
4. Reported Comfort Issues:
   A. The airport Director's office has high humidity during the summer months. It is conditioned by a rooftop unit that also serves the adjacent office area. The humidity in the adjacent office area is reported to be noticeably lower than that in the Director's office. A problem exists with surface water from the adjacent apron slab running towards the building. This is evidenced by a severely rusted frame on the exterior door and stained carpet in front of the door. The slope of the exterior slab should be corrected so that the water runs away from the building.
   B. There are no other reported comfort issues in the building.
5. Conditioning Systems energy Utilization:
   A. The building baseline electrical requirement is approximately 26,400 kWH per month. This electrical energy primarily supplies the lighting, basic ventilation and occupant power needs. The building electrical loads increase as much as 68% to provide air conditioning demand during the summer months. Additional heating needs during the winter can increase the electrical power requirement as much as 44%.
   B. The natural gas consumption is primarily building heating with approximately 2 Mcf (thousand cubic feet) used per month for water heating. Space heating requires up to 140 Mcf per month. This equates to a $1,632.00 gas cost.
   C. The heating systems energy consumption correlates well with ambient conditions with a few exceptions during the three year sample period. This indicates generally proper operation without serious malfunctions of the conditioning equipment and corresponding wasted heating energy.
   D. The electrical energy consumed by cooling systems indicates a fair response to ambient conditions. During four months, September 05, August 06, July 07

and August 07 of the past three years the actual electrical consumption has significantly exceeded what should be expected. From a very conservative estimate over 13,000 kWH or approximately 30 to 40 additional hours per month of cooling operation took place during those months. The additional energy consumption cannot be attributed to extreme weather conditions. Other more severe cooling months with less energy consumption are on record. Additional run time and/or temporary loss of equipment efficiency due to dirty filters, clogged condensers, and etcetera are suspected as causes.

Recommendations

1. Regular preventative maintenance of the multiple heating and cooling rooftop systems should be implemented. Regular changing of the unit filters and cleaning of condenser coils are necessary to realize the available efficiency of the terminal building air cooled equipment.
2. The rooftop units and split systems that condition this building have a normal life of about 15 years. Therefore, replacement of this equipment should be planned for sometime in the next 5 to 10 years. Probable Cost = $96,000.
3. The primary energy management for the building conditioning and lighting systems is the existing electronic control system. Scheduling and operation of the building system through this tool can be a valuable management operation. The control system for the 7 rooftop heating and cooling units should be modernized or replaced with one of the following:
   A. Replaced Johnson Controls user interface with a web interface allowing standard PC web-browser access to the system. Probable Cost = $6,000.
   B. Web-browser accessed controls system by Honeywell or another manufacturer that has more readily available local support. Probable Cost = $16,000.
   C. Stand-alone programmable thermostats. Probable Cost = $4,500.
4. No other equipment or system replacement is anticipated for the next 5 years.

The probable costs listed above are present day costs and do not include any escalation contingency, sales tax or design fees. Given the current volatility of the construction market, consideration should be given to including a significant (5% to 8% per year) escalation contingency.

Manhattan Regional Airport – Master Plan Update
Facility Equipment Photographs

Administration Office Door Frame and Threshold
Rust and water stains evident from water infiltration

Rooftop AC unit that serves administration offices in the foreground.

Terminal rooftop AC unit – East side.

Administration RTU outside air dampers closed.

Waiting area rooftop AC unit with minor hail damage to condensing coil.

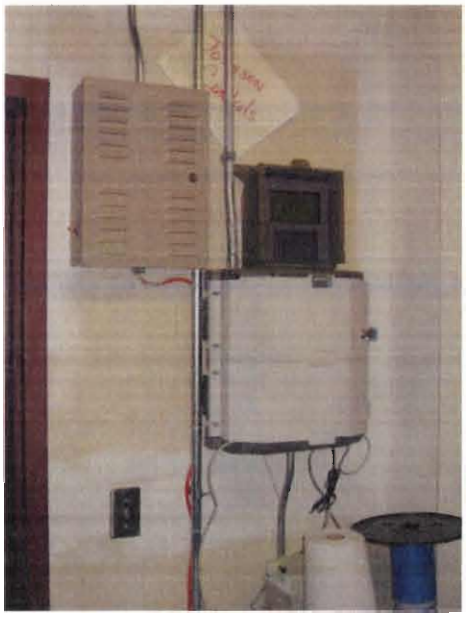
Terminal building electrical service transformer and standby generator.

Automatic transfer switch inclined due to settlement around conduits.

Main electrical distribution panelboard.

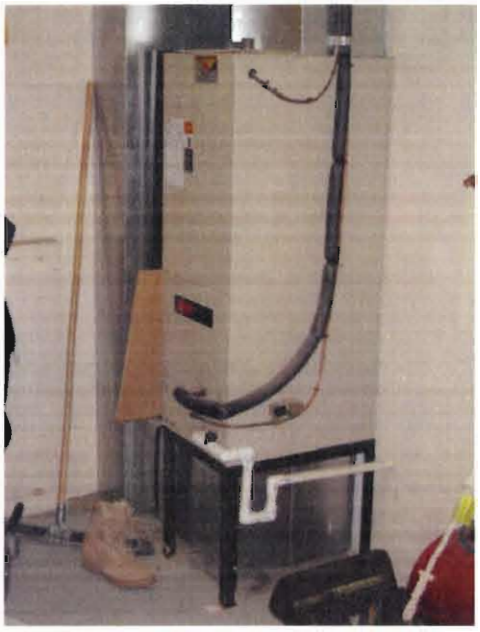
Terminal building fire alarm control panel.

Telecommunications and data interface and wiring center.



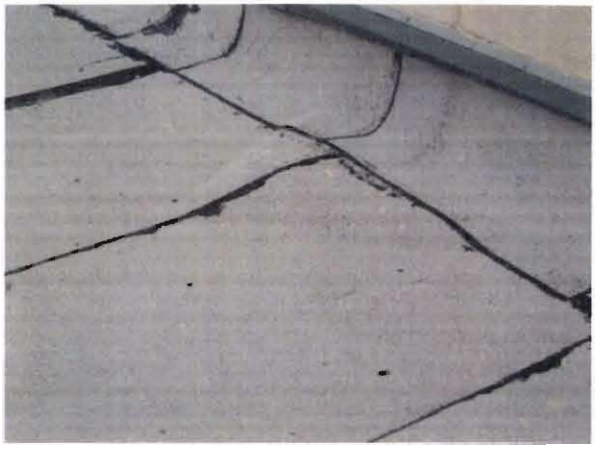
Building temperature control and automation system main equipment.

Airline tenant space gas fired unit heater.



Split DX system provides air conditioning to airline tenant space.

Clearstory flashing detached from wall.



Roofing with air bubble near lobby clearstory.

Rooftop exhaust fan.

Airside of terminal area lighting with yellowing lenses.

Terminal building main entrance.

Turboprop Scenario - Beech 1900

Years 0-5

15	Departures per workweek		
3	Departures per weekend		
18	Departures per week		
36	Weekly Operations		
215	Weekly Enplanements (start) with 0.65 LF	11200	Annual Enplanements
264	Weekly Enplanements (end) with 0.85 LF	13700	Annual Enplanements

2012 for Years 6-10

25	Departures per workweek	assume a 2nd market (other than MCI)	
4	Departures per weekend	add two more dep per day	
29	Departures per week	one more on weekend	
58	Weekly Operations		
346	Weekly Enplanements (start) with 0.65 LF	18000	Annual Enplanements
425	Weekly Enplanements (end) with 0.85 LF	22100	Annual Enplanements

2017 for Years 11-15

30	Departures per workweek	add a second dep per day	
5	Departures per weekend	one more on weekend	
35	Departures per week		
70	Weekly Operations		
417	Weekly Enplanements (start) with 0.65 LF	21700	Annual Enplanements
513	Weekly Enplanements (end) with 0.85 LF	26700	Annual Enplanements

2022 for Years 16-20

35	Departures per workweek	…for 6 departures per day	
6	Departures per weekend	one more on weekend	
41	Departures per week		
82	Weekly Operations		
489	Weekly Enplanements (start) with 0.65 LF	25400	Annual Enplanements
601	Weekly Enplanements (end) with 0.85 LF	31300	Annual Enplanements

Turboprop Scenario - Beech 1900 to EMB-120

Years 0-5

15	Departures per workweek		
3	Departures per weekend		
18	Departures per week		
36	Weekly Operations		
215	Weekly Enplanements (start) with 0.65 LF	11200	Annual Enplanements
264	Weekly Enplanements (end) with 0.85 LF	13700	Annual Enplanements

2012 for Years 6-10

25	Departures per workweek	assume a 2nd market (other than MCI)	
4	Departures per weekend	add two more dep per day	
29	Departures per week	one more on weekend	
58	Weekly Operations		
346	Weekly Enplanements (start) with 0.65 LF	18000	Annual Enplanements
425	Weekly Enplanements (end) with 0.85 LF	22100	Annual Enplanements

2017 for Years 11-15

25	Departures per workweek	keep schedule but change aircraft	
4	Departures per weekend	from 19- to 30-seat	
29	Departures per week		
58	Weekly Operations		
546	Weekly Enplanements (start) with 0.65 LF	28400	Annual Enplanements
672	Weekly Enplanements (end) with 0.85 LF	34900	Annual Enplanements

2022 for Years 16-20

30	Departures per workweek	…for 6 departures per day	
6	Departures per weekend		
36	Departures per week		
72	Weekly Operations		
677	Weekly Enplanements (start) with 0.65 LF	35200	Annual Enplanements
834	Weekly Enplanements (end) with 0.85 LF	43400	Annual Enplanements

Regional Jet Scenario

Years 0-5

10	Departures per workweek		
2	Departures per weekend		
12	Departures per week		
24	Weekly Operations		
376	Weekly Enplanements (start) with 0.65 LF	19600	Annual Enplanements
463	Weekly Enplanements (end) with 0.85 LF	24100	Annual Enplanements

2012 for Years 6-10

13	Departures per workweek		
2	Departures per weekend		
15	Departures per week		
30	Weekly Operations		
470	Weekly Enplanements (start) with 0.65 LF	24500	Annual Enplanements
579	Weekly Enplanements (end) with 0.85 LF	30100	Annual Enplanements

2017 for Years 11-15

17	Departures per workweek		
2	Departures per weekend		
19	Departures per week		
38	Weekly Operations		
596	Weekly Enplanements (start) with 0.65 LF	31000	Annual Enplanements
733	Weekly Enplanements (end) with 0.85 LF	38100	Annual Enplanements

2022 for Years 16-20

22	Departures per workweek		
2	Departures per weekend		
24	Departures per week		
48	Weekly Operations		
753	Weekly Enplanements (start) with 0.65 LF	39100	Annual Enplanements
926	Weekly Enplanements (end) with 0.85 LF	48200	Annual Enplanements

Operations Summary

	Turboprop Scenario (Beech 1900)	Turboprop Scenario (Beech 1900 to EMB-120)	Regional Jet Scenario
2008	1,872	1,872	1,248
2009	1,872	1,872	1,248
2010	1,872	1,872	1,248
2011	1,872	1,872	1,248
2012	3,016	3,016	1,560
2013	3,016	3,016	1,560
2014	3,016	3,016	1,560
2015	3,016	3,016	1,560
2016	3,016	3,016	1,560
2017	3,640	3,016	1,976
2018	3,640	3,016	1,976
2019	3,640	3,016	1,976
2020	3,640	3,016	1,976
2021	3,640	3,016	1,976
2022	4,264	3,744	2,496
2023	4,264	3,744	2,496
2024	4,264	3,744	2,496
2025	4,264	3,744	2,496
2026	4,264	3,744	2,496
2027	4,264	3,744	2,496

Enplanements Summary

	Turboprop Scenario (Beech 1900)	Turboprop Scenario (Beech 1900 to EMB-120)	Regional Jet Scenario
2008	11,200	11,200	19,600
2009	12,900	12,900	20,825
2010	14,600	14,600	22,050
2011	16,300	16,300	23,275
2012	18,000	18,000	24,500
2013	18,740	20,080	25,800
2014	19,480	22,160	27,100
2015	20,220	24,240	28,400
2016	20,960	26,320	29,700
2017	21,700	28,400	31,000
2018	22,440	29,760	32,620
2019	23,180	31,120	34,240
2020	23,920	32,480	35,860
2021	24,660	33,840	37,480
2022	25,400	35,200	39,100
2023	26,580	36,840	40,920
2024	27,760	38,480	42,740
2025	28,940	40,120	44,560
2026	30,120	41,760	46,380
2027	31,300	43,400	48,200

FAA Terminal Area Forecast (TAF)

Year		-- Enplanements -- Air Carrier	Commuter	Total	-- Itinerant Operations -- Air Carrier	AT & Comm	GA	Military	Total	-- Local Operations -- GA	Military	Total	Total OPS	Total IOPS
		-- AIRPORT OPERATIONS --												
2001		2,700	11,866	14,566	100	4,029	19,075	1,713	24,917	17,690	0	17,690	42,607	0
2002		5,020	9,216	14,236	214	3,331	15,996	1,131	20,672	12,478	684	13,162	33,834	8,604
2003		1,786	7,164	8,950	141	3,103	15,527	1,071	19,842	10,257	370	10,627	30,469	8,475
2004		1,909	4,646	6,555	64	2,721	14,909	1,226	18,920	10,924	310	11,234	30,154	7,843
2005		2,631	10,432	13,063	180	2,836	13,876	989	17,881	10,614	426	11,040	28,921	7,834
2006	*	2,002	10,710	12,712	81	2,809	11,681	768	15,339	8,258	664	8,922	24,261	7,400
2007	*	2,002	10,790	12,792	81	2,820	11,921	5,980	20,802	8,324	3,004	11,328	32,130	10,848
2008	*	2,002	10,871	12,873	81	2,831	12,165	5,980	21,057	8,390	3,004	11,394	32,451	10,943
2009	*	2,002	10,952	12,954	81	2,842	12,415	5,980	21,318	8,456	3,004	11,460	32,778	11,040
2010	*	2,002	11,034	13,036	81	2,852	12,670	5,980	21,583	8,524	3,004	11,528	33,111	11,137
2011	*	2,002	11,116	13,118	81	2,863	12,930	5,980	21,854	8,592	3,004	11,596	33,450	11,237
2012	*	2,002	11,199	13,201	81	2874	13,195	5,980	22,130	8,661	3,004	11,665	33,795	11,340
2013	*	2,002	11,282	13,284	81	2,885	13,466	5,980	22,412	8,730	3,004	11,734	34,146	11,444
2014	*	2,002	11,368	13,370	81	2,896	13,742	5,980	22,699	8,800	3,004	11,804	34,503	11,550
2015	*	2,002	11,453	13,455	81	2,907	13,910	5,980	22,878	8,870	3,004	11,874	34,752	11,619
2016	*	2,002	11,540	13,542	81	2,918	14,080	5,980	23,059	8,941	3,004	11,945	35,004	11,688
2017	*	2,002	11,627	13,629	81	2929	14,252	5,980	23,242	9,012	3,004	12,016	35,258	11,758
2018	*	2,002	11,714	13,716	81	2,941	14,426	5,980	23,428	9,085	3,004	12,089	35,517	11,830
2019	*	2,002	11,802	13,804	81	2,952	14,602	5,980	23,615	9,158	3,004	12,162	35,777	11,902
2020	*	2,002	11,891	13,893	81	2,963	14,780	5,980	23,804	9,231	3,004	12,235	36,039	11,973
2021	*	2,002	11,981	13,983	81	2,974	14,961	5,980	23,996	9,305	3,004	12,309	36,305	12,047
2022	*	2,002	12,071	14,073	81	2986	15,144	5,980	24,191	9,379	3,004	12,383	36,574	12,123
2023	*	2,002	12,161	14,163	81	2,997	15,329	5,980	24,387	9,454	3,004	12,458	36,845	12,198
2024	*	2,002	12,253	14,255	81	3,008	15,516	5,980	24,585	9,530	3,004	12,534	37,119	12,273
2025	*	2,002	12,346	14,348	81	3,019	15,706	5,980	24,786	9,606	3,004	12,610	37,396	12,350
GR1		-1.35	0.84	0.47	-3.91	0.31	0.62	9.41	1.64	-0.49	10.25	0.66	1.29	2.30
GR2		0.00	0.75	0.63	0.00	0.38	1.57	11.40	2.55	0.79	8.26	1.83	2.30	2.73

GR1: Growth Rate from 2005 to 2025

GR2: Growth Rate from 2006 to 2025

Report created 7/17/2007 19:52

AIRPORT TRAFFIC RECORD
Manhattan Regional Airport

Airport Operations Count											INSTRUMENT OPERATIONS					
	ITINERANT					LOCAL			Total Operations	Special Use (47-51)						
Date	AC (17-21)	AT (22-26)	GA (27-31)	MI (32-36)	Total Itinerant	Civil (37-41)	Military (42-46)	Total Local			Date	AC (17-21)	AT (22-26)	GA (27-31)	MI (32-36)	Total (10-E) (14-1)
Sep-07	6	129	1078	41	1254	822	24	846	2100		Sep-07	6	129	337	31	503
Aug-07	4	146	1230	60	1440	1246	64	1310	2750		Aug-07	4	146	285	33	468
Jul-07	0	145	989	104	1238	1352	142	1494	2732		Jul-07	0	145	291	43	468
Jun-07	2	129	935	110	1176	968	416	1384	2560		Jun-07	2	129	263	50	468
May-07	19	236	1076	112	1443	1214	284	1498	2941		May-07	19	236	343	46	644
Apr-07	8	222	938	93	1261	649	180	829	2090		Apr-07	8	222	306	26	562
Mar-07	7	246	860	147	1260	616	456	1072	2332		Mar-07	7	246	361	35	649
Feb-07	6	190	632	110	938	490	768	1258	2196		Feb-07	6	190	247	29	472
Jan-07	8	235	585	158	986	360	666	1026	2012		Jan-07	8	235	263	54	560
Total 2007	60	1678	8323	935	10996	7717	3000	10717	21713		Total 2007	60	1678	2696	347	4794
Dec-06	20	215	748	104	1087	588	412	1000	2087		Dec-06	20	215	298	27	560
Nov-06	32	226	983	73	1314	462	226	688	2002		Nov-06	32	226	422	27	707
Oct-06	20	237	1092	71	1420	642	122	764	2184		Oct-06	20	237	508	51	816
Sep-06	21	212	1036	39	1308	652	32	684	1992		Sep-06	21	212	435	26	694
Aug-06	15	220	926	89	1250	670	128	798	2048		Aug-06	15	220	350	48	633
Jul-06	4	209	1039	39	1291	670	46	716	2007		Jul-06	4	209	302	29	544
Jun-06	2	237	1031	67	1337	664	30	694	2031		Jun-06	2	237	336	35	610
May-06	0	244	1048	59	1351	602	36	638	1989		May-06	0	244	379	46	669
Apr-06	0	231	975	62	1268	592	20	612	1880		Apr-06	0	231	298	47	576
Mar-06	2	244	855	56	1157	638	14	652	1809		Mar-06	2	244	329	46	621
Feb-06	1	220	841	23	1085	786	22	808	1893		Feb-06	1	220	239	15	475
Jan-06	10	242	978	46	1276	870	16	886	2162		Jan-06	10	242	279	35	566
Total 2006	127	2737	11552	728	15144	7836	1104	8940	24084		Total 2006	127	2737	4175	432	7471
Dec-05	0	238	808	51	1097	798	36	834	1931		Dec-05	0	238	250	37	525
Nov-05	5	250	976	100	1331	664	48	712	2043		Nov-05	5	250	353	60	668
Oct-05	19	257	1169	123	1568	832	62	894	2462		Oct-05	19	256	472	73	820
Sep-05	16	227	1063	56	1362	726	34	760	2122		Sep-05	16	229	362	27	634
Aug-05	76	283	1084	59	1502	790	42	832	2334		Aug-05	70	277	356	33	736
Jul-05	1	242	1228	59	1530	992	76	1068	2598		Jul-05	1	240	334	25	600
Jun-05	2	225	1344	102	1673	988	24	1012	2685		Jun-05	2	225	366	33	626
May-05	0	252	1310	108	1670	1094	52	1146	2816		May-05	0	250	374	54	678
Apr-05	2	237	1148	98	1485	952	28	980	2465		Apr-05	2	237	365	45	649
Mar-05	5	232	1107	75	1419	796	20	816	2235		Mar-05	5	232	350	37	624
Feb-05	1	230	1083	69	1383	1040	16	1056	2439		Feb-05	1	228	296	25	550
Jan-05	2	219	606	30	857	534	24	558	1415		Jan-05	2	199	197	14	412
Total 2005	129	2892	12926	930	16877	10206	462	10668	27545		Total 2005	123	2861	4075	463	7522
Dec-04	2	220	1134	111	1467	1062	66	1128	2595		Dec-04	2	220	304	49	575
Nov-04	42	220	1212	96	1570	806	28	834	2404		Nov-04	42	220	490	31	783
Oct-04	31	246	1594	124	1995	732	42	774	2769		Oct-04	31	242	648	24	945
Sep-04	4	222	1509	105	1840	1154	8	1162	3002		Sep-04	3	223	403	35	664
Aug-04	21	237	1459	93	1810	910	0	910	2720		Aug-04	21	237	366	21	645
Jul-04	0	229	1311	89	1629	1102	4	1106	2735		Jul-04	0	234	378	28	640
Jun-04	0	234	1322	87	1643	928	30	958	2601		Jun-04	0	234	422	37	693
May-04	0	227	1477	104	1808	1120	40	1160	2968		May-04	0	227	473	53	753
Apr-04	0	219	1280	122	1621	820	30	850	2471		Apr-04	0	219	351	52	622
Mar-04	7	252	1144	85	1488	988	24	1012	2500		Mar-04	7	252	320	36	615
Feb-04	0	197	889	85	1171	908	12	920	2091		Feb-04	0	197	296	43	536
Jan-04	11	226	805	139	1181	590	26	616	1797		Jan-04	11	226	315	52	604
Total 2004	118	2729	15136	1240	19223	11120	310	11430	30653		Total 2004	117	2731	4766	461	8075

MANHATTAN REGIONAL AIRPORT

REVISED ACTIVITY FORECASTS

June 2005

Prepared by:
HNTB Corporation

For:
City of Manhattan

MANHATTAN REGIONAL AIRPORT
REVISED AIRCRAFT ACTIVITY FORECASTS

1. INTRODUCTION

This report summarizes the methodology, assumptions, and results of the Manhattan Regional Airport (MHK) revised activity forecasts prepared for the Environmental Assessment. The forecasts were revised as a result of recent plans to significantly expand military activity at Fort Riley which will result in increased aircraft operations at MHK. The revised forecasts will be used as input into the Federal Aviation Administration's (FAA's) Integrated Noise Model (INM). During this effort, calendar year 2004 operations were estimated, and forecasts were prepared for 2005, 2008, and 2013.

2. AVAILABLE DATA SOURCES

Multiple data sources were used to estimate 2004 aviation activity and to forecast activity. Professional judgment was used in selecting which sources to use for the various data requirements of the forecast based on the data reported, its consistency, completeness, and other factors. Following is a review of these sources.

2.1 FAA Air Traffic Control Tower Counts

MHK's air traffic control tower (ATCT) is operated by Midwest ATC Services. Since February 2002, the tower has been staffed between 7:00 AM and 9:00 PM local time. (Prior to February 2002, the tower was staffed between 8:00 AM and 6:00 PM local time.) Aircraft operations are logged by ATCT staff using the following categories:

- Air carrier (typically, larger airline operations, both scheduled and non-scheduled)
- Air taxi/commuter (typically, scheduled and unscheduled large turboprop and regional jet operations)
- General aviation (itinerant and local), and
- Military (itinerant and local)

The FAA's Air Traffic Activity Data System (ATADS) database was used as the source for ATCT counts. The unreported evening traffic is important to this study, because INM weights operations between 10:00 PM and 7:00 AM by 10 decibels (i.e., by a factor of 10). It was therefore necessary to account for these after-hour operations, as described in other sections.

2.2 Airport Landing Reports

The airport collects landing fees from scheduled and non-scheduled air carrier landings. Monthly landing reports summarizing the number of landings by equipment type were used to estimate total commercial operations by aircraft type for calendar year 2004.

2.3 Official Airline Guide

The North American edition of the Official Airline Guide (OAG) lists every scheduled commercial airline flight in North America. The OAG was used to obtain the existing and historic schedule of airline operations at MHK. It should be noted that not all scheduled flights actually operate. The ratio between flights actually operated and those that were scheduled is known as the "completion rate" or "completion factor". These values are typically 95 percent or greater.

2.4 U.S. Department of Transportation T-100 Data

The U.S. Department of Transportation (DOT) publishes a T-100 database listing scheduled and non-scheduled commercial flights, passengers, and cargo by carrier and equipment type. T-100 data was available through November 2004 for this project. This database was used to estimate total commercial operations and to calculate a "completion factor" for scheduled operations. Non-scheduled operations are frequently underreported in the T-100 database; therefore, it was necessary to compare the data from this source to other counts.

2.5 Radar Data

Flight Explorer, an Internet-based flight tracking system, was used to collect a two-week sample of IFR flights arriving and departing MHK between January 14 and January 28, 2005. The sample provided aircraft types, arrival and departure times, runway use, and origin/destination data. This data supplemented the interviews with airport representatives to develop the operation fleet mix and stage length estimates for general aviation activity.

2.6 Federal Aviation Administration Terminal Area Forecasts

The FAA annually publishes the Terminal Area Forecast (TAF) for airports in the U.S. system. The most recent update of the TAF was released in February 2005. The aircraft operations forecast is based on historical tower counts (when available) or traffic estimates listed in airport 5010 forms. Since the MHK tower is not a 24-hour facility, its TAF implicitly undercounts historical aircraft operations and therefore provides activity forecasts which are likely to be lower than future actual activity.

2.7 Federal Aviation Administration Aerospace Forecasts FY2005-2016

This annual publication presents FAA's official forecasts of aviation activity at the national level. The most recent update was released in March 2005. The growth rates in

hours flown for GA aircraft categories (i.e., single engine, multi-engine piston, turboprop, jet, and helicopter) at the national level were used to forecast relative growth among these categories at MHK.

2.8 General Aviation Statistical Databook 2004

The *General Aviation Statistical Databook 2004*, produced by the General Aviation Manufacturers Association (GAMA), presents data on GA activity. Its data on aircraft shipments was used to help forecast future GA activity by aircraft type.

2.9 Interviews

Phone interviews were conducted with representatives from the following local organizations and businesses:

- Airport management,
- Midwest ATC,
- Fort Riley Transportation Officer,
- U.S. Air Force liaison at Fort Riley, and
- Kansas Air Center (Primary FBO)

3. ESTIMATES OF CALENDAR YEAR 2004 TOTAL AIRCRAFT OPERATIONS

The first step in preparing the activity forecasts for the EA was to estimate actual activity levels for calendar year 2004, the most recent year for which at least some actual data was available. As noted previously, because the control tower is not staffed 24 hours a day, the total number of operations at MHK is consistently under-reported. Sections 3.1 through 3.5 describe the process of estimating total activity and **Table 1 and Figure 1** compare actual tower counts (made between 7:00 AM and 9:00 PM local) to 24-hour estimated counts for calendar year 2004.

Table 1

Estimated 2004 Total Aircraft Operations

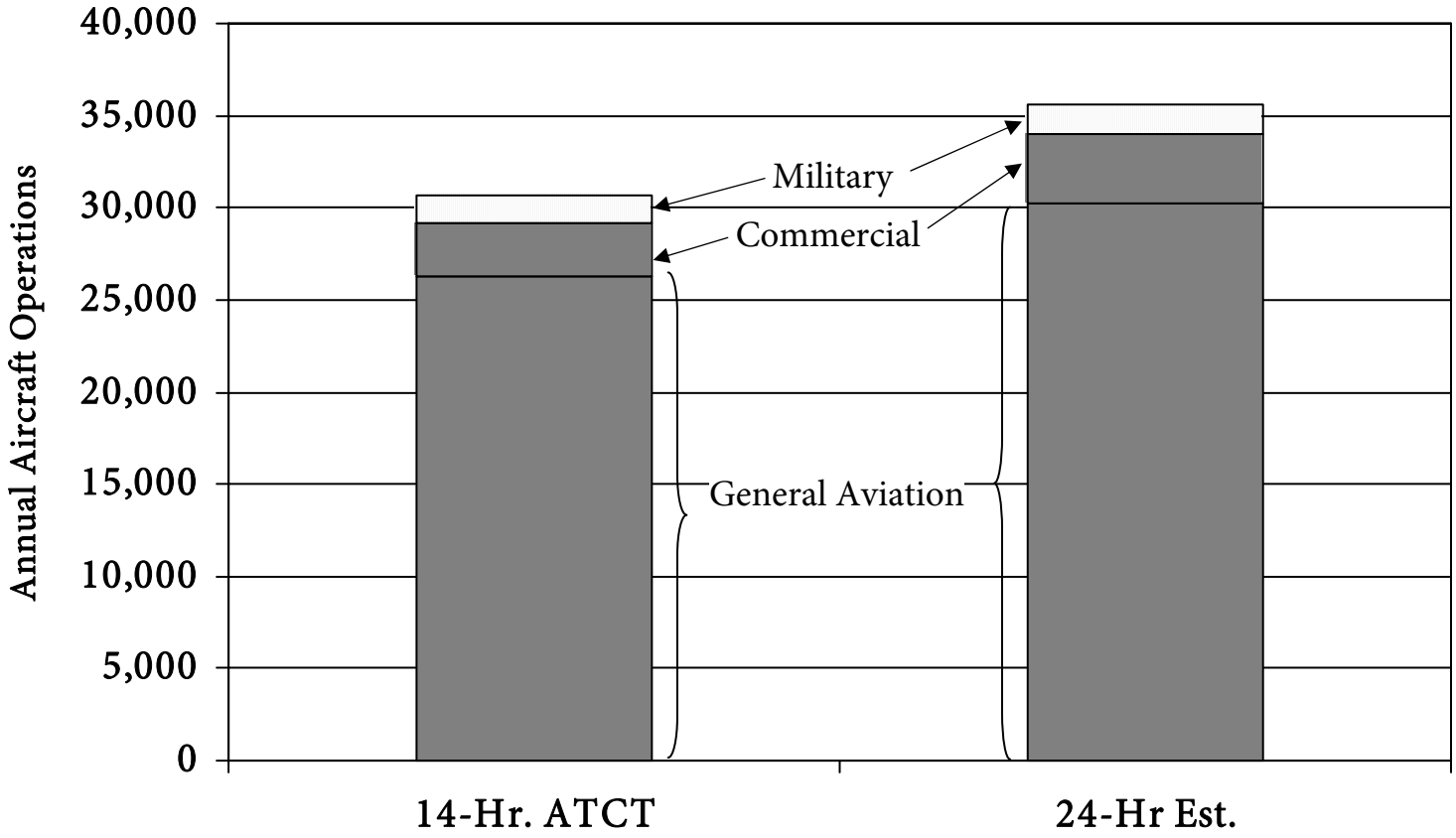
	Commercial (1)		General Aviation		Military		Total	
Time Period	Number	Pct.	Number	Pct.	Number	Pct.	Number	Pct.
0700-2059 (2)	2,847	75.3%	26,279	87.0%	1,524	92.1%	30,650	86.0%
2100-0659 Estimated	933	24.7% (3)	3,942	13.0% (4)	130	7.9% (5)	5,005	14.0%
Total Estimated	3,780	100.0%	30,221	100.0%	1,654	100.0%	35,655	100.0%

Notes: (1) Scheduled plus non-scheduled air carrier and air taxi operations.
(2) Recorded by ATCT during normal operating hours (0700-2059).
(3) Additional operations reported by DOT Form 41 through October 2004 plus estimates for November and December, and airport landing reports.
(4) Estimated based on two-week radar sample data and discussions with airport, ATCT, and FBO representatives.
(5) Estimated based on discussions with airport, ATCT, and FBO representatives.

Source: As listed above and HNTB analysis.

Figure 1
Manhattan Regional Airport Environmental Assessment

Comparison of FAA ATCT 14-Hour Counts with Estimated 24-Hour Counts



3.1 2004 Total Estimated Scheduled Commercial Airline Operations

U.S. DOT T-100 data was used to obtain the number of scheduled commercial flights at MHK through October 2004 (Air Midwest had not reported MHK activity for November). November and December activity for 2004 was estimated by multiplying the number of scheduled operations for those months (obtained from the OAG) by a completion factor. The total estimated number of scheduled commercial operations for calendar year 2004 was 3,568 (approximately five landings and five takeoffs a day).

3.2 2004 Total Estimated Charter Commercial Airline Operations

Airport landing reports and U.S. DOT T-100 data were examined to estimate total charter operations at MHK for 2004. The landing reports suggest 2004 charter flights totaled about 212 operations (including ferry flights to reposition aircraft) compared to 76 operations reported in the T-100 database. Based on experience at other airports, non-scheduled activity is sometimes underreported in the T-100 database, especially for smaller carriers; therefore, airport landing reports were used to determine total charter operations. The estimated 212 annual non-scheduled operations are equivalent to about four operations per week on average.

3.3 2004 Total Estimated General Aviation Operations

An estimate of total annual GA traffic was derived by taking the 14-hour counts produced by the ATCT and adding estimates of after-hour (i.e., between 2100 and 0700) GA activity. These estimates of after-hour GA operations were based on a two-week download of IFR operations using the Flight Explorer software package and discussions with airport management, ATCT staff, and an FBO representative. Based on these data sources, it was estimated that after-hour operations comprised 13 percent of total operations for calendar year 2004 and that the total number of GA operations for that year was 30,211 (about 41 takeoffs and 41 landings per day).

3.4 2004 Total Estimated Military Operations

Twenty-four-hour totals of military traffic were derived by summing the 14-hour counts from the ATCT and estimates of after-hour activity. The after-hour military operations were estimated based on discussions with airport management, the Air Force liaison and transportation officer for Ft. Riley, and the FBO which services military operations. Based on these discussions, it was estimated that, in 2004, about eight percent of military operations occur when the tower is closed. The total number of annual military operations was estimated at 1,654, or an average of about two takeoffs and two landings per day.

3.5 2004 Estimated Total Aircraft Operations

Based on the above analysis, the total number of operations conducted at MHK in calendar year 2004 was approximately 35,655, about 14 percent more than recorded by the tower during their 14-hour operational day.

4. FORECAST OF AIRCRAFT OPERATIONS

This section presents the assumptions, methodology, and results of the MHK EA operations forecast. Depending on the aviation segment being discussed, the forecasts reflect varying degrees of national trends (including FAA's national forecasts), local conditions (including FAA's TAF for MHK), discussions with airport and user representatives, and professional judgment. Forecasts were prepared for calendar years 2005, 2008, and 2013.

4.1 Scheduled Airline Operations Forecast

This section outlines the assumptions and forecasts of scheduled airline operations at MHK. **Table 2** summarizes the forecasts.

Table 2
Historic and Forecast Aircraft Operations by Activity Category

	Scheduled Commercial	Charter	General Aviation	Military	Total
2004	3,568 (1)	212 (2)	30,221 (3)	1,654 (3)	35,655
2005	3,568 (4)	212 (5)	30,475 (6)	1,674 (7)	35,929
2008	3,568 (4)	334 (5)	31,215 (6)	10,741 (7)	45,858
2013	3,568 (4)	398 (5)	32,468 (6)	11,467 (7)	47,900
		Average Annual Growth Rates			
2004-2005	0.0%	0.0%	0.8%	1.2%	0.8%
2005-2008	0.0%	16.4%	0.8%	85.8%	8.5%
2008-2013	0.0%	3.6%	0.8%	1.3%	0.9%
2004-2013	0.0%	7.2%	0.8%	24.0%	3.3%

Notes: (1) Two times U.S. DOT Form 41 completed departures through October 2004 plus OAG November and December scheduled departures multiplied by average completion rate.
(2) Airport landing reports.
(3) FAA Air Traffic Activity DATA System (ATADS) tower counts plus estimate of operations conducted when tower not staffed.
(4) Scheduled commercial operations assumed to remain constant through forecast period.
(5) Civilian charter operations assumed to remain constant through forecast period; military charters assumed to increase based on discussions with U.S. Air Force and Airport personnel.
(6) Forecast to grow at FAA TAF growth rate.
(7) Assumed to increase based on discussions with U.S. military representative.

Source: As listed above and HNTB analysis.

4.1.1 Forecast Number of Scheduled Airline Operations

MHK is currently designated as an Essential Air Service (EAS) community. The EAS program is designed to ensure that small communities retain their link to the national air transportation system, with federal assistance if necessary. In February 2004, Air Midwest (a subsidiary of Mesa Air Group) signed a two-year contract to provide 18 weekly round trips between MHK, Salina Municipal Airport (SLN), and Kansas City International Airport (MCI).[1] Because neither market (Manhattan or Salina) appears to be able to support profitable service to Kansas City on its own, Air Midwest originates its flight in Salina, picks up additional passengers in Manhattan, and then continues to Kansas City. The airline reverses this service on the return leg (i.e., departs MCI, stops at MHK, and continues to SLN). Although the press release states, "expansion of [Mesa's] participation in the Essential Air Service Program continues to be an important goal of [their] Air Midwest subsidiary", it is unlikely that the number of weekly flights will increase at MHK within the forecast horizon, recognizing that enplaning load factors (i.e., counting passengers actually boarding at MHK versus those already onboard from SLN) for flights to MCI averaged approximately 42 percent in 2004. In addition, the FAA's February 2005 Terminal Area Forecast shows no growth in air taxi operations through 2020.

It is assumed that Air Midwest will continue to schedule 18 weekly round trips through the forecast horizon, and assuming a completion rate of approximately 94.1 percent, a total of 3,568 total operations will be actually flown annually through 2013.

4.1.2 Forecast Scheduled Airline Fleet Mix

Air Midwest primarily uses its twin-engine turboprop 19-seat Beech 1900D fleet to serve EAS markets, including MHK. A review of recent Air Midwest press releases did not indicate any plans for changing the fleet mix for EAS communities. In addition, using the next largest aircraft type operated by Air Midwest (the Dash-8, seating 36/37 passengers) would make the market less profitable. It is likewise assumed that the use of regional jets would be unprofitable, particularly at the short stage lengths between MHK and SLN and MCI. (There are currently no regional jet operations to any destinations served by a US Airways affiliated carrier within 500 nautical miles of MCI.)

It is assumed that Air Midwest will continue to serve MHK using Beech 1900D aircraft through the forecast horizon. **Tables 3 through 6** show the existing and forecast fleet mix.

4.1.3 Forecast Scheduled Airline Time of Day

The FAA's integrated Noise Model (INM) requires a "day/night split" for arrivals and departures. Daytime operations are those defined as operating between 7:00 AM and

[1] Mesa Air Group press release dated February 20, 2004.

Table 3

Fleet Mix by Stage Length and Day/Night Split
2004

	Operations		DEPARTURES															ARRIVALS			TOUCH N GOS		
				Day							Night												
	Annual	Avg. Day	Total	St. L. 1	St. L. 2	St. L. 3	St. L. 4	St. L. 5	St. L. 6	St. L. 7	St. L. 1	St. L. 2	St. L. 3	St. L. 4	St. L. 5	St. L. 6	St. L. 7	Total	Day	Night	Total	Day	Night
Scheduled Comm'l																							
B1900	3,568	9.7486	4.8743	3.2315	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.6429	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	4.8743	3.2315	1.6429	0.0000	0.0000	0.0000
Subtotal	3,568	9.7486	4.8743	3.2315	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.6429	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	4.8743	3.2315	1.6429	0.0000	0.0000	0.0000
Charter																							
DC-9-15	8	0.0219	0.0109	0.0087	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0022	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0109	0.0087	0.0022	0.0000	0.0000	0.0000
B727-200	18	0.0492	0.0246	0.0000	0.0110	0.0079	0.0000	0.0000	0.0000	0.0000	0.0000	0.0030	0.0020	0.0000	0.0000	0.0000	0.0000	0.0246	0.0197	0.0049	0.0000	0.0000	0.0000
B737-200	2	0.0055	0.0027	0.0000	0.0000	0.0022	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0000	0.0000	0.0000	0.0000	0.0027	0.0022	0.0005	0.0000	0.0000	0.0000
B737-300	14	0.0383	0.0191	0.0061	0.0046	0.0046	0.0000	0.0000	0.0000	0.0000	0.0015	0.0011	0.0011	0.0000	0.0000	0.0000	0.0000	0.0191	0.0153	0.0038	0.0000	0.0000	0.0000
B737-700	32	0.0874	0.0437	0.0035	0.0157	0.0157	0.0000	0.0000	0.0000	0.0000	0.0009	0.0039	0.0039	0.0000	0.0000	0.0000	0.0000	0.0437	0.0350	0.0087	0.0000	0.0000	0.0000
B737-800	68	0.1858	0.0929	0.0074	0.0334	0.0334	0.0000	0.0000	0.0000	0.0000	0.0019	0.0084	0.0084	0.0000	0.0000	0.0000	0.0000	0.0929	0.0743	0.0186	0.0000	0.0000	0.0000
A319	6	0.0164	0.0082	0.0020	0.0039	0.0007	0.0000	0.0000	0.0000	0.0000	0.0005	0.0010	0.0002	0.0000	0.0000	0.0000	0.0000	0.0082	0.0066	0.0016	0.0000	0.0000	0.0000
A320	10	0.0273	0.0137	0.0033	0.0055	0.0027	0.0000	0.0000	0.0000	0.0000	0.0008	0.0014	0.0005	0.0000	0.0000	0.0000	0.0000	0.0137	0.0109	0.0027	0.0000	0.0000	0.0000
MD-80	-	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
B757-200	8	0.0219	0.0109	0.0035	0.0035	0.0017	0.0000	0.0000	0.0000	0.0000	0.0009	0.0009	0.0004	0.0000	0.0000	0.0000	0.0000	0.0109	0.0087	0.0022	0.0000	0.0000	0.0000
ERJ-145	22	0.0601	0.0301	0.0048	0.0192	0.0000	0.0000	0.0000	0.0000	0.0000	0.0012	0.0048	0.0000	0.0000	0.0000	0.0000	0.0000	0.0301	0.0240	0.0060	0.0000	0.0000	0.0000
F27	-	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FD-328	8	0.0219	0.0109	0.0087	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0022	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0109	0.0087	0.0022	0.0000	0.0000	0.0000
CRJ-200	8	0.0219	0.0109	0.0048	0.0039	0.0000	0.0000	0.0000	0.0000	0.0000	0.0012	0.0010	0.0000	0.0000	0.0000	0.0000	0.0000	0.0109	0.0087	0.0022	0.0000	0.0000	0.0000
EM2	8	0.0219	0.0109	0.0087	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0022	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0109	0.0087	0.0022	0.0000	0.0000	0.0000
Subtotal	212	0.5792	0.2896	0.0616	0.1009	0.0690	0.0000	0.0000	0.0000	0.0000	0.0154	0.0254	0.0171	0.0000	0.0000	0.0000	0.0000	0.2896	0.2317	0.0579	0.0000	0.0000	0.0000
General Aviation																							
C172	8,990	24.5628	4.9126	4.2696	0.1320	0.0000	0.0000	0.0000	0.0000	0.0000	0.4956	0.0153	0.0000	0.0000	0.0000	0.0000	0.0000	4.9126	4.4016	0.5109	7.3688	6.6025	0.7664
C182	4,994	13.6460	2.7292	2.3720	0.0734	0.0000	0.0000	0.0000	0.0000	0.0000	0.2753	0.0085	0.0000	0.0000	0.0000	0.0000	0.0000	2.7292	2.4454	0.2838	4.0938	3.6680	0.4258
PA-28	2,198	6.0042	1.2008	1.0437	0.0323	0.0000	0.0000	0.0000	0.0000	0.0000	0.1211	0.0037	0.0000	0.0000	0.0000	0.0000	0.0000	1.2008	1.0760	0.1249	1.8013	1.6139	0.1873
PA-32	2,198	6.0042	1.2008	1.0437	0.0323	0.0000	0.0000	0.0000	0.0000	0.0000	0.1211	0.0037	0.0000	0.0000	0.0000	0.0000	0.0000	1.2008	1.0760	0.1249	1.8013	1.6139	0.1873
B-35	799	2.1834	0.4367	0.3795	0.0117	0.0000	0.0000	0.0000	0.0000	0.0000	0.0441	0.0014	0.0000	0.0000	0.0000	0.0000	0.0000	0.4367	0.3913	0.0454	0.6550	0.5869	0.0681
M-20	799	2.1834	0.4367	0.3795	0.0117	0.0000	0.0000	0.0000	0.0000	0.0000	0.0441	0.0014	0.0000	0.0000	0.0000	0.0000	0.0000	0.4367	0.3913	0.0454	0.6550	0.5869	0.0681
C310	264	0.7224	0.2890	0.2382	0.0207	0.0000	0.0000	0.0000	0.0000	0.0000	0.0276	0.0024	0.0000	0.0000	0.0000	0.0000	0.0000	0.2890	0.2589	0.0301	0.0722	0.0647	0.0075
C340	1,511	4.1279	1.6511	1.3611	0.1184	0.0000	0.0000	0.0000	0.0000	0.0000	0.1580	0.0137	0.0000	0.0000	0.0000	0.0000	0.0000	1.6511	1.4794	0.1717	0.4128	0.3699	0.0429
C414	378	1.0320	0.4128	0.3403	0.0296	0.0000	0.0000	0.0000	0.0000	0.0000	0.0395	0.0034	0.0000	0.0000	0.0000	0.0000	0.0000	0.4128	0.3699	0.0429	0.1032	0.0925	0.0107
C421	755	2.0639	0.8256	0.6805	0.0592	0.0000	0.0000	0.0000	0.0000	0.0000	0.0790	0.0069	0.0000	0.0000	0.0000	0.0000	0.0000	0.8256	0.7397	0.0859	0.2064	0.1849	0.0215
PA-34	113	0.3096	0.1238	0.1021	0.0089	0.0000	0.0000	0.0000	0.0000	0.0000	0.0118	0.0010	0.0000	0.0000	0.0000	0.0000	0.0000	0.1238	0.1110	0.0129	0.0310	0.0277	0.0032
PA-31	113	0.3096	0.1238	0.1021	0.0089	0.0000	0.0000	0.0000	0.0000	0.0000	0.0118	0.0010	0.0000	0.0000	0.0000	0.0000	0.0000	0.1238	0.1110	0.0129	0.0310	0.0277	0.0032
B55	642	1.7543	0.7017	0.5785	0.0503	0.0000	0.0000	0.0000	0.0000	0.0000	0.0671	0.0058	0.0000	0.0000	0.0000	0.0000	0.0000	0.7017	0.6288	0.0730	0.1754	0.1572	0.0182
King Air-90	1,879	5.1344	2.5415	1.9812	0.2960	0.0000	0.0000	0.0000	0.0000	0.0000	0.2300	0.0344	0.0000	0.0000	0.0000	0.0000	0.0000	2.5415	2.2772	0.2643	0.0257	0.0230	0.0027
C-425	301	0.8215	0.4066	0.3170	0.0474	0.0000	0.0000	0.0000	0.0000	0.0000	0.0368	0.0055	0.0000	0.0000	0.0000	0.0000	0.0000	0.4066	0.3644	0.0423	0.0041	0.0037	0.0004
PA-31T	827	2.2591	1.1183	0.8717	0.1303	0.0000	0.0000	0.0000	0.0000	0.0000	0.1012	0.0151	0.0000	0.0000	0.0000	0.0000	0.0000	1.1183	1.0020	0.1163	0.0113	0.0101	0.0012
PC-12	376	1.0269	0.5083	0.3962	0.0592	0.0000	0.0000	0.0000	0.0000	0.0000	0.0460	0.0069	0.0000	0.0000	0.0000	0.0000	0.0000	0.5083	0.4554	0.0529	0.0051	0.0046	0.0005
C208	376	1.0269	0.5083	0.3962	0.0592	0.0000	0.0000	0.0000	0.0000	0.0000	0.0460	0.0069	0.0000	0.0000	0.0000	0.0000	0.0000	0.5083	0.4554	0.0529	0.0051	0.0046	0.0005
Lear 31	256	0.6985	0.3458	0.2355	0.0620	0.0124	0.0000	0.0000	0.0000	0.0000	0.0273	0.0072	0.0014	0.0000	0.0000	0.0000	0.0000	0.3458	0.3098	0.0360	0.0035	0.0031	0.0004
Lear 45	614	1.6765	0.8299	0.5651	0.1487	0.0297	0.0000	0.0000	0.0000	0.0000	0.0656	0.0173	0.0035	0.0000	0.0000	0.0000	0.0000	0.8299	0.7436	0.0863	0.0084	0.0075	0.0009
Lear 55	256	0.6985	0.3458	0.2355	0.0620	0.0124	0.0000	0.0000	0.0000	0.0000	0.0273	0.0072	0.0014	0.0000	0.0000	0.0000	0.0000	0.3458	0.3098	0.0360	0.0035	0.0031	0.0004

Table 3

Fleet Mix by Stage Length and Day/Night Split
2004

	Operations		DEPARTURES															ARRIVALS			TOUCH N GOS		
				Day							Night												
	Annual	Avg. Day	Total	St. L. 1	St. L. 2	St. L. 3	St. L. 4	St. L. 5	St. L. 6	St. L. 7	St. L. 1	St. L. 2	St. L. 3	St. L. 4	St. L. 5	St. L. 6	St. L. 7	Total	Day	Night	Total	Day	Night
C550	256	0.6985	0.3458	0.2355	0.0620	0.0124	0.0000	0.0000	0.0000	0.0000	0.0273	0.0072	0.0014	0.0000	0.0000	0.0000	0.0000	0.3458	0.3098	0.0360	0.0035	0.0031	0.0004
C560	256	0.6985	0.3458	0.2355	0.0620	0.0124	0.0000	0.0000	0.0000	0.0000	0.0273	0.0072	0.0014	0.0000	0.0000	0.0000	0.0000	0.3458	0.3098	0.0360	0.0035	0.0031	0.0004
C525	383	1.0478	0.5187	0.3532	0.0929	0.0186	0.0000	0.0000	0.0000	0.0000	0.0410	0.0108	0.0022	0.0000	0.0000	0.0000	0.0000	0.5187	0.4647	0.0539	0.0052	0.0047	0.0005
Cit. X	153	0.4191	0.2075	0.1413	0.0372	0.0074	0.0000	0.0000	0.0000	0.0000	0.0164	0.0043	0.0009	0.0000	0.0000	0.0000	0.0000	0.2075	0.1859	0.0216	0.0021	0.0019	0.0002
R-BJ	179	0.4890	0.2420	0.1648	0.0434	0.0087	0.0000	0.0000	0.0000	0.0000	0.0191	0.0050	0.0010	0.0000	0.0000	0.0000	0.0000	0.2420	0.2169	0.0252	0.0024	0.0022	0.0003
G-IV	102	0.2794	0.1383	0.0942	0.0248	0.0050	0.0000	0.0000	0.0000	0.0000	0.0109	0.0029	0.0006	0.0000	0.0000	0.0000	0.0000	0.1383	0.1239	0.0144	0.0014	0.0013	0.0001
G-V	102	0.2794	0.1383	0.0942	0.0248	0.0050	0.0000	0.0000	0.0000	0.0000	0.0109	0.0029	0.0006	0.0000	0.0000	0.0000	0.0000	0.1383	0.1239	0.0144	0.0014	0.0013	0.0001
B205	50	0.1362	0.0279	0.0250	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0029	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0279	0.0250	0.0029	0.0402	0.0360	0.0042
B206	59	0.1610	0.0330	0.0296	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0034	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0330	0.0296	0.0034	0.0475	0.0426	0.0049
BK-117	11	0.0289	0.0059	0.0053	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0006	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0059	0.0053	0.0006	0.0085	0.0076	0.0009
Ae350	11	0.0289	0.0059	0.0053	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0006	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0059	0.0053	0.0006	0.0085	0.0076	0.0009
R-22	11	0.0289	0.0059	0.0053	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0006	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0059	0.0053	0.0006	0.0085	0.0076	0.0009
MD500	11	0.0289	0.0059	0.0053	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0006	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0059	0.0053	0.0006	0.0085	0.0076	0.0009
Subtotal	30,221	82.5706	23.6701	19.2835	1.8010	0.1239	0.0000	0.0000	0.0000	0.0000	2.2383	0.2090	0.0144	0.0000	0.0000	0.0000	0.0000	23.6701	21.2084	2.4617	17.6152	15.7832	1.8320
Military																							
C-12	745	2.0345	0.9898	0.9205	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0693	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.9898	0.9205	0.0693	0.0275	0.0255	0.0019
T-45	17	0.0452	0.0221	0.0206	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0015	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0221	0.0206	0.0015	0.0005	0.0004	0.0000
T-A4	17	0.0452	0.0221	0.0206	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0015	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0221	0.0206	0.0015	0.0005	0.0004	0.0000
UC-35A	149	0.4067	0.1991	0.1234	0.0617	0.0000	0.0000	0.0000	0.0000	0.0000	0.0093	0.0046	0.0000	0.0000	0.0000	0.0000	0.0000	0.1991	0.1852	0.0139	0.0043	0.0040	0.0003
C-21	17	0.0452	0.0221	0.0137	0.0069	0.0000	0.0000	0.0000	0.0000	0.0000	0.0010	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0221	0.0206	0.0015	0.0005	0.0004	0.0000
C-37A	17	0.0452	0.0221	0.0137	0.0069	0.0000	0.0000	0.0000	0.0000	0.0000	0.0010	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0221	0.0206	0.0015	0.0005	0.0004	0.0000
C-32	-	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
C-130	192	0.5251	0.2555	0.0792	0.0792	0.0792	0.0000	0.0000	0.0000	0.0000	0.0060	0.0060	0.0060	0.0000	0.0000	0.0000	0.0000	0.2555	0.2376	0.0179	0.0071	0.0066	0.0005
C-17	6	0.0163	0.0081	0.0000	0.0000	0.0038	0.0000	0.0038	0.0000	0.0000	0.0000	0.0000	0.0003	0.0000	0.0003	0.0000	0.0000	0.0081	0.0076	0.0006	0.0000	0.0000	0.0000
C-5	-	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A-10	25	0.0678	0.0332	0.0309	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0023	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0332	0.0309	0.0023	0.0007	0.0007	0.0000
UH-60	308	0.8406	0.1719	0.1599	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0120	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1719	0.1599	0.0120	0.2484	0.2310	0.0174
CH-47	116	0.3163	0.0647	0.0602	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0045	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0647	0.0602	0.0045	0.0935	0.0869	0.0065
AH-64	48	0.1311	0.0268	0.0249	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0268	0.0249	0.0019	0.0387	0.0360	0.0027
Subtotal	1,654	4.5191	1.8375	1.4675	0.1546	0.0830	0.0000	0.0038	0.0000	0.0000	0.1105	0.0116	0.0062	0.0000	0.0003	0.0000	0.0000	1.8375	1.7089	0.1286	0.4220	0.3925	0.0295
Grand Total	35,655	97.4176	48.7088	24.0441	2.0565	0.2759	0.0000	0.0038	0.0000	0.0000	4.0070	0.2461	0.0377	0.0000	0.0003	0.0000	0.0000	30.6716	26.3805	4.2911	18.0372	16.1757	1.8615

Source: HNTB analysis.

Table 4

Fleet Mix by Stage Length and Day/Night Split
2005

	Operations		DEPARTURES															ARRIVALS			TOUCH N GOS		
				Day							Night												
	Annual	Avg. Day	Total	St. L. 1	St. L. 2	St. L. 3	St. L. 4	St. L. 5	St. L. 6	St. L. 7	St. L. 1	St. L. 2	St. L. 3	St. L. 4	St. L. 5	St. L. 6	St. L. 7	Total	Day	Night	Total	Day	Night
Scheduled Comm'l																							
B1900	3,568	9.7486	4.8743	3.2315	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.6429	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	4.8743	3.2315	1.6429	0.0000	0.0000	0.0000
Subtotal	3,568	9.7486	4.8743	3.2315	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.6429	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	4.8743	3.2315	1.6429	0.0000	0.0000	0.0000
Charter																							
DC-9-15	6	0.0164	0.0082	0.0066	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0082	0.0066	0.0016	0.0000	0.0000	0.0000
B727-200	14	0.0383	0.0191	0.0000	0.0086	0.0061	0.0000	0.0000	0.0000	0.0000	0.0000	0.0023	0.0015	0.0000	0.0000	0.0000	0.0000	0.0191	0.0153	0.0038	0.0000	0.0000	0.0000
B737-200	2	0.0055	0.0027	0.0000	0.0000	0.0022	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0000	0.0000	0.0000	0.0000	0.0027	0.0022	0.0005	0.0000	0.0000	0.0000
B737-300	14	0.0383	0.0191	0.0061	0.0046	0.0046	0.0000	0.0000	0.0000	0.0000	0.0015	0.0011	0.0011	0.0000	0.0000	0.0000	0.0000	0.0191	0.0153	0.0038	0.0000	0.0000	0.0000
B737-700	34	0.0929	0.0464	0.0037	0.0167	0.0167	0.0000	0.0000	0.0000	0.0000	0.0009	0.0042	0.0042	0.0000	0.0000	0.0000	0.0000	0.0464	0.0372	0.0093	0.0000	0.0000	0.0000
B737-800	68	0.1858	0.0929	0.0074	0.0334	0.0334	0.0000	0.0000	0.0000	0.0000	0.0019	0.0084	0.0084	0.0000	0.0000	0.0000	0.0000	0.0929	0.0743	0.0186	0.0000	0.0000	0.0000
A319	8	0.0219	0.0109	0.0026	0.0052	0.0009	0.0000	0.0000	0.0000	0.0000	0.0007	0.0013	0.0002	0.0000	0.0000	0.0000	0.0000	0.0109	0.0087	0.0022	0.0000	0.0000	0.0000
A320	10	0.0273	0.0137	0.0033	0.0055	0.0027	0.0000	0.0000	0.0000	0.0000	0.0008	0.0014	0.0005	0.0000	0.0000	0.0000	0.0000	0.0137	0.0109	0.0027	0.0000	0.0000	0.0000
MD-80	-	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
B757-200	8	0.0219	0.0109	0.0035	0.0035	0.0017	0.0000	0.0000	0.0000	0.0000	0.0009	0.0009	0.0004	0.0000	0.0000	0.0000	0.0000	0.0109	0.0087	0.0022	0.0000	0.0000	0.0000
ERJ-145	24	0.0656	0.0328	0.0052	0.0210	0.0000	0.0000	0.0000	0.0000	0.0000	0.0013	0.0052	0.0000	0.0000	0.0000	0.0000	0.0000	0.0328	0.0262	0.0066	0.0000	0.0000	0.0000
F27	-	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FD-328	8	0.0219	0.0109	0.0087	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0022	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0109	0.0087	0.0022	0.0000	0.0000	0.0000
CRJ-200	10	0.0273	0.0137	0.0060	0.0049	0.0000	0.0000	0.0000	0.0000	0.0000	0.0015	0.0012	0.0000	0.0000	0.0000	0.0000	0.0000	0.0137	0.0109	0.0027	0.0000	0.0000	0.0000
EM2	6	0.0164	0.0082	0.0066	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0082	0.0066	0.0016	0.0000	0.0000	0.0000
Subtotal	212	0.5792	0.2896	0.0598	0.1034	0.0684	0.0000	0.0000	0.0000	0.0000	0.0149	0.0260	0.0170	0.0000	0.0000	0.0000	0.0000	0.2896	0.2317	0.0579	0.0000	0.0000	0.0000
General Aviation																							
C172	9,022	24.6493	4.9299	4.2846	0.1325	0.0000	0.0000	0.0000	0.0000	0.0000	0.4973	0.0154	0.0000	0.0000	0.0000	0.0000	0.0000	4.9299	4.4172	0.5127	7.3948	6.6257	0.7691
C182	5,012	13.6941	2.7388	2.3804	0.0736	0.0000	0.0000	0.0000	0.0000	0.0000	0.2763	0.0085	0.0000	0.0000	0.0000	0.0000	0.0000	2.7388	2.4540	0.2848	4.1082	3.6810	0.4273
PA-28	2,205	6.0254	1.2051	1.0474	0.0324	0.0000	0.0000	0.0000	0.0000	0.0000	0.1216	0.0038	0.0000	0.0000	0.0000	0.0000	0.0000	1.2051	1.0797	0.1253	1.8076	1.6196	0.1880
PA-32	2,205	6.0254	1.2051	1.0474	0.0324	0.0000	0.0000	0.0000	0.0000	0.0000	0.1216	0.0038	0.0000	0.0000	0.0000	0.0000	0.0000	1.2051	1.0797	0.1253	1.8076	1.6196	0.1880
B-35	802	2.1910	0.4382	0.3809	0.0118	0.0000	0.0000	0.0000	0.0000	0.0000	0.0442	0.0014	0.0000	0.0000	0.0000	0.0000	0.0000	0.4382	0.3926	0.0456	0.6573	0.5890	0.0684
M-20	802	2.1910	0.4382	0.3809	0.0118	0.0000	0.0000	0.0000	0.0000	0.0000	0.0442	0.0014	0.0000	0.0000	0.0000	0.0000	0.0000	0.4382	0.3926	0.0456	0.6573	0.5890	0.0684
C310	263	0.7198	0.2879	0.2373	0.0206	0.0000	0.0000	0.0000	0.0000	0.0000	0.0275	0.0024	0.0000	0.0000	0.0000	0.0000	0.0000	0.2879	0.2580	0.0299	0.0720	0.0645	0.0075
C340	1,505	4.1132	1.6453	1.3562	0.1179	0.0000	0.0000	0.0000	0.0000	0.0000	0.1574	0.0137	0.0000	0.0000	0.0000	0.0000	0.0000	1.6453	1.4742	0.1711	0.4113	0.3685	0.0428
C414	376	1.0283	0.4113	0.3391	0.0295	0.0000	0.0000	0.0000	0.0000	0.0000	0.0394	0.0034	0.0000	0.0000	0.0000	0.0000	0.0000	0.4113	0.3685	0.0428	0.1028	0.0921	0.0107
C421	753	2.0566	0.8226	0.6781	0.0590	0.0000	0.0000	0.0000	0.0000	0.0000	0.0787	0.0068	0.0000	0.0000	0.0000	0.0000	0.0000	0.8226	0.7371	0.0856	0.2057	0.1843	0.0214
PA-34	113	0.3085	0.1234	0.1017	0.0088	0.0000	0.0000	0.0000	0.0000	0.0000	0.0118	0.0010	0.0000	0.0000	0.0000	0.0000	0.0000	0.1234	0.1106	0.0128	0.0308	0.0276	0.0032
PA-31	113	0.3085	0.1234	0.1017	0.0088	0.0000	0.0000	0.0000	0.0000	0.0000	0.0118	0.0010	0.0000	0.0000	0.0000	0.0000	0.0000	0.1234	0.1106	0.0128	0.0308	0.0276	0.0032
B55	640	1.7481	0.6992	0.5764	0.0501	0.0000	0.0000	0.0000	0.0000	0.0000	0.0669	0.0058	0.0000	0.0000	0.0000	0.0000	0.0000	0.6992	0.6265	0.0727	0.1748	0.1566	0.0182
King Air-90	1,912	5.2232	2.5855	2.0154	0.3012	0.0000	0.0000	0.0000	0.0000	0.0000	0.2339	0.0350	0.0000	0.0000	0.0000	0.0000	0.0000	2.5855	2.3166	0.2689	0.0261	0.0234	0.0027
C-425	306	0.8357	0.4137	0.3225	0.0482	0.0000	0.0000	0.0000	0.0000	0.0000	0.0374	0.0056	0.0000	0.0000	0.0000	0.0000	0.0000	0.4137	0.3707	0.0430	0.0042	0.0037	0.0004
PA-31T	841	2.2982	1.1376	0.8868	0.1325	0.0000	0.0000	0.0000	0.0000	0.0000	0.1029	0.0154	0.0000	0.0000	0.0000	0.0000	0.0000	1.1376	1.0193	0.1183	0.0115	0.0103	0.0012
PC-12	382	1.0446	0.5171	0.4031	0.0602	0.0000	0.0000	0.0000	0.0000	0.0000	0.0468	0.0070	0.0000	0.0000	0.0000	0.0000	0.0000	0.5171	0.4633	0.0538	0.0052	0.0047	0.0005
C208	382	1.0446	0.5171	0.4031	0.0602	0.0000	0.0000	0.0000	0.0000	0.0000	0.0468	0.0070	0.0000	0.0000	0.0000	0.0000	0.0000	0.5171	0.4633	0.0538	0.0052	0.0047	0.0005
Lear 31	269	0.7338	0.3632	0.2473	0.0651	0.0130	0.0000	0.0000	0.0000	0.0000	0.0287	0.0076	0.0015	0.0000	0.0000	0.0000	0.0000	0.3632	0.3255	0.0378	0.0037	0.0033	0.0004
Lear 45	645	1.7611	0.8718	0.5936	0.1562	0.0312	0.0000	0.0000	0.0000	0.0000	0.0689	0.0181	0.0036	0.0000	0.0000	0.0000	0.0000	0.8718	0.7811	0.0907	0.0088	0.0079	0.0009
Lear 55	269	0.7338	0.3632	0.2473	0.0651	0.0130	0.0000	0.0000	0.0000	0.0000	0.0287	0.0076	0.0015	0.0000	0.0000	0.0000	0.0000	0.3632	0.3255	0.0378	0.0037	0.0033	0.0004

Table 4

Fleet Mix by Stage Length and Day/Night Split
2005

	Operations		DEPARTURES															ARRIVALS			TOUCH N GOS		
				Day							Night												
	Annual	Avg. Day	Total	St. L. 1	St. L. 2	St. L. 3	St. L. 4	St. L. 5	St. L. 6	St. L. 7	St. L. 1	St. L. 2	St. L. 3	St. L. 4	St. L. 5	St. L. 6	St. L. 7	Total	Day	Night	Total	Day	Night
C550	269	0.7338	0.3632	0.2473	0.0651	0.0130	0.0000	0.0000	0.0000	0.0000	0.0287	0.0076	0.0015	0.0000	0.0000	0.0000	0.0000	0.3632	0.3255	0.0378	0.0037	0.0033	0.0004
C560	269	0.7338	0.3632	0.2473	0.0651	0.0130	0.0000	0.0000	0.0000	0.0000	0.0287	0.0076	0.0015	0.0000	0.0000	0.0000	0.0000	0.3632	0.3255	0.0378	0.0037	0.0033	0.0004
C525	403	1.1007	0.5448	0.3710	0.0976	0.0195	0.0000	0.0000	0.0000	0.0000	0.0431	0.0113	0.0023	0.0000	0.0000	0.0000	0.0000	0.5448	0.4882	0.0567	0.0055	0.0049	0.0006
Cit. X	161	0.4403	0.2179	0.1484	0.0391	0.0078	0.0000	0.0000	0.0000	0.0000	0.0172	0.0045	0.0009	0.0000	0.0000	0.0000	0.0000	0.2179	0.1953	0.0227	0.0022	0.0020	0.0002
R-BJ	188	0.5137	0.2543	0.1731	0.0456	0.0091	0.0000	0.0000	0.0000	0.0000	0.0201	0.0053	0.0011	0.0000	0.0000	0.0000	0.0000	0.2543	0.2278	0.0264	0.0026	0.0023	0.0003
G-IV	107	0.2935	0.1453	0.0989	0.0260	0.0052	0.0000	0.0000	0.0000	0.0000	0.0115	0.0030	0.0006	0.0000	0.0000	0.0000	0.0000	0.1453	0.1302	0.0151	0.0015	0.0013	0.0002
G-V	107	0.2935	0.1453	0.0989	0.0260	0.0052	0.0000	0.0000	0.0000	0.0000	0.0115	0.0030	0.0006	0.0000	0.0000	0.0000	0.0000	0.1453	0.1302	0.0151	0.0015	0.0013	0.0002
B205	51	0.1388	0.0285	0.0255	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0030	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0285	0.0255	0.0030	0.0409	0.0367	0.0043
B206	60	0.1640	0.0336	0.0301	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0035	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0336	0.0301	0.0035	0.0484	0.0434	0.0050
BK-117	11	0.0294	0.0060	0.0054	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0006	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0060	0.0054	0.0006	0.0087	0.0078	0.0009
Ae350	11	0.0294	0.0060	0.0054	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0006	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0060	0.0054	0.0006	0.0087	0.0078	0.0009
R-22	11	0.0294	0.0060	0.0054	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0006	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0060	0.0054	0.0006	0.0087	0.0078	0.0009
MD500	11	0.0294	0.0060	0.0054	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0006	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0060	0.0054	0.0006	0.0087	0.0078	0.0009
Subtotal	30,475	83.2642	23.9579	19.4936	1.8425	0.1302	0.0000	0.0000	0.0000	0.0000	2.2626	0.2139	0.0151	0.0000	0.0000	0.0000	0.0000	23.9579	21.4663	2.4916	17.6742	15.8361	1.8381
Military																							
C-12	754	2.0614	1.0029	0.9327	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0702	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0029	0.9327	0.0702	0.0278	0.0259	0.0019
T-45	17	0.0458	0.0224	0.0208	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0224	0.0208	0.0016	0.0005	0.0004	0.0000
T-A4	17	0.0458	0.0224	0.0208	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0224	0.0208	0.0016	0.0005	0.0004	0.0000
UC-35A	151	0.4121	0.2017	0.1251	0.0625	0.0000	0.0000	0.0000	0.0000	0.0000	0.0094	0.0047	0.0000	0.0000	0.0000	0.0000	0.0000	0.2017	0.1876	0.0141	0.0043	0.0040	0.0003
C-21	17	0.0458	0.0224	0.0139	0.0069	0.0000	0.0000	0.0000	0.0000	0.0000	0.0010	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0224	0.0208	0.0016	0.0005	0.0004	0.0000
C-37A	17	0.0458	0.0224	0.0139	0.0069	0.0000	0.0000	0.0000	0.0000	0.0000	0.0010	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0224	0.0208	0.0016	0.0005	0.0004	0.0000
C-32	-	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
C-130	192	0.5243	0.2551	0.0791	0.0791	0.0791	0.0000	0.0000	0.0000	0.0000	0.0060	0.0060	0.0060	0.0000	0.0000	0.0000	0.0000	0.2551	0.2372	0.0179	0.0071	0.0066	0.0005
C-17	7	0.0191	0.0096	0.0000	0.0000	0.0044	0.0000	0.0044	0.0000	0.0000	0.0000	0.0000	0.0003	0.0000	0.0003	0.0000	0.0000	0.0096	0.0089	0.0007	0.0000	0.0000	0.0000
C-5	-	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A-10	25	0.0687	0.0336	0.0313	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0024	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0336	0.0313	0.0024	0.0007	0.0007	0.0001
UH-60	312	0.8517	0.1742	0.1620	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0122	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1742	0.1620	0.0122	0.2517	0.2340	0.0176
CH-47	117	0.3205	0.0655	0.0610	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0046	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0655	0.0610	0.0046	0.0947	0.0881	0.0066
AH-64	49	0.1328	0.0272	0.0253	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0272	0.0253	0.0019	0.0392	0.0365	0.0027
Subtotal	1,674	4.5737	1.8594	1.4857	0.1555	0.0835	0.0000	0.0044	0.0000	0.0000	0.1118	0.0117	0.0063	0.0000	0.0003	0.0000	0.0000	1.8594	1.7292	0.1302	0.4275	0.3976	0.0299
Grand Total	35,929	98.1658	49.0829	24.2706	2.1015	0.2821	0.0000	0.0044	0.0000	0.0000	4.0323	0.2516	0.0384	0.0000	0.0003	0.0000	0.0000	30.9812	26.6587	4.3226	18.1017	16.2336	1.8680

Source; HNTB analysis.

Table 5

Fleet Mix by Stage Length and Day/Night Split
2008

	Operations		DEPARTURES															ARRIVALS			TOUCH N GOS		
				Day							Night												
	Annual	Avg. Day	Total	St. L. 1	St. L. 2	St. L. 3	St. L. 4	St. L. 5	St. L. 6	St. L. 7	St. L. 1	St. L. 2	St. L. 3	St. L. 4	St. L. 5	St. L. 6	St. L. 7	Total	Day	Night	Total	Day	Night
Scheduled Comm'l																							
B1900	3,568	9.7486	4.8743	3.2315	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.6429	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	4.8743	3.2315	1.6429	0.0000	0.0000	0.0000
Subtotal	3,568	9.7486	4.8743	3.2315	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.6429	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	4.8743	3.2315	1.6429	0.0000	0.0000	0.0000
Charter																							
DC-9-15	4	0.0109	0.0055	0.0038	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0055	0.0038	0.0016	0.0000	0.0000	0.0000
B727-200	10	0.0273	0.0137	0.0000	0.0054	0.0038	0.0000	0.0000	0.0000	0.0000	0.0000	0.0025	0.0016	0.0000	0.0000	0.0000	0.0000	0.0137	0.0096	0.0041	0.0000	0.0000	0.0000
B737-200	2	0.0055	0.0027	0.0000	0.0000	0.0019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0008	0.0000	0.0000	0.0000	0.0000	0.0027	0.0019	0.0008	0.0000	0.0000	0.0000
B737-300	16	0.0437	0.0219	0.0061	0.0046	0.0046	0.0000	0.0000	0.0000	0.0000	0.0026	0.0020	0.0020	0.0000	0.0000	0.0000	0.0000	0.0219	0.0153	0.0066	0.0000	0.0000	0.0000
B737-700	68	0.1858	0.0929	0.0065	0.0293	0.0293	0.0000	0.0000	0.0000	0.0000	0.0028	0.0125	0.0125	0.0000	0.0000	0.0000	0.0000	0.0929	0.0650	0.0279	0.0000	0.0000	0.0000
B737-800	130	0.3552	0.1776	0.0124	0.0559	0.0559	0.0000	0.0000	0.0000	0.0000	0.0053	0.0240	0.0240	0.0000	0.0000	0.0000	0.0000	0.1776	0.1243	0.0533	0.0000	0.0000	0.0000
A319	17	0.0464	0.0232	0.0049	0.0098	0.0016	0.0000	0.0000	0.0000	0.0000	0.0021	0.0042	0.0007	0.0000	0.0000	0.0000	0.0000	0.0232	0.0163	0.0070	0.0000	0.0000	0.0000
A320	17	0.0464	0.0232	0.0049	0.0081	0.0046	0.0000	0.0000	0.0000	0.0000	0.0021	0.0035	0.0021	0.0000	0.0000	0.0000	0.0000	0.0232	0.0163	0.0070	0.0000	0.0000	0.0000
MD-80	4	0.0109	0.0055	0.0011	0.0015	0.0011	0.0000	0.0000	0.0000	0.0000	0.0005	0.0007	0.0005	0.0000	0.0000	0.0000	0.0000	0.0055	0.0038	0.0016	0.0000	0.0000	0.0000
B757-200	20	0.0546	0.0273	0.0077	0.0077	0.0038	0.0000	0.0000	0.0000	0.0000	0.0033	0.0033	0.0025	0.0000	0.0000	0.0000	0.0000	0.0273	0.0191	0.0082	0.0000	0.0000	0.0000
ERJ-145	24	0.0656	0.0328	0.0046	0.0161	0.0000	0.0000	0.0000	0.0000	0.0000	0.0030	0.0079	0.0000	0.0000	0.0000	0.0000	0.0000	0.0328	0.0230	0.0098	0.0000	0.0000	0.0000
F27	-	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FD-328	8	0.0219	0.0109	0.0077	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0033	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0109	0.0077	0.0033	0.0000	0.0000	0.0000
CRJ-200	10	0.0273	0.0137	0.0053	0.0043	0.0000	0.0000	0.0000	0.0000	0.0000	0.0023	0.0018	0.0000	0.0000	0.0000	0.0000	0.0000	0.0137	0.0096	0.0041	0.0000	0.0000	0.0000
EM2	4	0.0109	0.0055	0.0038	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0055	0.0038	0.0016	0.0000	0.0000	0.0000
Subtotal	334	0.9126	0.4563	0.0688	0.1426	0.1068	0.0000	0.0000	0.0000	0.0000	0.0305	0.0623	0.0467	0.0000	0.0000	0.0000	0.0000	0.4563	0.3194	0.1369	0.0000	0.0000	0.0000
General Aviation																							
C172	9,045	24.7120	4.9424	4.2955	0.1329	0.0000	0.0000	0.0000	0.0000	0.0000	0.4986	0.0154	0.0000	0.0000	0.0000	0.0000	0.0000	4.9424	4.4284	0.5140	7.4136	6.6426	0.7710
C182	5,025	13.7289	2.7458	2.3864	0.0738	0.0000	0.0000	0.0000	0.0000	0.0000	0.2770	0.0086	0.0000	0.0000	0.0000	0.0000	0.0000	2.7458	2.4602	0.2856	4.1187	3.6903	0.4283
PA-28	2,211	6.0407	1.2081	1.0500	0.0325	0.0000	0.0000	0.0000	0.0000	0.0000	0.1219	0.0038	0.0000	0.0000	0.0000	0.0000	0.0000	1.2081	1.0825	0.1256	1.8122	1.6237	0.1885
PA-32	2,211	6.0407	1.2081	1.0500	0.0325	0.0000	0.0000	0.0000	0.0000	0.0000	0.1219	0.0038	0.0000	0.0000	0.0000	0.0000	0.0000	1.2081	1.0825	0.1256	1.8122	1.6237	0.1885
B-35	804	2.1966	0.4393	0.3818	0.0118	0.0000	0.0000	0.0000	0.0000	0.0000	0.0443	0.0014	0.0000	0.0000	0.0000	0.0000	0.0000	0.4393	0.3936	0.0457	0.6590	0.5905	0.0685
M-20	804	2.1966	0.4393	0.3818	0.0118	0.0000	0.0000	0.0000	0.0000	0.0000	0.0443	0.0014	0.0000	0.0000	0.0000	0.0000	0.0000	0.4393	0.3936	0.0457	0.6590	0.5905	0.0685
C310	258	0.7051	0.2820	0.2325	0.0202	0.0000	0.0000	0.0000	0.0000	0.0000	0.0270	0.0023	0.0000	0.0000	0.0000	0.0000	0.0000	0.2820	0.2527	0.0293	0.0705	0.0632	0.0073
C340	1,475	4.0293	1.6117	1.3286	0.1155	0.0000	0.0000	0.0000	0.0000	0.0000	0.1542	0.0134	0.0000	0.0000	0.0000	0.0000	0.0000	1.6117	1.4441	0.1676	0.4029	0.3610	0.0419
C414	369	1.0073	0.4029	0.3321	0.0289	0.0000	0.0000	0.0000	0.0000	0.0000	0.0386	0.0034	0.0000	0.0000	0.0000	0.0000	0.0000	0.4029	0.3610	0.0419	0.1007	0.0903	0.0105
C421	737	2.0146	0.8059	0.6643	0.0578	0.0000	0.0000	0.0000	0.0000	0.0000	0.0771	0.0067	0.0000	0.0000	0.0000	0.0000	0.0000	0.8059	0.7220	0.0838	0.2015	0.1805	0.0210
PA-34	111	0.3022	0.1209	0.0996	0.0087	0.0000	0.0000	0.0000	0.0000	0.0000	0.0116	0.0010	0.0000	0.0000	0.0000	0.0000	0.0000	0.1209	0.1083	0.0126	0.0302	0.0271	0.0031
PA-31	111	0.3022	0.1209	0.0996	0.0087	0.0000	0.0000	0.0000	0.0000	0.0000	0.0116	0.0010	0.0000	0.0000	0.0000	0.0000	0.0000	0.1209	0.1083	0.0126	0.0302	0.0271	0.0031
B55	627	1.7124	0.6850	0.5646	0.0491	0.0000	0.0000	0.0000	0.0000	0.0000	0.0655	0.0057	0.0000	0.0000	0.0000	0.0000	0.0000	0.6850	0.6137	0.0712	0.1712	0.1534	0.0178
King Air-90	1,981	5.4128	2.6793	2.0886	0.3121	0.0000	0.0000	0.0000	0.0000	0.0000	0.2424	0.0362	0.0000	0.0000	0.0000	0.0000	0.0000	2.6793	2.4007	0.2787	0.0271	0.0242	0.0028
C-425	317	0.8660	0.4287	0.3342	0.0499	0.0000	0.0000	0.0000	0.0000	0.0000	0.0388	0.0058	0.0000	0.0000	0.0000	0.0000	0.0000	0.4287	0.3841	0.0446	0.0043	0.0039	0.0005
PA-31T	872	2.3816	1.1789	0.9190	0.1373	0.0000	0.0000	0.0000	0.0000	0.0000	0.1067	0.0159	0.0000	0.0000	0.0000	0.0000	0.0000	1.1789	1.0563	0.1226	0.0119	0.0107	0.0012
PC-12	396	1.0826	0.5359	0.4177	0.0624	0.0000	0.0000	0.0000	0.0000	0.0000	0.0485	0.0072	0.0000	0.0000	0.0000	0.0000	0.0000	0.5359	0.4801	0.0557	0.0054	0.0048	0.0006
C208	396	1.0826	0.5359	0.4177	0.0624	0.0000	0.0000	0.0000	0.0000	0.0000	0.0485	0.0072	0.0000	0.0000	0.0000	0.0000	0.0000	0.5359	0.4801	0.0557	0.0054	0.0048	0.0006
Lear 31	331	0.9040	0.4475	0.3047	0.0802	0.0160	0.0000	0.0000	0.0000	0.0000	0.0354	0.0093	0.0019	0.0000	0.0000	0.0000	0.0000	0.4475	0.4009	0.0465	0.0045	0.0040	0.0005
Lear 45	794	2.1696	1.0740	0.7313	0.1925	0.0385	0.0000	0.0000	0.0000	0.0000	0.0849	0.0223	0.0045	0.0000	0.0000	0.0000	0.0000	1.0740	0.9623	0.1117	0.0108	0.0097	0.0011
Lear 55	331	0.9040	0.4475	0.3047	0.0802	0.0160	0.0000	0.0000	0.0000	0.0000	0.0354	0.0093	0.0019	0.0000	0.0000	0.0000	0.0000	0.4475	0.4009	0.0465	0.0045	0.0040	0.0005

Table 5

Fleet Mix by Stage Length and Day/Night Split
2008

	Operations		DEPARTURES															ARRIVALS			TOUCH N GOS		
				Day							Night												
	Annual	Avg. Day	Total	St. L. 1	St. L. 2	St. L. 3	St. L. 4	St. L. 5	St. L. 6	St. L. 7	St. L. 1	St. L. 2	St. L. 3	St. L. 4	St. L. 5	St. L. 6	St. L. 7	Total	Day	Night	Total	Day	Night
C550	331	0.9040	0.4475	0.3047	0.0802	0.0160	0.0000	0.0000	0.0000	0.0000	0.0354	0.0093	0.0019	0.0000	0.0000	0.0000	0.0000	0.4475	0.4009	0.0465	0.0045	0.0040	0.0005
C560	331	0.9040	0.4475	0.3047	0.0802	0.0160	0.0000	0.0000	0.0000	0.0000	0.0354	0.0093	0.0019	0.0000	0.0000	0.0000	0.0000	0.4475	0.4009	0.0465	0.0045	0.0040	0.0005
C525	496	1.3560	0.6712	0.4571	0.1203	0.0241	0.0000	0.0000	0.0000	0.0000	0.0531	0.0140	0.0028	0.0000	0.0000	0.0000	0.0000	0.6712	0.6014	0.0698	0.0068	0.0061	0.0007
Cit. X	199	0.5424	0.2685	0.1828	0.0481	0.0096	0.0000	0.0000	0.0000	0.0000	0.0212	0.0056	0.0011	0.0000	0.0000	0.0000	0.0000	0.2685	0.2406	0.0279	0.0027	0.0024	0.0003
R-BJ	232	0.6328	0.3132	0.2133	0.0561	0.0112	0.0000	0.0000	0.0000	0.0000	0.0248	0.0065	0.0013	0.0000	0.0000	0.0000	0.0000	0.3132	0.2807	0.0326	0.0032	0.0028	0.0003
G-IV	132	0.3616	0.1790	0.1219	0.0321	0.0064	0.0000	0.0000	0.0000	0.0000	0.0141	0.0037	0.0007	0.0000	0.0000	0.0000	0.0000	0.1790	0.1604	0.0186	0.0018	0.0016	0.0002
G-V	132	0.3616	0.1790	0.1219	0.0321	0.0064	0.0000	0.0000	0.0000	0.0000	0.0141	0.0037	0.0007	0.0000	0.0000	0.0000	0.0000	0.1790	0.1604	0.0186	0.0018	0.0016	0.0002
B205	52	0.1429	0.0293	0.0263	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0030	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0293	0.0263	0.0030	0.0422	0.0378	0.0044
B206	62	0.1689	0.0346	0.0310	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0036	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0346	0.0310	0.0036	0.0498	0.0446	0.0052
BK-117	11	0.0303	0.0062	0.0056	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0006	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0062	0.0056	0.0006	0.0089	0.0080	0.0009
Ae350	11	0.0303	0.0062	0.0056	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0006	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0062	0.0056	0.0006	0.0089	0.0080	0.0009
R-22	11	0.0303	0.0062	0.0056	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0006	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0062	0.0056	0.0006	0.0089	0.0080	0.0009
MD500	11	0.0303	0.0062	0.0056	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0006	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0062	0.0056	0.0006	0.0089	0.0080	0.0009
Subtotal	31,215	85.2875	24.9347	20.1710	2.0101	0.1604	0.0000	0.0000	0.0000	0.0000	2.3413	0.2333	0.0186	0.0000	0.0000	0.0000	0.0000	24.9347	22.3415	2.5932	17.7091	15.8673	1.8417
Military																							
C-12	785	2.1440	1.0430	0.9700	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0730	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0430	0.9700	0.0730	0.0289	0.0269	0.0020
T-45	17	0.0476	0.0233	0.0217	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0233	0.0217	0.0016	0.0005	0.0005	0.0000
T-A4	17	0.0476	0.0233	0.0217	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0233	0.0217	0.0016	0.0005	0.0005	0.0000
UC-35A	157	0.4286	0.2098	0.1301	0.0650	0.0000	0.0000	0.0000	0.0000	0.0000	0.0098	0.0049	0.0000	0.0000	0.0000	0.0000	0.0000	0.2098	0.1951	0.0147	0.0045	0.0042	0.0003
C-21	67	0.1841	0.0901	0.0559	0.0279	0.0000	0.0000	0.0000	0.0000	0.0000	0.0042	0.0021	0.0000	0.0000	0.0000	0.0000	0.0000	0.0901	0.0838	0.0063	0.0019	0.0018	0.0001
C-37A	17	0.0476	0.0233	0.0145	0.0072	0.0000	0.0000	0.0000	0.0000	0.0000	0.0011	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0233	0.0217	0.0016	0.0005	0.0005	0.0000
C-32	50	0.1366	0.0669	0.0415	0.0207	0.0000	0.0000	0.0000	0.0000	0.0000	0.0031	0.0016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0669	0.0622	0.0047	0.0014	0.0013	0.0001
C-130	395	1.0801	0.5168	0.1974	0.1361	0.1061	0.0000	0.0000	0.0000	0.0000	0.0482	0.0209	0.0080	0.0000	0.0000	0.0000	0.0000	0.5168	0.4448	0.0720	0.0233	0.0199	0.0034
C-17	57	0.1557	0.0779	0.0000	0.0000	0.0335	0.0000	0.0335	0.0000	0.0000	0.0000	0.0000	0.0055	0.0000	0.0055	0.0000	0.0000	0.0779	0.0670	0.0109	0.0000	0.0000	0.0000
C-5	-	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A-10	52	0.1429	0.0699	0.0651	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0049	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0699	0.0651	0.0049	0.0015	0.0014	0.0001
UH-60	4,106	11.2194	2.2944	1.9732	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3212	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	2.2944	1.9732	0.3212	3.3153	2.8512	0.4641
CH-47	1,004	2.7426	0.5609	0.4823	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0785	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.5609	0.4823	0.0785	0.8104	0.6970	0.1135
AH-64	4,015	10.9699	2.2434	1.9293	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3141	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	2.2434	1.9293	0.3141	3.2416	2.7878	0.4538
Subtotal	10,741	29.3468	7.2429	5.9025	0.2571	0.1396	0.0000	0.0335	0.0000	0.0000	0.8614	0.0300	0.0135	0.0000	0.0055	0.0000	0.0000	7.2429	6.3378	0.9052	7.4305	6.3929	1.0376
Grand Total	45,858	125.2955	62.6477	29.3737	2.4097	0.4068	0.0000	0.0335	0.0000	0.0000	4.8759	0.3255	0.0788	0.0000	0.0055	0.0000	0.0000	37.5082	32.2301	5.2781	25.1396	22.2602	2.8794

Source: HNTB analysis.

Table 6

Fleet Mix by Stage Length and Day/Night Split
2013

	Operations		DEPARTURES															ARRIVALS			TOUCH N GOS		
				Day							Night												
	Annual	Avg. Day	Total	St. L. 1	St. L. 2	St. L. 3	St. L. 4	St. L. 5	St. L. 6	St. L. 7	St. L. 1	St. L. 2	St. L. 3	St. L. 4	St. L. 5	St. L. 6	St. L. 7	Total	Day	Night	Total	Day	Night
Scheduled Comm'l																							
B1900	3,568	9.7486	4.8743	3.2315	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.6429	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	4.8743	3.2315	1.6429	0.0000	0.0000	0.0000
Subtotal	3,568	9.7486	4.8743	3.2315	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.6429	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	4.8743	3.2315	1.6429	0.0000	0.0000	0.0000
Charter																							
DC-9-15	2	0.0055	0.0027	0.0019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0008	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0027	0.0019	0.0008	0.0000	0.0000	0.0000
B727-200	6	0.0164	0.0082	0.0000	0.0032	0.0023	0.0000	0.0000	0.0000	0.0000	0.0000	0.0015	0.0010	0.0000	0.0000	0.0000	0.0000	0.0082	0.0057	0.0025	0.0000	0.0000	0.0000
B737-200	2	0.0055	0.0027	0.0000	0.0000	0.0019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0008	0.0000	0.0000	0.0000	0.0000	0.0027	0.0019	0.0008	0.0000	0.0000	0.0000
B737-300	20	0.0546	0.0273	0.0077	0.0057	0.0057	0.0000	0.0000	0.0000	0.0000	0.0033	0.0025	0.0025	0.0000	0.0000	0.0000	0.0000	0.0273	0.0191	0.0082	0.0000	0.0000	0.0000
B737-700	77	0.2112	0.1056	0.0074	0.0333	0.0333	0.0000	0.0000	0.0000	0.0000	0.0032	0.0143	0.0143	0.0000	0.0000	0.0000	0.0000	0.1056	0.0739	0.0317	0.0000	0.0000	0.0000
B737-800	167	0.4574	0.2287	0.0160	0.0720	0.0720	0.0000	0.0000	0.0000	0.0000	0.0069	0.0309	0.0309	0.0000	0.0000	0.0000	0.0000	0.2287	0.1601	0.0686	0.0000	0.0000	0.0000
A319	25	0.0678	0.0339	0.0071	0.0142	0.0024	0.0000	0.0000	0.0000	0.0000	0.0030	0.0061	0.0010	0.0000	0.0000	0.0000	0.0000	0.0339	0.0237	0.0102	0.0000	0.0000	0.0000
A320	17	0.0454	0.0227	0.0048	0.0079	0.0045	0.0000	0.0000	0.0000	0.0000	0.0020	0.0034	0.0020	0.0000	0.0000	0.0000	0.0000	0.0227	0.0159	0.0068	0.0000	0.0000	0.0000
MD-80	8	0.0219	0.0109	0.0023	0.0031	0.0023	0.0000	0.0000	0.0000	0.0000	0.0010	0.0013	0.0010	0.0000	0.0000	0.0000	0.0000	0.0109	0.0077	0.0033	0.0000	0.0000	0.0000
B757-200	28	0.0754	0.0377	0.0106	0.0106	0.0053	0.0000	0.0000	0.0000	0.0000	0.0045	0.0045	0.0034	0.0000	0.0000	0.0000	0.0000	0.0377	0.0264	0.0113	0.0000	0.0000	0.0000
ERJ-145	24	0.0656	0.0328	0.0046	0.0161	0.0000	0.0000	0.0000	0.0000	0.0000	0.0030	0.0079	0.0000	0.0000	0.0000	0.0000	0.0000	0.0328	0.0230	0.0098	0.0000	0.0000	0.0000
F27	-	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FD-328	8	0.0219	0.0109	0.0077	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0033	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0109	0.0077	0.0033	0.0000	0.0000	0.0000
CRJ-200	12	0.0328	0.0164	0.0063	0.0052	0.0000	0.0000	0.0000	0.0000	0.0000	0.0027	0.0022	0.0000	0.0000	0.0000	0.0000	0.0000	0.0164	0.0115	0.0049	0.0000	0.0000	0.0000
EM2	2	0.0055	0.0027	0.0019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0008	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0027	0.0019	0.0008	0.0000	0.0000	0.0000
Subtotal	398	1.0866	0.5433	0.0782	0.1713	0.1297	0.0000	0.0000	0.0000	0.0000	0.0345	0.0745	0.0568	0.0000	0.0000	0.0000	0.0000	0.5433	0.3803	0.1630	0.0000	0.0000	0.0000
General Aviation																							
C172	9,004	24.6007	4.9201	4.2762	0.1323	0.0000	0.0000	0.0000	0.0000	0.0000	0.4963	0.0154	0.0000	0.0000	0.0000	0.0000	0.0000	4.9201	4.4084	0.5117	7.3802	6.6127	0.7675
C182	5,002	13.6671	2.7334	2.3757	0.0735	0.0000	0.0000	0.0000	0.0000	0.0000	0.2757	0.0085	0.0000	0.0000	0.0000	0.0000	0.0000	2.7334	2.4491	0.2843	4.1001	3.6737	0.4264
PA-28	2,201	6.0135	1.2027	1.0453	0.0323	0.0000	0.0000	0.0000	0.0000	0.0000	0.1213	0.0038	0.0000	0.0000	0.0000	0.0000	0.0000	1.2027	1.0776	0.1251	1.8041	1.6164	0.1876
PA-32	2,201	6.0135	1.2027	1.0453	0.0323	0.0000	0.0000	0.0000	0.0000	0.0000	0.1213	0.0038	0.0000	0.0000	0.0000	0.0000	0.0000	1.2027	1.0776	0.1251	1.8041	1.6164	0.1876
B-35	800	2.1867	0.4373	0.3801	0.0118	0.0000	0.0000	0.0000	0.0000	0.0000	0.0441	0.0014	0.0000	0.0000	0.0000	0.0000	0.0000	0.4373	0.3919	0.0455	0.6560	0.5878	0.0682
M-20	800	2.1867	0.4373	0.3801	0.0118	0.0000	0.0000	0.0000	0.0000	0.0000	0.0441	0.0014	0.0000	0.0000	0.0000	0.0000	0.0000	0.4373	0.3919	0.0455	0.6560	0.5878	0.0682
C310	248	0.6789	0.2716	0.2239	0.0195	0.0000	0.0000	0.0000	0.0000	0.0000	0.0260	0.0023	0.0000	0.0000	0.0000	0.0000	0.0000	0.2716	0.2433	0.0282	0.0679	0.0608	0.0071
C340	1,420	3.8796	1.5518	1.2792	0.1112	0.0000	0.0000	0.0000	0.0000	0.0000	0.1485	0.0129	0.0000	0.0000	0.0000	0.0000	0.0000	1.5518	1.3905	0.1614	0.3880	0.3476	0.0403
C414	355	0.9699	0.3880	0.3198	0.0278	0.0000	0.0000	0.0000	0.0000	0.0000	0.0371	0.0032	0.0000	0.0000	0.0000	0.0000	0.0000	0.3880	0.3476	0.0403	0.0970	0.0869	0.0101
C421	710	1.9398	0.7759	0.6396	0.0556	0.0000	0.0000	0.0000	0.0000	0.0000	0.0742	0.0065	0.0000	0.0000	0.0000	0.0000	0.0000	0.7759	0.6952	0.0807	0.1940	0.1738	0.0202
PA-34	106	0.2910	0.1164	0.0959	0.0083	0.0000	0.0000	0.0000	0.0000	0.0000	0.0111	0.0010	0.0000	0.0000	0.0000	0.0000	0.0000	0.1164	0.1043	0.0121	0.0291	0.0261	0.0030
PA-31	106	0.2910	0.1164	0.0959	0.0083	0.0000	0.0000	0.0000	0.0000	0.0000	0.0111	0.0010	0.0000	0.0000	0.0000	0.0000	0.0000	0.1164	0.1043	0.0121	0.0291	0.0261	0.0030
B55	603	1.6488	0.6595	0.5437	0.0473	0.0000	0.0000	0.0000	0.0000	0.0000	0.0631	0.0055	0.0000	0.0000	0.0000	0.0000	0.0000	0.6595	0.5909	0.0686	0.1649	0.1477	0.0171
King Air-90	2,083	5.6899	2.8165	2.1955	0.3281	0.0000	0.0000	0.0000	0.0000	0.0000	0.2548	0.0381	0.0000	0.0000	0.0000	0.0000	0.0000	2.8165	2.5236	0.2929	0.0284	0.0255	0.0030
C-425	333	0.9104	0.4506	0.3513	0.0525	0.0000	0.0000	0.0000	0.0000	0.0000	0.0408	0.0061	0.0000	0.0000	0.0000	0.0000	0.0000	0.4506	0.4038	0.0469	0.0046	0.0041	0.0005
PA-31T	916	2.5036	1.2393	0.9660	0.1443	0.0000	0.0000	0.0000	0.0000	0.0000	0.1121	0.0168	0.0000	0.0000	0.0000	0.0000	0.0000	1.2393	1.1104	0.1289	0.0125	0.0112	0.0013
PC-12	417	1.1380	0.5633	0.4391	0.0656	0.0000	0.0000	0.0000	0.0000	0.0000	0.0510	0.0076	0.0000	0.0000	0.0000	0.0000	0.0000	0.5633	0.5047	0.0586	0.0057	0.0051	0.0006
C208	417	1.1380	0.5633	0.4391	0.0656	0.0000	0.0000	0.0000	0.0000	0.0000	0.0510	0.0076	0.0000	0.0000	0.0000	0.0000	0.0000	0.5633	0.5047	0.0586	0.0057	0.0051	0.0006
Lear 31	458	1.2514	0.6194	0.4218	0.1110	0.0222	0.0000	0.0000	0.0000	0.0000	0.0490	0.0129	0.0026	0.0000	0.0000	0.0000	0.0000	0.6194	0.5550	0.0644	0.0063	0.0056	0.0007
Lear 45	1,099	3.0034	1.4867	1.0124	0.2664	0.0533	0.0000	0.0000	0.0000	0.0000	0.1175	0.0309	0.0062	0.0000	0.0000	0.0000	0.0000	1.4867	1.3321	0.1546	0.0150	0.0135	0.0016
Lear 55	458	1.2514	0.6194	0.4218	0.1110	0.0222	0.0000	0.0000	0.0000	0.0000	0.0490	0.0129	0.0026	0.0000	0.0000	0.0000	0.0000	0.6194	0.5550	0.0644	0.0063	0.0056	0.0007

Table 6

Fleet Mix by Stage Length and Day/Night Split
2013

	Operations		DEPARTURES															ARRIVALS			TOUCH N GOS		
				Day							Night												
	Annual	Avg. Day	Total	St. L. 1	St. L. 2	St. L. 3	St. L. 4	St. L. 5	St. L. 6	St. L. 7	St. L. 1	St. L. 2	St. L. 3	St. L. 4	St. L. 5	St. L. 6	St. L. 7	Total	Day	Night	Total	Day	Night
C550	458	1.2514	0.6194	0.4218	0.1110	0.0222	0.0000	0.0000	0.0000	0.0000	0.0490	0.0129	0.0026	0.0000	0.0000	0.0000	0.0000	0.6194	0.5550	0.0644	0.0063	0.0056	0.0007
C560	458	1.2514	0.6194	0.4218	0.1110	0.0222	0.0000	0.0000	0.0000	0.0000	0.0490	0.0129	0.0026	0.0000	0.0000	0.0000	0.0000	0.6194	0.5550	0.0644	0.0063	0.0056	0.0007
C525	687	1.8771	0.9292	0.6327	0.1665	0.0333	0.0000	0.0000	0.0000	0.0000	0.0734	0.0193	0.0039	0.0000	0.0000	0.0000	0.0000	0.9292	0.8325	0.0966	0.0094	0.0084	0.0010
Cit. X	275	0.7508	0.3717	0.2531	0.0666	0.0133	0.0000	0.0000	0.0000	0.0000	0.0294	0.0077	0.0015	0.0000	0.0000	0.0000	0.0000	0.3717	0.3330	0.0387	0.0038	0.0034	0.0004
R-BJ	321	0.8760	0.4336	0.2953	0.0777	0.0155	0.0000	0.0000	0.0000	0.0000	0.0343	0.0090	0.0018	0.0000	0.0000	0.0000	0.0000	0.4336	0.3885	0.0451	0.0044	0.0039	0.0005
G-IV	183	0.5006	0.2478	0.1687	0.0444	0.0089	0.0000	0.0000	0.0000	0.0000	0.0196	0.0052	0.0010	0.0000	0.0000	0.0000	0.0000	0.2478	0.2220	0.0258	0.0025	0.0022	0.0003
G-V	183	0.5006	0.2478	0.1687	0.0444	0.0089	0.0000	0.0000	0.0000	0.0000	0.0196	0.0052	0.0010	0.0000	0.0000	0.0000	0.0000	0.2478	0.2220	0.0258	0.0025	0.0022	0.0003
B205	54	0.1483	0.0304	0.0272	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0032	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0304	0.0272	0.0032	0.0438	0.0392	0.0046
B206	64	0.1753	0.0359	0.0322	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0037	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0359	0.0322	0.0037	0.0517	0.0463	0.0054
BK-117	12	0.0315	0.0064	0.0058	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0064	0.0058	0.0007	0.0093	0.0083	0.0010
Ae350	12	0.0315	0.0064	0.0058	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0064	0.0058	0.0007	0.0093	0.0083	0.0010
R-22	12	0.0315	0.0064	0.0058	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0064	0.0058	0.0007	0.0093	0.0083	0.0010
MD500	12	0.0315	0.0064	0.0058	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0064	0.0058	0.0007	0.0093	0.0083	0.0010
Subtotal	32,468	88.7108	26.7329	21.3925	2.3382	0.2220	0.0000	0.0000	0.0000	0.0000	2.4831	0.2714	0.0258	0.0000	0.0000	0.0000	0.0000	26.7329	23.9527	2.7802	17.6224	15.7897	1.8327
Military																							
C-12	838	2.2888	1.1135	1.0356	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0779	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.1135	1.0356	0.0779	0.0309	0.0287	0.0022
T-45	19	0.0508	0.0249	0.0231	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0017	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0249	0.0231	0.0017	0.0005	0.0005	0.0000
T-A4	19	0.0508	0.0249	0.0231	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0017	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0249	0.0231	0.0017	0.0005	0.0005	0.0000
UC-35A	167	0.4576	0.2240	0.1389	0.0694	0.0000	0.0000	0.0000	0.0000	0.0000	0.0105	0.0052	0.0000	0.0000	0.0000	0.0000	0.0000	0.2240	0.2083	0.0157	0.0048	0.0045	0.0003
C-21	72	0.1965	0.0962	0.0596	0.0298	0.0000	0.0000	0.0000	0.0000	0.0000	0.0045	0.0022	0.0000	0.0000	0.0000	0.0000	0.0000	0.0962	0.0895	0.0067	0.0021	0.0019	0.0001
C-37A	19	0.0508	0.0249	0.0154	0.0077	0.0000	0.0000	0.0000	0.0000	0.0000	0.0012	0.0006	0.0000	0.0000	0.0000	0.0000	0.0000	0.0249	0.0231	0.0017	0.0005	0.0005	0.0000
C-32	53	0.1458	0.0714	0.0443	0.0221	0.0000	0.0000	0.0000	0.0000	0.0000	0.0033	0.0017	0.0000	0.0000	0.0000	0.0000	0.0000	0.0714	0.0664	0.0050	0.0015	0.0014	0.0001
C-130	422	1.1530	0.5517	0.1974	0.1361	0.1061	0.0000	0.0000	0.0000	0.0000	0.0482	0.0209	0.0080	0.0000	0.0000	0.0000	0.0000	0.5517	0.4448	0.0720	0.0249	0.0199	0.0034
C-17	61	0.1663	0.0831	0.0000	0.0000	0.0357	0.0000	0.0357	0.0000	0.0000	0.0000	0.0000	0.0058	0.0000	0.0058	0.0000	0.0000	0.0831	0.0715	0.0116	0.0000	0.0000	0.0000
C-5	-	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A-10	56	0.1526	0.0747	0.0694	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0052	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0747	0.0694	0.0052	0.0016	0.0015	0.0001
UH-60	4,384	11.9774	2.4495	2.1065	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3429	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	2.4495	2.1065	0.3429	3.5394	3.0439	0.4955
CH-47	1,072	2.9279	0.5988	0.5150	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0838	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.5988	0.5150	0.0838	0.8652	0.7441	0.1211
AH-64	4,286	11.7111	2.3950	2.0597	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3353	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	2.3950	2.0597	0.3353	3.4608	2.9762	0.4845
Subtotal	11,467	31.3296	7.7325	6.2882	0.2652	0.1419	0.0000	0.0357	0.0000	0.0000	0.9163	0.0306	0.0138	0.0000	0.0058	0.0000	0.0000	7.7326	6.7361	0.9615	7.9328	6.8237	1.1075
Grand Total	47,900	130.8756	65.4378	30.9903	2.7747	0.4936	0.0000	0.0357	0.0000	0.0000	5.0767	0.3765	0.0964	0.0000	0.0058	0.0000	0.0000	39.8831	34.3006	5.5476	25.5553	22.6134	2.9403

Source: HNTB analysis.

10:00 PM. Nighttime operations are those operating between 10:00 PM and 7:00 AM. Based on the most recent schedules published by Air Midwest, there are, on average, about 23 weekly operations occurring during nighttime hours.

It is assumed that the number of nighttime operations will stay constant through the forecast horizon.

4.1.4 Forecast Scheduled Airline Stage Length

In general, the farther an aircraft is flying, the heavier the aircraft weighs, since more fuel is required to reach its destination. This increased weight affects aircraft performance and therefore its noise impacts. For this reason, INM requires departing flights to be forecast by "stage length", i.e., the distance the flight is traveling. (If a flight will be making multiple stops, only the first leg is considered.) The following stage lengths, illustrated in **Figure 2**, are used by INM:

- 0 to 499 nautical miles (Stage Length 1),
- 500 to 999 nautical miles (Stage Length 2),
- 1,000 to 1,499 nautical miles (Stage Length 3),
- 1,500 to 2,499 nautical miles (Stage Length 4),
- 2,500 to 3,499 nautical miles (Stage Length 5),
- 3,500 to 4,499 nautical miles (Stage Length 6), and
- 4,500 nautical miles or more (Stage Length 7).

Currently, scheduled airline service is provided to two markets: Kansas City International Airport and Salina. Both of these markets are within Stage Length 1—the distance between MHK and MCI is 91 nautical miles; the distance between MHK and SLN is 50 nautical miles.

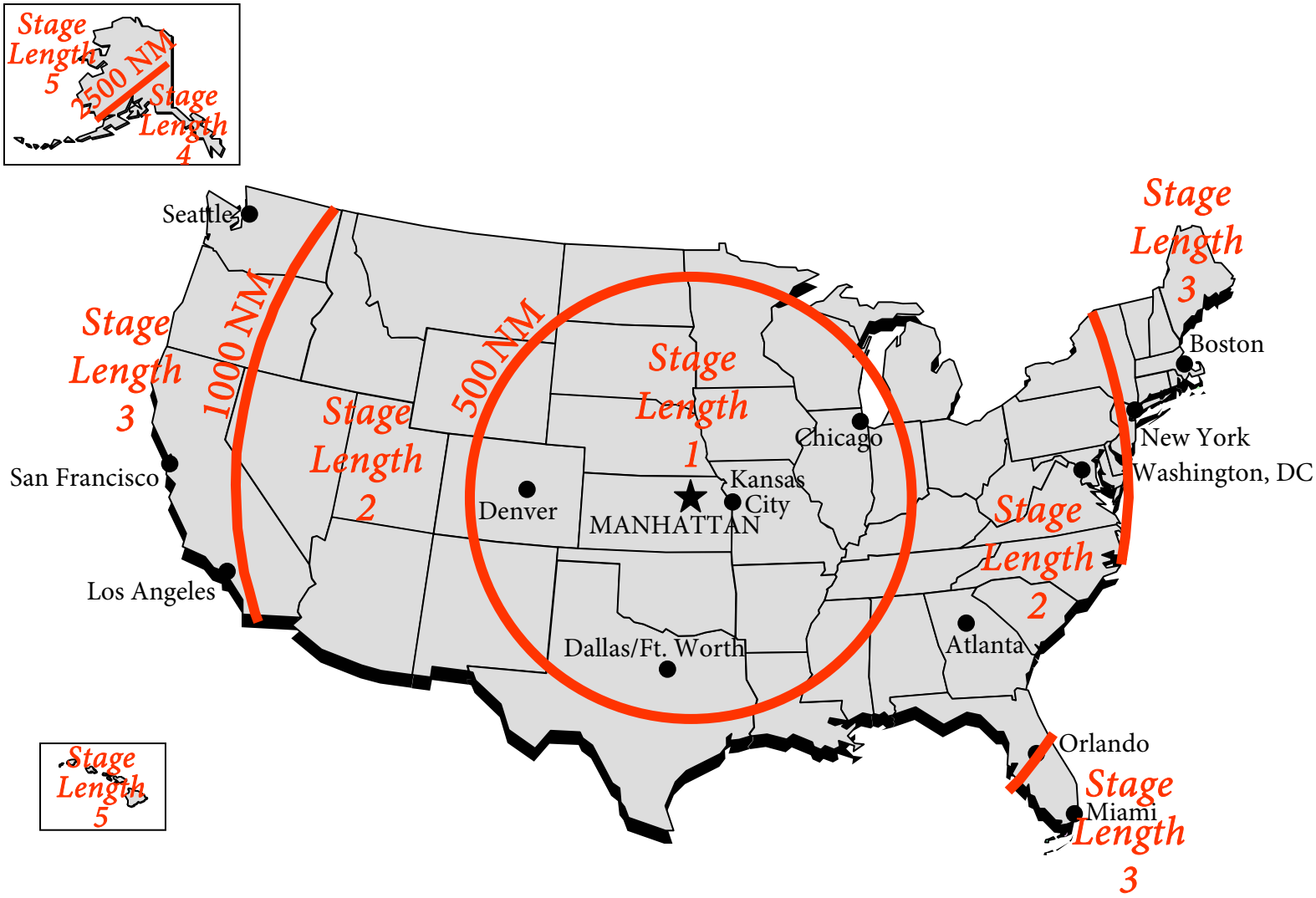
Recognizing that considerable growth would have to occur in the MHK market before service to a new destination could be supported, it is assumed that no new markets will receive scheduled service within the forecast horizon. (The TAF also does not forecast any additional commercial operations.) All scheduled airline operations are therefore assumed to be within Stage Length 1.

4.2 Non-scheduled Airline Operations Forecast

By their very nature, non-scheduled (typically, charter) flights are difficult to forecast. The two primary generators of non-scheduled activity at MHK are charters related to various Kansas State sports programs and those related to Fort Riley personnel transport. (Other military operations also occur at the airport; they are discussed in Section 4.4.)

Figure 2
Manhattan Regional Airport Environmental Assessment

Stage Lengths



4.2.1 Forecast Number of Charter Operations

Based on airport landing reports, there were a total of approximately 212 charter operations (landings and takeoffs) fairly evenly divided between Kansas State athletics and U.S. military troop transport activity. Recognizing the on-demand nature of charter activity, aircraft may be flown in or out of MHK with no passengers for positioning, increasing the overall number of charter operations from those carrying revenue passengers.

In 2004, approximately 108 charter operations were flown in association with Kansas State athletics. According to discussions with airport management and representatives of airport users, it is not anticipated that Kansas State athletic activity will increase during the forecast horizon; therefore, the number of operations associated with the Kansas State sports program activity was kept constant through 2013.

The troop transport operations conducted by Fort Riley are primarily to transfer military personnel between the fort and the National Training Center (NTC) at Fort Irwin in California or the Joint Readiness Training Center (JRTC) at Fort Polk in Louisiana. Based on discussions with the Fort Riley Air Force Liaison, about half of these missions travel to each of these two destinations. A typical rotation consists of 20 to 25 outbound flights and 20 to 25 return flights. The requirement to position aircraft (i.e., ferrying empty aircraft) for the charter flights generated additional charter-related operations. In 2004, there were two rotations and a few miscellaneous military charters resulting in a total of 104 aircraft operations.

The Transportation Officer for Fort Riley noted that the Fort's military population is expected to increase from its current 12,000 to about 20,000 over the next three years, and that a "light unit" will be added (in addition to the two existing heavy tank units at the fort). Airport management, the Air Force Liaison for Fort Riley, and the Transportation Officer at the fort believe military charters will increase over the forecast horizon, and it was estimated that the number of troop rotations related to training would increase from two in 2004 to three in 2008 and four in 2013. In addition, increased charter activity will result from direct deployment flights. It was also assumed that miscellaneous troop transport would also double over the forecast horizon.

Total charter operations (Kansas State and civil aircraft chartered by the military) are forecast to increase from 212 operations in 2004 to 398 by 2013. All of this growth is attributed to increased military charter activity.

4.2.2 Forecast Charter Fleet Mix

The charters flown for Kansas State typically use narrow body aircraft and regional jets, while the military charters are usually flown by narrow body aircraft. In 2004, about 55 percent of charter operations were flown using various versions of the Boeing 737,

including the hushkitted -200 version. Other jets, including the Boeing 727, DC-9, narrow body Airbus aircraft, and Boeing 757, comprised another 24 percent. Regional jets comprised about 18 percent of the charter operational fleet in 2004, and turboprops made up about four percent. It is assumed that the number of hushkitted aircraft in the charter fleet (i.e., B727-200s, B737-200s, and DC-9s) will decrease from about 13 percent to less than three percent by 2013 as airlines continue to phase these aircraft out of their fleet.

4.2.3 Forecast Charter Time of Day

Based on the landing reports for 2004, approximately 20 percent of charter activity occurred between 10:00 PM and 7:00 AM. Based on discussions with the Fort Riley Transportation Officer, many troop transport charters occur during nighttime hours—up to 40 percent. The overall percentage of nighttime charter operations was therefore increased from 20 percent in 2004 to 30 percent for 2008 and 2013, recognizing the military's growing share of overall charter activity.

4.2.4 Forecast Charter Stage Length

Approximately 27 percent of charters were destined to airports within 500 nautical miles of MHK. Forty-four percent of departures were bound for airports between 500 nautical miles and 999 nautical miles. About 30 percent of charter departures were headed to airports between 1,000 nautical miles and 1,499 nautical miles from MHK. By the end of the forecast period, about 21 percent of departures would be within 500 nautical miles of MHK, 45 percent would be between 500 and 999 nautical miles, and 34 percent between 1,000 and 1,499 nautical miles as the number of military-related flights increases.

4.3 General Aviation Operations Forecast

GA activity comprises about 85 percent of total operations at MHK. More than 40 percent of these operations are considered "local" (typically, training flights, including "touch-and-go's") which are usually performed by single engine piston aircraft. "Itinerant" operations (i.e., those leaving or entering the local traffic area) are conducted by single engine piston, multi-engine piston, turboprop, jet, and helicopter aircraft.

4.3.1 Forecast GA Operations

Airport management and airport users agree that GA activity will increase over the next several years, confirming the expected growth in this segment shown in the FAA's TAF for MHK (released in February 2005). The TAF shows GA activity increasing by 0.8 percent annually through the forecast horizon; this growth rate was assumed for the EA forecasts. GA operations are forecasted to increase from 30,221 in 2004 to 32,468 in 2013.

4.3.2 Forecast GA Fleet Mix

The current based aircraft fleet at MHK is composed of about 78 percent single engine aircraft and 22 percent multi-engine propeller aircraft. Although there are no jets or helicopters currently based at the airport, there are operations of these types of aircraft. Based on discussions with airport management, ATCT personnel, and airport users, single engine aircraft currently comprise about 66 percent of operations, multi-engine piston aircraft comprise 13 percent, turboprops comprise about 12 percent, and business jets comprise about eight percent.

Airport management and airport users agree that more complex aircraft (particularly business jets) will comprise an increasing share of GA activity at MHK, reflecting the overall trend shown in FAA's national forecast for hours flown by these types of aircraft. For the MHK EA operations forecast, the FAA's national growth rates for single engine, multi-engine piston, turboprops, turbojets, and helicopters were used. Based on this assumption, the share of single engine operations at MHK will decrease from an estimated 66 percent in 2004 to 63 percent in 2013; turbojets will increase from an estimated eight percent in 2004 to 15 percent in 2013. Multi-engine aircraft are forecast to comprise a slightly greater share of the operational fleet, while helicopters (which comprise less than one percent of the fleet) are forecast to have a constant share.

Specific aircraft types within each GA category were determined based on discussions with airport management, ATCT, airport users, a two-week sample of IFR radar data using Flight Explorer software, and a review of the GAMA report entitled, *General Aviation Statistical Databook 2004*.

4.3.3 Forecast GA Time of Day

As shown in Table 1, it was estimated that about 13 percent of GA operations occur during the non-operating hours of the ATCT. This estimate was based on discussions with airport management, ATCT, the primary FBO, and the two-week IFR data pull from January 2005. According to these contacts, many of these flights occur between 9:00 PM and 9:59 PM; it was therefore assumed about 20 percent occurred in this hour and the rest during the period defined as night for INM (i.e., between 10:00 and 7:00 AM). This translates into about 10.4 percent occurring during INM nighttime hours. It was assumed that these percentages would continue through the forecast horizon.

4.3.4 Forecast GA Stage Length

Stage length assumptions were based on discussions with airport representatives and the two-week radar pull obtained using the Flight Explorer software package. For itinerant single engine departures, 97 percent were assumed to travel within 499 NM of MHK (INM Stage Length 1), while three percent were assumed to travel between 500 NM and 999 NM. Ninety-two percent of itinerant twin-engine GA departures were assumed to be

destined for airports within 499 NM of MHK and eight percent between 500 NM and 999 NM. Itinerant turboprop aircraft were assigned a distribution of 87 percent within 499 NM of MHK and 13 percent between 500 and 999 NM of the airport. About 76 percent of GA jets were assumed to operate within 499 NM of MHK, 20 percent between 500 NM and 999 NM of MHK, and four percent between 1,000 NM and 1,499 NM of MHK. Although these stage length assumptions were held constant for each aircraft category, the overall average stage length for the GA fleet will increase as twin-engine prop and jets comprise a growing share of the fleet.

4.4 Military Operations Forecast

By 2008, there are eight military-related aviation activities planned for MHK: 1) transporting high-ranking officials to/from Fort Riley, 2) air ambulance missions, 3) air-drop operations, 4) quick reaction force activity, 5) division ready brigade, 6) helicopter activity, 7) miscellaneous military operations, (typically, practice activity and cross country flight refueling), and 8) chartering civilian aircraft to transport military personnel to out-of-state training facilities and for direct deployment missions, which were described in Section 4.2, and are counted as commercial activity. Each of these activities is expected to significantly increase over the next several years. This section discusses military operations associated with the first seven categories.

4.4.1 Forecast Military Operations

Between 2002 and 2004, military activity varied between approximately 1,500 and 2,000 annual operations at MHK. In 2004, there were an estimated 1,654 military operations at the airport.

It is difficult to forecast military activity because it is significantly dependent on decision-making at the national level, which in turn, is often made in response to issues of national security and world events. MHK tower counts of military activity for calendar year 2003, which would include activity related to the Iraq War, including the pre-invasion buildup, were actually 24 percent lower than counts for 2002. Calendar year counts for 2004 increased about six percent over 2003. For the first five months of 2005 (the most recent months for which tower counts were available), military operations were 22 percent lower than for the same five-month period of the previous year.

The FAA's TAF for MHK shows military operations holding constant from 2003 activity levels through the year 2020. Their 2005 Aerospace Forecasts show no growth in military operations at civil airports with control towers.

Ft. Riley has a military population of about 12,000, and based on discussions with their Transportation Officer, its population will increase to about 20,000 over the next three years.

For the EA forecasts, it was assumed that the significant anticipated growth at Fort Riley over the next several years would undoubtedly increase military operations at MHK. Based on estimates provided by the military, military activity is forecast to increase nearly seven-fold between 2004 and 2013, i.e., 1,654 operations to 11,467 operations over the period.

4.4.2 Forecast Military Fleet Mix

The transport of military officials is primarily flown by C-12s (the military equivalent of the twin-engine turboprop King Air), UC-35As (the military equivalent to the Citation 560), C-21s (the military equivalent of the civilian Lear 35A), and the C-37A (the military equivalent to the Gulfstream G-V). The Fort Riley Transportation Officer also anticipates that the C-32 (the military equivalent to the B-757) would be used.

The air ambulance operations are typically flown by C-130 aircraft. In 2004, there were approximately two C-130 flights (i.e., four operations) per week; all these operations were reported to have occurred during the tower's hours of operation. The Transportation Officer indicated that C-17s would also be used for air ambulance missions by 2008.

Air drop operations and quick reaction force missions will likely be flown by C-130 aircraft.

Division ready brigade activity is anticipated to be flown by C-17s. It should be noted that three C-17 flights (i.e., six operations) unrelated to the division ready brigade took place in 2004. These flights originated at McChord AFB in Washington State. The flights were destined overseas and were refueled in the air. These three flights occurred during the day.

Helicopter (Aviation BCT) activity is flown by UH-60s, CH-47s, and AH-64s.

Training-related activity is expected to be conducted by T-45s and A-4s, A-10s, and helicopters.

In general, the forecast fleet mix for military aircraft was based on information provided by the Fort Riley Transportation Officer and professional judgment and was primarily driven by the anticipated increases in various mission categories listed above.

4.4.3 Forecast Military Time of Day

Based on discussions with airport contacts, approximately seven percent of all military operations occurred between 10:00 PM and 7:00 AM in 2004. This percentage was assumed to increase to 13 percent by 2008 and remain at that level through 2013 based on information provided by the Fort Riley Transportation Officer.

4.4.4 Forecast Military Stage Length

Most of the transporting of senior officers occurs between Manhattan and Andrews AFB (922 nautical miles east of Manhattan in suburban Washington, DC), Scott AFB (322 nautical miles east near St. Louis), and Fort Hood (488 nautical miles south near Killeen, Texas). It was assumed that all turboprop military departures associated with senior officer transport were within 500 nautical miles of MHK (INM Stage Length 1). Assuming that the smaller turbojet aircraft used to transport senior officers were distributed fairly evenly among the three primary destinations listed above, about two-thirds would be within INM Stage Length 1 and one-third would be within Stage Length 2. It was assumed that this distribution would remain constant through the forecast period.

C-130 departures are typically destined to Illinois, Southern California, and Louisiana; there are also local C-130 operations associated with air drop drills at Ft. Riley. In addition, C-130s will be flown to the Canadian and Mexican borders as part of Quick Reaction Force activity. It was assumed that one-third of C-130 operations would occur within INM Stage Length 1, one-third would occur within INM Stage Length 2, and one-third would occur within INM Stage Length 3. This distribution was assumed to hold constant through the forecast horizon.

C-17 departures are typically destined for McChord AFB near Tacoma, Washington or overseas to theaters of war. (In the latter case, the aircraft are usually refueled en-route, about 2,500 nautical miles from MHK.) For the purposes of this forecast, half of the C-17 departures were assumed to be traveling to McChord (INM Stage Length 3) and half were assumed to be traveling overseas and refueling in-flight (INM Stage Length 5). This assumption was held constant through the forecast period.

Based on discussions with the ATCT representative, most other military activity is destined for airports within the central U.S. (typically to facilities in Iowa, Nebraska, Wisconsin, and Oklahoma); therefore, all other military aircraft operations were assumed to be destined to airports within 500 nautical miles of MHK (INM Stage Length 1). This assumption was held constant through the forecast horizon.

4.5 Total Forecast Operations and Comparison to FAA TAF

Combining scheduled air carrier, charter, general aviation, and military activity, the total number of aircraft operations is forecast to increase approximately 34 percent from 2004 to 2013—from 35,655 operations to 47,900 operations. Most of this growth is attributable to a significant anticipated increase in military-related activity—the bulk of which should occur over the next few years. **Table 7** summarizes existing and future activity by aircraft groupings.

Table 7

Historic and Forecast Aircraft Operations by Group

	Estimated		Forecast					
	2004		2005		2008		2013	
Aircraft Group	Ann. Ops.	Percent	Ann. Ops.	Percent	Ann. Ops.	Percent	Ann. Ops.	Percent
GA/Military Single Engine Piston	19,978	56.0%	20,048	55.8%	20,099	43.8%	20,009	41.8%
GA/Military Small Multi-engine Piston &Turboprops	8,280	23.2%	8,341	23.2%	8,434	18.4%	8,553	17.9%
Commercial/Military Large Turboprops	3,768	10.6%	3,766	10.5%	3,967	8.7%	3,992	8.3%
GA/Military Small Jets	2,796	7.8%	2,929	8.2%	3,637	7.9%	4,931	10.3%
Commercial/Military Large Jets	210	0.6%	213	0.6%	437	1.0%	510	1.1%
GA/Military Helicopters	622	1.7%	632	1.8%	9,284	20.2%	9,906	20.7%
Total	35,655	100.0%	35,929	100.0%	45,858	100.0%	47,900	100.0%

Source: HNTB analysis.

Although a direct comparison between the EA forecasts and the TAF for MHK was not possible (because the TAF does not include operations that occur when the tower is not operational), **Table 8** does compare the average annual growth rates for each activity component under the EA forecast with those of the FAA's TAF. As shown, the EA forecast growth rate is 0.5 percent for commercial operations compared to the 0.0 percent growth rate assumed for the TAF. The difference is attributable to the assumption made for the EA forecast that charter operations would increase due to increased military troop transfer activity. Because the EA forecast for GA activity assumed the TAF growth rate, both show an average annual growth rate of 0.8 percent through the forecast period. The EA forecast indicates military activity will increase at an average annual rate of 24.0 percent versus 0.0 percent indicated by the TAF. This difference is attributable to the assumption made for the EA forecast that the anticipated significant Fort Riley population increase would result in an increase in military operations at MHK. The overall average annual growth rate for total operations indicated by the EA is 3.3 percent, compared to 0.7 percent indicated by the TAF. **Figure 3** shows the TAF and EA forecasts.

Table 8

Comparison of EA and FAA TAF Operations Forecast Growth Rates
2004-2013

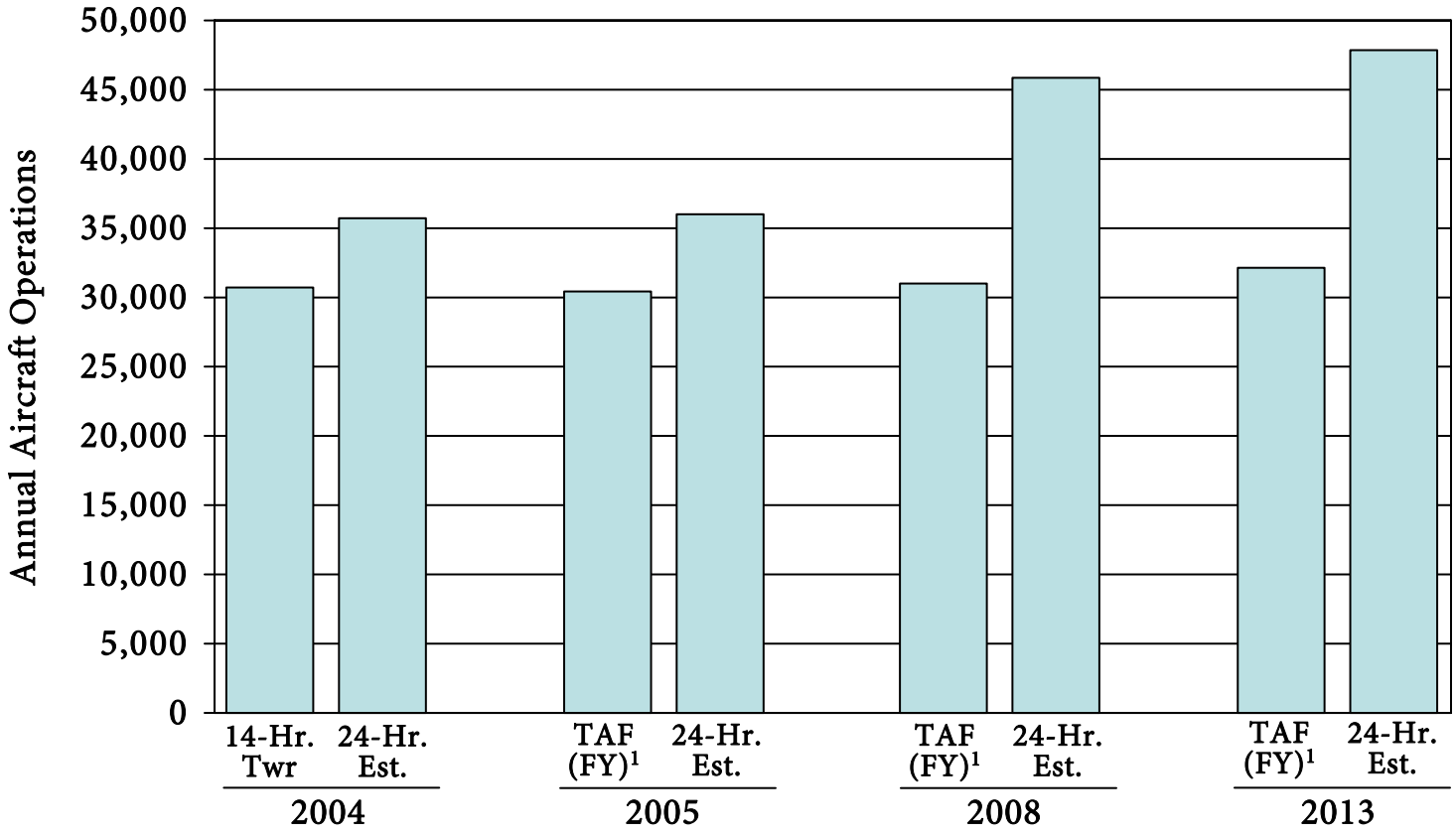
	Commercial (1)	General Aviation	Military	Total
EA Growth Rate (2)	0.5%	0.8%	24.0%	3.3%
FAA TAF Growth Rate (2)	0.0%	0.8%	0.0%	0.7%

Notes: (1) Scheduled + Non-scheduled compared with TAF Air Carrier + Air Taxi categories.
(2) EA forecasts are for calendar years; FAA TAF forecasts are federal fiscal years (Oct-Sep).

Sources: As noted above and HNTB analysis.

Figure 3
Manhattan Regional Airport Environmental Assessment

Comparison of FAA TAF and Revised EA Annual Aircraft Operations Forecasts



Note: (1) TAF based on 14-hour tower counts.

Manhattan Regional Airport Runway Study
757-300 Capability

This paper considers what airfield expansions would be required to support regular operations of Boeing 757-300 aircraft at Manhattan Regional Airport (MHK).

Bottom Line Up Front: To increase Manhattan Regional Airport suitability, the following infrastructure improvements are desired by Fort Riley. These expansions would need to be done keeping in mind pavement Weight Bearing Capacity (WBC) for the aircraft served.

- Widen Taxiway B to 75' to allow the 757-300 to direct taxi from the runway to the expanded ramp. This change alone would allow for immediate, though limited, use by the 757-300. Until then, the current width of 50' does not provide a safe taxiing environment for the aircraft.
- Increase the length of Runway 3-21 to a minimum of 8,000' X 150'.
- Construct 1000' overruns at each end* of runway to allow for a 9,000' takeoff roll. For a 747-300, takeoff distance is more limiting than landing distance. An 8,000' runway with a paved overrun area will sufficiently handle landing for a 757-300 that requires 9,000' for takeoff.
- Construct a 190-foot wide "hammerhead" or "keyhole" on each end of the runway to allow for the aircraft to perform a 180° turn in adverse conditions and back-taxi on the runway. The 757-300 requires a minimum of 144' to perform a 180° turn in good conditions and increases for adverse conditions.

**An alternative solution would be to increase Runway 03/21 to 8,000' X 150' and add only one overrun. This reduces cost, but could reduce full use of the runway during adverse weather conditions.*

The table below lists minimum takeoff distance requirements for a 757-300 departing MHK. These distances assume a wet runway, standard atmosphere at varying temperatures, with a field elevation of 1057' MSL, maximum cargo load of 62,300 lbs., and maximum takeoff weight of 220,000 lbs. This allows for enough fuel to reach Bangor International Airport, ME (KBGR). Temperatures of 80, 90 and 100° F were considered with 90° F set as the standard to match the "Hoover" study and the historical average high temperatures.

757-300 Takeoff Distance Required (KMHK)			
Temperature	**80° F**	**90° F**	**100° F**
RWY 03	**8,000'**	**9,000'**	**10,000' ***
RWY 21	**8,000'**	**9,000'**	**9,250'**

**Required for Runway 3 due to published obstacles off departure end. Reference current DOD Flight Information Publication (FLIP) for current obstacle information.*

All 757-300 Take-Off and Landing Data was taken from telephone conversations with Mr. Dewey Irvin from American Trans Airlines (comm. Phone 317-282-5925) on 25 and 29 Jan 08.

During research, we came across an interesting minimum model from Pope AFB. The main Runway 05/23 is 7501' X 150'and has 1,000' overruns on both ends allowing takeoff runs of 8501'. It supports 82nd Airborne operations and is suitable for year around use by nearly all military aircraft (including the C-5 and KC-10) and civilian aircraft (including 757-300, DC10, MD11 and L1011). However, flights can

be limited by load and/or range during hot weather operations. As such, Runway 05/23 at one time was scheduled for expansion. For now, it has 190' hammerheads to allow aircraft to turn around at the end of the runway and it has 74-75' taxiways.

Finally, in discussions with ATA, Pope AFB and Dover AFB (C-5 operations), all mentioned the need for a hammerhead or keyhole at the end of the runway. A 757-300 requires approximately 144' of pavement to conduct a 180° turn (where a C-5 requires 150' minimum). This minimum considers ideal conditions. Both Pope Base Ops and Mr. Irvin mentioned the hammerhead at Pope (approximately 190' wide) as an adequate size for adverse operations.

Apron Size Calculations for Transient Aircraft

Airport	Manhattan Regional Airport (MHK)
Location	Manhattan, KS

NOTE: (You can calculate size of apron based upon total annual ops or you may develop an estimate of annual operations based upon number of based aircraft)

1. Calculate the total annual operations

			small GA 250 ops / AC	med GA 350 ops / AC
Enter number of based aircraft	→	43		
Enter number of operations per aircraft	→	540		
			Reliver 450 ops / AC	Busy Reliver 750 ops / AC
Total Annual Operations	→		23,228	23,220
			(Forecasted by 2027)	

2. Busiest Month (% of Annual Ops)

Enter % of Annual Ops that occur in busiest month	→	10.5		
Busiest Month Operations	→		2,439	2,438

3. Busiest Day (10%>Avg Day)

Enter Busiest Month (e.g. August)	→	May		
Avg Day Busy Month	→		79	79
Busiest Day 10% > avg. day	→		87	87

4. # Itinerant Aircraft

Enter % of Itinerant Operations	→	54		
# Itinerant Aircraft operations	→		47	47
# Itinerant Aircraft Landing Operations	→		23	23
Enter % of Itinerant Operations on ground	→	50		
# Itinerant AC on ground (assume 50%)	→		12	12

5. Apron area

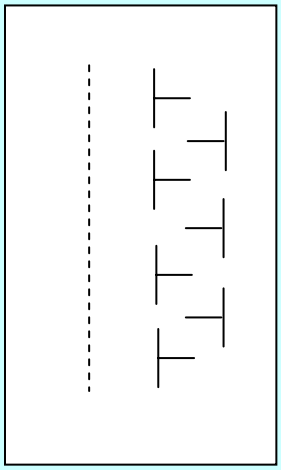
# square yards per aircraft	→	490		
Apron Area (sq yds)	→		5,725	5,723

6. Planned Apron (10%>)

# square yards	→		6,297	6,295

Note: Amount of activity can be determined from fuel sales or from actual operations counts. For example if month with highest fuel sales accounts for 20% of annual sales, use 20% of annual as busy month. If actual traffic counts available, use those. Assume 50% of operations itinerant if no records. Planning areas shown assume 10' clearance between wingtips, taxilane on edge places taxilane on edge of apron

Apron Area	w/o Taxilane	w/Taxilane @ edge	w/Taxilane	
Group I	360	755	960	
Group II	490	1,075	1,385	



Apron Size Calculations for Transient Aircraft

Airport	Manhattan Regional Airport (MHK)
Location	Manhattan, KS

NOTE: (You can calculate size of apron based upon total annual ops or you may develop an estimate of annual operations based upon number of based aircraft)

1. Calculate the total annual operations

			small GA 250 ops / AC	med GA 350 ops / AC	Reliver 450 ops / AC	Busy Reliver 750 ops / AC
Enter number of based aircraft	→	55				
Enter number of operations per aircraft	→	536				
Total Annual Operations	→		29,500		29,480	
(Forecasted by 2027)						

2. Busiest Month (% of Annual Ops)

Enter % of Annual Ops that occur in busiest month	→	10.5		
Busiest Month Operations	→		3,098	3,095

3. Busiest Day (10%>Avg Day)

Enter Busiest Month (e.g. August)	→	May		
Avg Day Busy Month	→		100	100
Busiest Day 10% > avg. day	→		110	110

4. # Itinerant Aircraft

Enter % of Itinerant Operations	→	57		
# Itinerant Aircraft operations	→		63	63
# Itinerant Aircraft Landing Operations	→		31	31
Enter % of Itinerant Operations on ground	→	50		
# Itinerant AC on ground (assume 50%)	→		16	16

5. Apron area

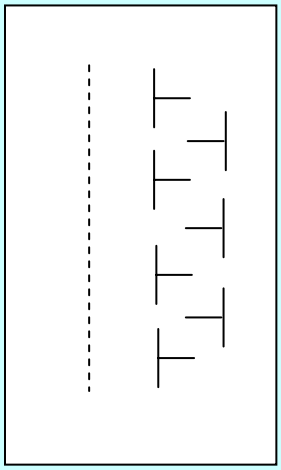
# square yards per aircraft	→	490		
Apron Area (sq yds)	→		7,675	7,669

6. Planned Apron (10%>)

# square yards	→		8,442	8,436

Note: Amount of activity can be determined from fuel sales or from actual operations counts. For example if month with highest fuel sales accounts for 20% of annual sales, use 20% of annual as busy month. If actual traffic counts available, use those. Assume 50% of operations itinerant if no records. Planning areas shown assume 10' clearance between wingtips, taxilane on edge places taxilane on edge of apron

Apron Area	w/o Taxilane	w/Taxilane @ edge	w/Taxilane	
Group I	360	755	960	
Group II	490	1,075	1,385	



Paid Parking System

Introduction

Paid parking systems are a primary airport management strategy for generating alternative revenue streams in addition to the obvious reduction of parking problems and the funding of parking facilities. Given a choice every traveler would prefer free parking. However, most airports must consider the actual cost of providing parking since ultimately airport users bear parking costs through higher ticket/air travel taxes, retail prices, and in the case of employees, potentially lower wages and benefits. Donald Shoup, a parking expert and author of several articles including "An Opportunity to Reduce Minimum Parking Requirements," *Journal of the American Planning Association, 1995*; "Curb Parking: An Ideal Source of Public Revenue," *Lincoln Institute of Land Policy (2002);* and the book "The High Cost of Free Parking," *Planners Press (2005),* notes that paying directly for parking is more equitable and efficient for all airport users.

The benefits of a paid parking system are as follows:

- Efficient use of parking facilities resulting in intended users having the ability to park in a timely manner.
- Revenue creation which in turn can be used to recover parking facility costs and fund other programs.
- Reduction in congested areas close to the terminal or most favored parking spots.
- Creation of better equality in pricing for all users whereas free parking creates a cross-subsidy from those who use alternative travel modes (public) and pay taxes.

The disadvantages associated with paid parking systems are as follows:

- Parking lot development including equipment and administrative costs.
- Delay and inconvenience to travelers who must either prepay or use specific parking denominations.
- Additional cost to travelers, which is the economic transfer offset by revenues to the airport sponsor.
- Competitive disadvantage to other similar nearby airports having free parking.

Parking Revenues at Other Airports

Revenues range widely from large hub airports like Atlanta Hartsfield International (ATL) and Intercontinental Bush (IAH) where parking revenues account for 54% and 16% respectively of total operational revenues and often represents an airport's largest single revenue source. At ATL, the definition of parking revenues combines rental car company revenues and concessions along with paid parking stall or space.

At Asheville Regional (AVL), parking revenues amount to 28% of total operational revenues. This is the largest revenue source when compared to airline fees (28%; rental car leases 20%; FBO, 8%; building and land leases 2% and other 11%). Other regional airports as shown in **Table 1** above that have parking percentage revenues of 28% or higher are Colorado Springs Municipal (COS) at 28.7% and Kansas City International (MCI) at a very high 42%.

Feasibility of a Paid Parking System at MHK

Today MHK offers free parking. Whether or not paid parking should be implemented needs to be evaluated in terms of the impact that instituting paid parking would have for the traveling public and the feasibility (and expense) of airport administration to operate it. If MHK desires to consider some form of paid parking, the following rate schedule could be considered:

- Short term - $1.00 for the first two hours. Thereafter the rate is $4.00 for all day.
- Long term - $4.00 charge per day.

Preliminary revenue estimates show that MHK can collect from 82 stalls (40 short term and 42 long term) for approximately $120,000 in annual revenue. This low cost alternative still allows MHK be very competitive with those airports that offer free parking yet can recoup revenues that can continue expansion.

Moving to an automated/electronic paid system, however, requires upfront capital to install parking control systems. Currently, there is no gate controls to any parking lot so travelers are free to park wherever they please. To create secure parking areas for short- and long term lots the following equipment is needed:

- parking access gates;
- lane equipment/ticket entrance dispensers;
- revenue equipment/fee indicators; and
- application software.

Limited research of suppliers has found two entities, namely Amano Cincinnati Inc. and GMG Systems Parking Technologies.

Table 1. *Comparison Airport Enplanements/Percent Parking Revenue and Parking rates*

Airport	2006 (TAF) Enplanements	Operating Revenue % of Parking	Short Term/Long Term	0-20 mins	21-30 mins	31-60 mins	1-2 hrs	2-3 hrs	3-4 hrs	1 Day
Brookings Regional (BKX)	770	0%	-	FREE	FREE	FREE	FREE	FREE	FREE	FREE
Forbes Field (FOE)	8,634	0%	-	FREE	FREE	FREE	FREE	FREE	FREE	FREE
Pierre Regional (PIR)	15,576	0%	-	FREE	FREE	FREE	FREE	FREE	FREE	FREE
Columbia Regional (COU)	19,089	0%	-	FREE	FREE	FREE	FREE	FREE	FREE	FREE
Bemidji Regional (BJI)	31,266	0%	-	FREE	FREE	FREE	FREE	FREE	FREE	FREE
Sioux Gateway Airport/Col. Bud Day Field (SUX)	38,081	-	Short Term	-	-	-	-	-	-	$7 per day
			Long Term	-	-	-	-	-	-	$5 per day
Dubuque Regional (DBQ)	42,561	Approx. 7%	-	FREE	FREE	FREE	FREE	FREE	N/A	$6.00
Bismarck Municipal (BIS)	165,817	Unknown	Short Term	FREE	FREE	$1.00	$2	$2	$2	$8 per day
			Long Term	FREE	FREE	$1hr	$1hr	$1hr	$1hr	$6 per day, $30 per week

Airport	2006 (TAF) Enplanements	Operating Revenue % of Parking	Short Term/Long Term	0-20 mins	21-30 mins	31-60 mins	1-2 hrs	2-3 hrs	3-4 hrs	1 Day
Asheville Regional (AVL)	295,078	28.10%	-	FREE	$1.50	$2.00	$2.75	$4.75	$5.75	$10
Eastern Iowa (CID)	514,043	-	-	FREE	$1.50	$2.25	$1.00 for each additional half hr	$7.00	-	-
Wichita Mid-Continent (ICT)	683,624	-	Short Term	FREE	FREE	$2	$4	-	-	$12 short term
			Long Term			$3	$5			$7 long term/shuttle parking
Salina Municipal (SLN)	2,197	N/A	FREE	FREE	FREE	FREE	FREE	FREE	FREE	FREE
Fort Dodge (FOD)	6,825	N/A	FREE	FREE	FREE	FREE	FREE	FREE	FREE	FREE
Colorado Springs Municipal (COS)	1,008,238	28.70%	Short Term	-	$1	-	-	-	-	$8 per day
Kansas City International (MCI)	5,624,570	41.90%	Short Term	FREE	FREE	$2	plus $2 per hr			$18 max per day/$12 circle
			Long Term	-	-	-	-	-	-	$5.50 per day/$12 circle

Table D1: Short-Term Operational Development (2008-2012)

Year	*Project No. and Description*		*FAA Eligible*	*Local Funding*	*Total Cost*
2009	1.	Runway 3-21 and Taxiway A Extension	$8,372,350	$440,650	$8,813,000
2009	2.	Update Pavement Management System	$87,400	$4,600	$92,000
2010	3.	Runway 13-31 Reconstruction and Extension	$8,037,950	$423,050	$8,461,000
2010	4.	Roadway and Utility Development for Restaurant/Retail	$0	$996,000	$996,000
2011	5.	Construct Commercial Hangar and Apron	$0	$1,547,000	$1,547,000
2011	6.	Construct Wildlife Fence (Phase II) and Airport Perimeter Service Road	$2,642,900	$139,100	$2,782,000
2011	7.	Reconfigure and Expand Short-Term Parking Lot	$1,486,750	$78,250	$1,565,000
2012	8.	Rehabilitate Terminal Apron	$163,400	$8,600	$172,000
2012	9.	Replace 10-Unit T-Hangar	$0	$862,000	$862,000
2012	10.	Replace 7-Unit T-Hangar	$0	$667,000	$667,000
2012	11.	Renovate Departure Lounge Room	$317,300	$16,700	$334,000
2012	12.	Construct 60' x 60' Hangar	$0	$427,000	$427,000
2012	13.	Construct 7-Unit T-Hangar	$0	$667,000	$667,000
Estimated Total Cost for Phase I Development			**$21,108,050**	**$6,276,950**	**$27,385,000**

Table D2: Intermediate Financial Development (2013-2017)

Year	*Project No. and Description*		*FAA Eligible*	*Local Funding*	*Total Cost*
2013	14.	Reconstruct Taxiway E (Portion East of Taxiway A)	$1,821,150	$95,850	$1,917,000
2013	15.	Reconstruct T-Hangar Taxilanes - Phase 1	$1,477,250	$77,750	$1,555,000
2013	16.	Rehabilitate GA Apron East	$521,550	$27,450	$549,000
2013	17.	Reseal Runway 3-21 Pavement Joints	$242,250	$12,750	$255,000
2014	18.	Environmental Assessment (EA) for 1000 ft. Runway 3-21 Extension	$497,800	$26,200	$524,000
2014	19.	Reconstruct and Expand GA Apron West	$1,701,450	$89,550	$1,791,000
2015	20.	Renovate Stone Hangar	$0	$1,307,000	$1,307,000
2015	21.	Reconstruct T-Hangar Taxilanes - Phase 2	$1,064,950	$56,050	$1,121,000
2016	22.	Construct FBO Complex	$0	$4,376,000	$4,376,000
2017	23.	Construct Cargo Apron	$9,549,400	$502,600	$10,052,000
2017	24.	Reconstruct T-Hangar Taxilanes - Phase 3	$1,481,050	$77,950	$1,559,000
Estimated Total Cost for Phase II Development			**$18,356,850**	**$6,649,150**	**$25,006,000**

Table D3: Long-Term Conceptual Development (2018-2027)

Year	*Project No. and Description*		*FAA Eligible*	*Local Funding*	*Total Cost*
2018	25.	Extend Runway 3-21 by 1,000 Feet and Construct Overruns	$0	$23,578,000	$23,578,000
2018	26.	Install Passenger Boarding Bridge and Construct Terminal Addition	$1,744,200	$91,800	$1,836,000
2019	27.	Construct 100' x 100' Hangar and Apron	$0	$2,476,000	$2,476,000
2020	28.	Expand Fuel Farm	$0	$759,000	$759,000
2020	29.	Widen Parallel Taxiway A to 75'	$6,570,200	$345,800	$6,916,000
2021	30.	Widen Taxiways B, C, and D to 75'	$3,515,000	$185,000	$3,700,000
2021	31.	Renovate and Expand Terminal Building	$3,241,400	$170,600	$3,412,000
2022	32.	Construct 75' x 80' Hangar and Apron	$0	$1,593,000	$1,593,000
2022	33.	Replace FBO Building (GATTS) with 140' x 140' Hangar	$0	$2,605,000	$2,605,000
2023	34.	Construct Airport Vehicle Maintenance Building	$2,642,900	$139,100	$2,782,000
2023	35.	Reconstruct Runway 3-21; Construct Shoulders and Blast Pads	$37,747,300	$1,986,700	$39,734,000
2024	36.	Construct 75' x 80' Hangar, 80' x 180' Hangar, and Aprons	$0	$3,304,330	$3,304,330
Estimated Total Cost for Phase III Development			**$55,461,000**	**$37,234,330**	**$92,695,330**
Estimated Total Development Plan Cost			**$94,925,900**	**$50,160,430**	**$145,086,330**

Table D4
Master Plan Update Capital Improvement Program
(Costs in 2008 dollars and include Contingencies, Administration, Engineering and Testing)

MANHATTAN REGIONAL AIRPORT

Project Number/Description		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Airfield/NAVAIDS												
AN-1	Runway 3-21 and Taxiway A Extension and Update Pavement Management System		8,822,200									
AN-2	Runway 13-31 Reconstruction and Extension			8,461,000								
AN-3	Construct Wildlife Fence (Phase II) and Airport Perimeter Service Road				2,782,000							
AN-4	Rehabilitate Terminal Apron					172,000						
AN-5	Reconstruct Taxiway E (Portion East of Taxiway A)						1,917,000					
AN-6	Reconstruct T-Hangar Taxilanes - Phase 1						1,555,000					
AN-7	Reseal Runway 3-21 Pavement Joints						255,000					
AN-8	Environmental Assessment (EA) for Runway 3-21 Extension							524,000				
AN-9	Reconstruct T-Hangar Taxilanes - Phase 2								1,121,000			
AN-10	Reconstruct T-Hangar Taxilanes - Phase 3										1,559,000	
AN-11	Extend Runway 3-21 by 1,000 Feet and Construct Overruns											23,578,000
AN-12	Widen Parallel Taxiway A to 75'											
AN-13	Widen Taxiways B, C, and D to 75'											
AN-14	Reconstruct Runway 3-21; Construct Shoulders and Blast Pads											
	Subtotal	$ -	$ 8,822,200	$ 8,461,000	$ 2,782,000	$ 172,000	$ 3,727,000	$ 524,000	$ 1,121,000	$ -	$ 1,559,000	$ 23,578,000
Terminal												
T-1	Renovate Departure Lounge Room					334,000						
T-2	Install Passenger Boarding Bridge and Construct Terminal Addition											1,836,000
T-3	Renovate and Expand Terminal Building											
	Subtotal	$ -	$ -	$ -	$ -	$ 334,000	$ -	$ -	$ -	$ -	$ -	$ 1,836,000
Landside (Ground Access/Parking)												
L-1	Roadway and Utility Development for Restaurant/Retail			996,000								
L-2	Reconfigure and Expand Short-Term Parking Lot				1,565,000							
	Subtotal	$ -	$ -	$ 996,000	$ 1,565,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Air Cargo												
C-1	Construct Cargo Apron										10,052,000	
	Subtotal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 10,052,000	$ -
General Aviation												
GA-1	Construct Commercial Hangar and Apron				1,547,000							
GA-2	Replace 10-Unit T-Hangar					862,000						
GA-3	Replace 7-Unit T-Hangar					667,000						
GA-4	Construct 60' x 60' Hangar					427,000						
GA-5	Construct 7-Unit T-Hangar					667,000						
GA-6	Rehabilitate GA Apron East						549,000					
GA-7	Reconstruct and Expand GA Apron West							1,791,000				
GA-8	Renovate Stone Hangar								1,307,000			
GA-9	Construct 100' x 100' Hangar and Apron											
GA-10	Construct 75' x 80' Hangar and Apron											
GA-11	Replace FBO Building (GATTS) with 140' x 140' Hangar											
GA-12	Construct 75' x 80' Hangar, 80' x 180' Hangar, and Aprons											
	Subtotal	$ -	$ -	$ -	$ 1,547,000	$ 2,623,000	$ 549,000	$ 1,791,000	$ 1,307,000	$ -	$ -	$ -
Airfield/Airline Maintenance/Support Facilities												
M-1	Construct FBO Complex									4,376,000		
M-2	Expand Fuel Farm											
M-3	Construct Airport Vehicle Maintenance Building											
	Subtotal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,376,000	$ -	$ -
Construction Total		$ -	$ 8,822,200	$ 9,457,000	$ 5,894,000	$ 3,129,000	$ 4,276,000	$ 2,315,000	$ 2,428,000	$ 4,376,000	$ 11,611,000	$ 25,414,000
GRAND TOTAL		$ -	$ 8,822,200	$ 9,457,000	$ 5,894,000	$ 3,129,000	$ 4,276,000	$ 2,315,000	$ 2,428,000	$ 4,376,000	$ 11,611,000	$ 25,414,000

Sources: Manhattern Regional Airport, compiled by HNTB Corporation

Table D4
Master Plan Update Capital Improvement Program
(Costs in 2008 dollars and include Contingencies, Administration, Engineering and Testing)

MANHATTAN REGIONAL AIRPORT

Project Number/Description		2019	2020	2021	2022	2023	2024	2025	2026	2027	Total
Airfield/NAVAIDS											
AN-1	Runway 3-21 and Taxiway A Extension and Update Pavement Management System										8,822,200
AN-2	Runway 13-31 Reconstruction and Extension										8,461,000
AN-3	Construct Wildlife Fence (Phase II) and Airport Perimeter Service Road										2,782,000
AN-4	Rehabilitate Terminal Apron										172,000
AN-5	Reconstruct Taxiway E (Portion East of Taxiway A)										1,917,000
AN-6	Reconstruct T-Hangar Taxilanes - Phase 1										1,555,000
AN-7	Reseal Runway 3-21 Pavement Joints										255,000
AN-8	Environmental Assessment (EA) for Runway 3-21 Extension										524,000
AN-9	Reconstruct T-Hangar Taxilanes - Phase 2										1,121,000
AN-10	Reconstruct T-Hangar Taxilanes - Phase 3										1,559,000
AN-11	Extend Runway 3-21 by 1,000 Feet and Construct Overruns										23,578,000
AN-12	Widen Parallel Taxiway A to 75'		6,916,000								6,916,000
AN-13	Widen Taxiways B, C, and D to 75'			3,700,000							3,700,000
AN-14	Reconstruct Runway 3-21; Construct Shoulders and Blast Pads					39,734,000					39,734,000
	Subtotal	$ -	$ 6,916,000	$ 3,700,000	$ -	$ 39,734,000	$ -	$ -	$ -	$ -	$ 101,096,200
Terminal											
T-1	Renovate Departure Lounge Room										334,000
T-2	Install Passenger Boarding Bridge and Construct Terminal Addition										1,836,000
T-3	Renovate and Expand Terminal Building			3,412,000						-	3,412,000
	Subtotal	$ -	$ -	$ 3,412,000	$ -	$ -	$ -	$ -	$ -	$ -	$ 5,582,000
Landside (Ground Access/Parking)											
L-1	Roadway and Utility Development for Restaurant/Retail										996,000
L-2	Reconfigure and Expand Short-Term Parking Lot										1,565,000
	Subtotal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,561,000
Air Cargo											
C-1	Construct Cargo Apron										10,052,000
	Subtotal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 10,052,000
General Aviation											
GA-1	Construct Commercial Hangar and Apron										1,547,000
GA-2	Replace 10-Unit T-Hangar										862,000
GA-3	Replace 7-Unit T-Hangar										667,000
GA-4	Construct 60' x 60' Hangar										427,000
GA-5	Construct 7-Unit T-Hangar										667,000
GA-6	Rehabilitate GA Apron East										549,000
GA-7	Reconstruct and Expand GA Apron West										1,791,000
GA-8	Renovate Stone Hangar										
GA-9	Construct 100' x 100' Hangar and Apron	2,476,000									2,476,000
GA-10	Construct 75' x 80' Hangar and Apron				1,593,000						1,593,000
GA-11	Replace FBO Building (GATTS) with 140' x 140' Hangar				2,605,000						2,605,000
GA-12	Construct 75' x 80' Hangar, 80' x 180' Hangar, and Aprons						3,304,330				3,304,330
	Subtotal	$ 2,476,000	$ -	$ -	$ 4,198,000	$ -	$ 3,304,330	$ -	$ -	$ -	$ 17,795,330
Airfield/Airline Maintenance/Support Facilities											
M-1	Construct FBO Complex										4,376,000
M-2	Expand Fuel Farm		759,000								759,000
M-3	Construct Airport Vehicle Maintenance Building					2,782,000					2,782,000
	Subtotal	$ -	$ 759,000	$ -	$ -	$ 2,782,000	$ -	$ -	$ -	$ -	$ 7,917,000
Construction Total		$ 2,476,000	$ 7,675,000	$ 7,112,000	$ 4,198,000	$ 42,516,000	$ 3,304,330	$ -	$ -	$ -	$ 145,003,530
GRAND TOTAL		$ 2,476,000	$ 7,675,000	$ 7,112,000	$ 4,198,000	$ 42,516,000	$ 3,304,330	$ -	$ -	$ -	$ 145,003,530

Sources: Manhattern Regional Airport, compiled by HNTB Corporation

Table D5
Capital Costs in Escalated Dollars
(Costs include contingencies, A&E Fees and cost escalation)

MANHATTAN REGIONAL AIRPORT

Project Description		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Airfield/NAVAIDS												
AN-1	Runway 3-21 and Taxiway A Extension and Update Pavement Management System	-	9,006,000	-	-	-	-	-	-	-	-	-
AN-2	Runway 13-31 Reconstruction and Extension	-	-	8,833,000	-	-	-	-	-	-	-	-
AN-3	Construct Wildlife Fence (Phase II) and Airport Perimeter Service Road	-	-	-	2,971,000	-	-	-	-	-	-	-
AN-4	Rehabilitate Terminal Apron	-	-	-	-	188,000	-	-	-	-	-	-
AN-5	Reconstruct Taxiway E (Portion East of Taxiway A)	-	-	-	-	-	2,142,000	-	-	-	-	-
AN-6	Reconstruct T-Hangar Taxilanes - Phase 1	-	-	-	-	-	1,738,000	-	-	-	-	-
AN-7	Reseal Runway 3-21 Pavement Joints	-	-	-	-	-	285,000	-	-	-	-	-
AN-8	Environmental Assessment (EA) for Runway 3-21 Extension	-	-	-	-	-	-	599,000	-	-	-	-
AN-9	Reconstruct T-Hangar Taxilanes - Phase 2	-	-	-	-	-	-	-	1,311,000	-	-	-
AN-10	Reconstruct T-Hangar Taxilanes - Phase 3	-	-	-	-	-	-	-	-	-	1,909,000	-
AN-11	Extend Runway 3-21 by 1,000 Feet and Construct Overruns	-	-	-	-	-	-	-	-	-	-	29,525,000
AN-12	Widen Parallel Taxiway A to 75'	-	-	-	-	-	-	-	-	-	-	-
AN-13	Widen Taxiways B, C, and D to 75'	-	-	-	-	-	-	-	-	-	-	-
AN-14	Reconstruct Runway 3-21; Construct Shoulders and Blast Pads	-	-	-	-	-	-	-	-	-	-	-
	Subtotal	-	9,006,000	8,833,000	2,971,000	188,000	4,165,000	599,000	1,311,000	-	1,909,000	29,525,000
Terminal												
T-1	Renovate Departure Lounge Room	-	-	-	-	365,000	-	-	-	-	-	-
T-2	Install Passenger Boarding Bridge and Construct Terminal Addition	-	-	-	-	-	-	-	-	-	-	2,299,000
T-3	Renovate and Expand Terminal Building	-	-	-	-	-	-	-	-	-	-	-
	Subtotal	-	-	-	-	365,000	-	-	-	-	-	2,299,000
Landside (Ground Access/Parking)												
L-1	Roadway and Utility Development for Restaurant/Retail	-	-	1,040,000	-	-	-	-	-	-	-	-
L-2	Reconfigure and Expand Short-Term Parking Lot	-	-	-	1,671,000	-	-	-	-	-	-	-
	Subtotal	-	-	1,040,000	1,671,000	-	-	-	-	-	-	-
Air Cargo												
C-1	Construct Cargo Apron	-	-	-	-	-	-	-	-	-	12,307,000	-
	Subtotal	-	-	-	-	-	-	-	-	-	12,307,000	-
General Aviation												
GA-1	Construct Commercial Hangar and Apron	-	-	-	1,652,000	-	-	-	-	-	-	-
GA-2	Replace 10-Unit T-Hangar	-	-	-	-	942,000	-	-	-	-	-	-
GA-3	Replace 7-Unit T-Hangar	-	-	-	-	729,000	-	-	-	-	-	-
GA-4	Construct 60' x 60' Hangar	-	-	-	-	467,000	-	-	-	-	-	-
GA-5	Construct 7-Unit T-Hangar	-	-	-	-	729,000	-	-	-	-	-	-
GA-6	Rehabilitate GA Apron East	-	-	-	-	-	614,000	-	-	-	-	-
GA-7	Reconstruct and Expand GA Apron West	-	-	-	-	-	-	2,048,000	-	-	-	-
GA-8	Renovate Stone Hangar	-	-	-	-	-	-	-	1,529,000	-	-	-
GA-9	Construct 100' x 100' Hangar and Apron	-	-	-	-	-	-	-	-	-	-	-
GA-10	Construct 75' x 80' Hangar and Apron	-	-	-	-	-	-	-	-	-	-	-
GA-11	Replace FBO Building (GATTS) with 140' x 140' Hangar	-	-	-	-	-	-	-	-	-	-	-
GA-12	Construct 75' x 80' Hangar, 80' x 180' Hangar, and Aprons	-	-	-	-	-	-	-	-	-	-	-
	Subtotal	-	-	-	1,652,000	2,867,000	614,000	2,048,000	1,529,000	-	-	-
Airfield/Airline Maintenance/Support Facilities												
M-1	Construct FBO Complex	-	-	-	-	-	-	-	-	5,236,000	-	-
M-2	Expand Fuel Farm	-	-	-	-	-	-	-	-	-	-	-
M-3	Construct Airport Vehicle Maintenance Building	-	-	-	-	-	-	-	-	-	-	-
	Subtotal	-	-	-	-	-	-	-	-	5,236,000	-	-
GRAND TOTAL		$ -	$ 9,006,000	$ 9,873,000	$ 6,294,000	$ 3,420,000	$ 4,779,000	$ 2,647,000	$ 2,840,000	$ 5,236,000	$ 14,216,000	$ 31,824,000
	Calculated Growth Factor	1	1.020784128	1.04393009	1.068020784	1.092583845	1.117619273	1.143599433	1.169579594	1.196504487	1.224374114	1.252243741

Source: HNTB Corporation

Table D5
Capital Costs in Escalated Dollars
(Costs include contingencies, A&E Fees and cost escalation)

MANHATTAN REGIONAL AIRPORT

Project Description		2019	2020	2021	2022	2023	2024	2025	2026	2027	Total
Airfield/NAVAIDS											
AN-1	Runway 3-21 and Taxiway A Extension and Update Pavement Management System	-	-	-	-	-	-	-	-	-	9,006,000
AN-2	Runway 13-31 Reconstruction and Extension	-	-	-	-	-	-	-	-	-	8,833,000
AN-3	Construct Wildlife Fence (Phase II) and Airport Perimeter Service Road	-	-	-	-	-	-	-	-	-	2,971,000
AN-4	Rehabilitate Terminal Apron	-	-	-	-	-	-	-	-	-	188,000
AN-5	Reconstruct Taxiway E (Portion East of Taxiway A)	-	-	-	-	-	-	-	-	-	2,142,000
AN-6	Reconstruct T-Hangar Taxilanes - Phase 1	-	-	-	-	-	-	-	-	-	1,738,000
AN-7	Reseal Runway 3-21 Pavement Joints	-	-	-	-	-	-	-	-	-	285,000
AN-8	Environmental Assessment (EA) for Runway 3-21 Extension	-	-	-	-	-	-	-	-	-	599,000
AN-9	Reconstruct T-Hangar Taxilanes - Phase 2	-	-	-	-	-	-	-	-	-	1,311,000
AN-10	Reconstruct T-Hangar Taxilanes - Phase 3	-	-	-	-	-	-	-	-	-	1,909,000
AN-11	Extend Runway 3-21 by 1,000 Feet and Construct Overruns	-	-	-	-	-	-	-	-	-	29,525,000
AN-12	Widen Parallel Taxiway A to 75'	-	9,063,000	-	-	-	-	-	-	-	9,063,000
AN-13	Widen Taxiways B, C, and D to 75'	-	-	4,960,000	-	-	-	-	-	-	4,960,000
AN-14	Reconstruct Runway 3-21; Construct Shoulders and Blast Pads	-	-	-	-	55,748,000	-	-	-	-	55,748,000
	Subtotal	-	9,063,000	4,960,000	-	55,748,000	-	-	-	-	128,278,000
Terminal											
T-1	Renovate Departure Lounge Room	-	-	-	-	-	-	-	-	-	365,000
T-2	Install Passenger Boarding Bridge and Construct Terminal Addition	-	-	-	-	-	-	-	-	-	2,299,000
T-3	Renovate and Expand Terminal Building	-	-	4,574,000	-	-	-	-	-	-	4,574,000
	Subtotal	-	-	4,574,000	-	-	-	-	-	-	7,238,000
Landside (Ground Access/Parking)											
L-1	Roadway and Utility Development for Restaurant/Retail	-	-	-	-	-	-	-	-	-	1,040,000
L-2	Reconfigure and Expand Short-Term Parking Lot	-	-	-	-	-	-	-	-	-	1,671,000
	Subtotal	-	-	-	-	-	-	-	-	-	2,711,000
Air Cargo											
C-1	Construct Cargo Apron	-	-	-	-	-	-	-	-	-	12,307,000
	Subtotal	-	-	-	-	-	-	-	-	-	12,307,000
General Aviation											
GA-1	Construct Commercial Hangar and Apron	-	-	-	-	-	-	-	-	-	1,652,000
GA-2	Replace 10-Unit T-Hangar	-	-	-	-	-	-	-	-	-	942,000
GA-3	Replace 7-Unit T-Hangar	-	-	-	-	-	-	-	-	-	729,000
GA-4	Construct 60' x 60' Hangar	-	-	-	-	-	-	-	-	-	467,000
GA-5	Construct 7-Unit T-Hangar	-	-	-	-	-	-	-	-	-	729,000
GA-6	Rehabilitate GA Apron East	-	-	-	-	-	-	-	-	-	614,000
GA-7	Reconstruct and Expand GA Apron West	-	-	-	-	-	-	-	-	-	2,048,000
GA-8	Renovate Stone Hangar	-	-	-	-	-	-	-	-	-	1,529,000
GA-9	Construct 100' x 100' Hangar and Apron	3,172,000	-	-	-	-	-	-	-	-	3,172,000
GA-10	Construct 75' x 80' Hangar and Apron	-	-	-	2,185,000	-	-	-	-	-	2,185,000
GA-11	Replace FBO Building (GATTS) with 140' x 140' Hangar	-	-	-	3,573,000	-	-	-	-	-	3,573,000
GA-12	Construct 75' x 80' Hangar, 80' x 180' Hangar, and Aprons	-	-	-	-	-	4,743,000	-	-	-	4,743,000
	Subtotal	3,172,000	-	-	5,758,000	-	4,743,000	-	-	-	22,383,000
Airfield/Airline Maintenance/Support Facilities											
M-1	Construct FBO Complex	-	-	-	-	-	-	-	-	-	5,236,000
M-2	Expand Fuel Farm	-	995,000	-	-	-	-	-	-	-	995,000
M-3	Construct Airport Vehicle Maintenance Building	-	-	-	-	3,903,000	-	-	-	-	3,903,000
	Subtotal	-	995,000	-	-	3,903,000	-	-	-	-	10,134,000
GRAND TOTAL		$ 3,172,000	$ 10,058,000	$ 9,534,000	$ 5,758,000	$ 59,651,000	$ 4,743,000	$ -	$ -	$ -	183,051,000
	Calculated Growth Factor	1.281045347	1.31050939	1.340651106	1.371486082	1.403030261	1.435299957	1.468311857	1.473035522	1.477759188	

Source: HNTB Corporation

Table D6
Estimated Available Passenger Facilitity Charges and FAA Entitlement Funds

MANHATTAN REGIONAL AIRPORT

Calendar Year	Enplane-ments (a)	Estimated PFC Collec-tions (b)	Fiscal Year (c)	FAA AIP Entitlements			State Entitlements (f)
				Passenger (d)	Cargo	Total (e)	
2006	N/A	53,566	2008	1,000,000	-	1,000,000	-
2007	20,273	49,004	2009	1,000,000	-	1,000,000	-
2008	20,170	42,585	2010	1,000,000	-	1,000,000	-
2009	21,870	92,349	2011	1,000,000	-	1,000,000	-
2010	23,570	99,527	2012	1,000,000	-	1,000,000	-
2011	25,270	106,706	2013	1,000,000	-	1,000,000	-
2012	26,970	113,884	2014	1,000,000	-	1,000,000	-
2013	29,050	122,667	2015	1,000,000	-	1,000,000	-
2014	31,130	131,451	2016	1,000,000	-	1,000,000	-
2015	33,210	140,234	2017	1,000,000	-	1,000,000	-
2016	35,290	149,017	2018	1,000,000	-	1,000,000	-
2017	58,950	248,924	2019	1,000,000	-	1,000,000	-
2018	60,310	254,667	2020	1,000,000	-	1,000,000	-
2019	61,670	260,410	2021	1,000,000	-	1,000,000	-
2020	63,030	266,152	2022	1,000,000	-	1,000,000	-
2021	64,390	271,895	2023	1,000,000	-	1,000,000	-
2022	65,750	277,638	2024	1,000,000	-	1,000,000	-
2023	67,390	284,563	2025	1,000,000	-	1,000,000	-
2024	69,030	291,488	2026	1,000,000	-	1,000,000	-
2025	70,670	298,413	2027	1,000,000	-	1,000,000	-
2026	72,310	305,338	2028	1,012,014	-	1,012,014	-
2027	73,950	312,264	2029	1,029,070	-	1,029,070	-

(a) Table 3-8

(b) Assumes collection of $4.50 per enplaned passenger, at 95 percent collection rate less 11 cents administration fee to airlines. Assumes application is extended, or a new one is in effect, throughout the planning period. 2006 and 2007 PFC collections are actual data provided by Manhattan Regional Airport and not projections.

(c) Federal fiscal year ending September 30.

(d) Assumes existing passenger entitlement formula continues through the forecast period, including a doubling of entitlements in any fiscal year in which the total AIP appropriation is $3.2 billion or greater. It is assumed that this level will be met or exceeded in every year of the planning period.

(e) Passenger plus cargo entitlements.

(f) Per Kansas Department of Transportation MHK is not eligible for Kansas AIP Entitlement.

Sources: As noted and HNTB analysis.

Table D7

Projects by Estimated Funding Source (Preliminary): Base Case

(Costs include Escalation for Inflation, Contingencies, Administration, Engineering and Testing)

MANHATTAN REGIONAL AIRPORT

Project	Year of Construc-tion (a)	Total Cost (a)	Eligibility (b) AIP	Eligibility (b) PFCe	Eligibility (b) State (c)	Ineligible Costs (d)	Estimated Funding (e) AIP Entitle-ment	AIP Dis-cretion-ary	PFC	State Entitle-ments	State Discre-tionary	Third Party	Airport/City
	2008	-	-	-	-	-	-	-	-	-	-	-	-
Runway 3-21 and Taxiway A Extension and Update Pavement Management System	2009	9,006,000	8,555,700	9,006,000	-	-	2,000,000	5,555,700	-	-	-	-	1,450,300
Runway 13-31 Reconstruction and Extension	2010	8,833,000	8,391,350	8,833,000	-	-	1,000,000	6,391,350	-	-	-	-	1,441,650
Roadway and Utility Development for Restaurant/Retail	2010	1,040,000	-	-	-	1,040,000	-	-	-	-	-	-	1,040,000
Construct Wildlife Fence (Phase II) and Airport Perimeter Service Road	2011	2,971,000	2,822,450	2,971,000	-	-	1,000,000	1,822,450	-	-	-	-	148,550
Reconfigure and Expand Short-Term Parking Lot	2011	1,671,000	1,587,450	1,671,000	-	-	-	-	-	-	-	-	1,671,000
Construct Commercial Hangar and Apron	2011	1,652,000	-	-	-	1,652,000	-	-	-	-	-	-	1,652,000
Rehabilitate Terminal Apron	2012	188,000	178,600	188,000	-	-	178,600	-	-	-	-	-	9,400
Replace 10-Unit T-Hangar	2012	942,000	-	-	-	942,000	-	-	-	-	-	-	942,000
Replace 7-Unit T-Hangar	2012	729,000	-	-	-	729,000	-	-	-	-	-	-	729,000
Renovate Departure Lounge Room	2012	365,000	346,750	365,000	-	-	346,750	-	-	-	-	-	18,250
Construct 60' x 60' Hangar	2012	467,000	-	-	-	467,000	-	-	-	-	-	-	467,000
Construct 7-Unit T-Hangar	2012	729,000	-	-	-	729,000	-	-	-	-	-	-	729,000
Reconstruct Taxiway E (Portion East of Taxiway A)	2013	2,142,000	2,034,900	2,142,000	-	-	1,000,000	1,034,900	-	-	-	-	107,100
Reconstruct T-Hangar Taxilanes - Phase 1	2013	1,738,000	1,651,100	1,738,000	-	-	-	-	-	-	-	-	1,738,000
Reseal Runway 3-21 Pavement Joints	2013	285,000	270,750	285,000	-	-	-	270,750	-	-	-	-	14,250
Rehabilitate GA Apron East	2013	614,000	583,300	-	-	30,700	-	-	-	-	-	-	614,000
Environmental Assessment (EA) for Runway 3-21 Extension	2014	599,000	569,050	599,000	-	-		569,050	29,950	-	-	-	-
Reconstruct and Expand GA Apron West	2014	2,048,000	1,945,600	-	-	102,400	1,000,000	-	-	-	-	-	1,048,000
Renovate Stone Hangar	2015	1,529,000	-	-	-	-	-	-	-	-	-	-	1,529,000
Reconstruct T-Hangar Taxilanes - Phase 2	2015	1,311,000	1,245,450	1,311,000	-	-	1,000,000	-	218,447	-	-	-	92,553
Construct FBO Complex	2016	5,236,000	-	-	-	5,236,000	-	-	-	-	-	-	5,236,000
Construct Cargo Apron	2017	12,307,000	11,691,650	-	-	615,350	-	-	-	-	-	-	12,307,000
Reconstruct T-Hangar Taxilanes - Phase 3	2017	1,909,000	1,813,550	1,909,000	-	-	1,000,000	-	397,941	-	-	-	511,059
Install Passenger Boarding Bridge and Construct Terminal Addition	2018	2,299,000	2,184,050	2,299,000	-	-	-	-	-	-	-	-	2,299,000
Extend Runway 3-21 by 1,000 Feet and Construct Overruns	2018	29,525,000	-	-	-	29,525,000	-	-	-	-	-	-	29,525,000
Construct 100' x 100' Hangar and Apron	2019	3,172,000	-	-	-	3,172,000	-	-	-	-	-	-	3,172,000
Widen Parallel Taxiway A to 75'	2020	9,063,000	8,609,850	9,063,000	-	-	2,000,000	6,609,850	453,150	-	-	-	-
Expand Fuel Farm	2020	995,000	-	-	-	995,000	-	-	-	-	-	-	995,000
Widen Taxiways B, C, and D to 75'	2021	4,960,000	4,712,000	4,960,000	-	-	1,000,000	3,712,000	248,000	-	-	-	-
Renovate and Expand Terminal Building	2021	4,574,000	4,345,300	4,574,000	-		-	-	97,307	-	-	-	4,476,693
Construct 75' x 80' Hangar and Apron	2022	2,185,000	-	-	-	2,185,000	-	-	-	-	-	-	2,185,000
Replace FBO Building (GATTS) with 140' x 140' Hangar	2022	3,573,000	-	-	-	3,573,000	-	-	-	-	-	-	3,573,000
Construct Airport Vehicle Maintenance Building	2023	3,903,000	3,707,850	3,903,000	-	-	-	-	-	-	-	-	3,903,000
Reconstruct Runway 3-21; Construct Shoulders and Blast Pads	2023	55,748,000	52,960,600	55,748,000	-	-	2,000,000	50,960,600	562,201	-	-	-	2,225,199
Construct 75' x 80' Hangar, 80' x 180' Hangar, and Aprons	2024	4,743,000	-	-	-	4,743,000	-	-	-	-	-	-	4,743,000
Grand Total		183,051,000	120,207,300	111,565,000	-	55,736,450	13,525,350	76,926,650	2,006,996	-	-	-	90,592,004

(a) Table 9-2.
(b) Amount of project eligible for AIP or PFC. Eligiblity for funding does not assure funding.
(c) MHK is not eligible for State funding.
(d) Costs not eligible for any AIP or PFC funding.
(e) Estimated funding source(s) for each project.

Sources: As noted and HNTB analysis.

Table D8
Summary of Capital Costs by Project Eligibility
(Cost in Escalated Dollars)

MANHATTAN REGIONAL AIRPORT

Project Description		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Total Capital Costs (a)												
Airfield		-	9,006,000	8,833,000	2,971,000	188,000	4,165,000	599,000	2,840,000	-	1,909,000	29,525,000
Terminal Area		-	-	-	-	365,000	-	-	-	-	-	2,299,000
Landside		-	-	1,040,000	1,671,000	-	-	-	-	-	-	-
Air Cargo		-	-	-	-	-	-	-	-	-	12,307,000	-
General Aviation		-	-	-	1,652,000	2,867,000	614,000	2,048,000	-	-	-	-
Airfield/Airline Maintenance/Support		-	-	-	-	-	-	-	-	5,236,000	-	-
	Total	-	9,006,000	9,873,000	6,294,000	3,420,000	4,779,000	2,647,000	2,840,000	5,236,000	14,216,000	31,824,000
AIP Eligible Capital Costs (b)												
Airfield		-	8,555,700	8,391,350	2,822,450	178,600	3,956,750	569,050	1,245,450	-	1,813,550	-
Terminal Area		-	-	-	-	346,750	-	-	-	-	-	2,184,050
Landside		-	-	-	1,587,450	-	-	-	-	-	-	-
Air Cargo		-	-	-	-	-	-	-	-	-	11,691,650	-
General Aviation		-	-	-	-	-	583,300	1,945,600	-	-	-	-
Airfield/Airline Maintenance/Support		-	-	-	-	-	-	-	-	-	-	-
	Total	-	8,555,700	8,391,350	4,409,900	525,350	4,540,050	2,514,650	1,245,450	-	13,505,200	2,184,050
PFC Eligible Capital Costs (c)												
Airfield		-	9,006,000	8,833,000	2,971,000	188,000	4,165,000	599,000	1,311,000	-	1,909,000	-
Terminal Area		-	-	-	-	365,000	-	-	-	-	-	2,299,000
Landside		-	-	-	1,671,000	-	-	-	-	-	-	-
Air Cargo		-	-	-	-	-	-	-	-	-	-	-
General Aviation		-	-	-	-	-	-	-	-	-	-	-
Airfield/Airline Maintenance/Support		-	-	-	-	-	-	-	-	-	-	-
	Total	-	9,006,000	8,833,000	4,642,000	553,000	4,165,000	599,000	1,311,000	-	1,909,000	2,299,000
State Eligible Capital Costs												
Airfield		-	-	-	-	-	-	-	-	-	-	-
Terminal Area		-	-	-	-	-	-	-	-	-	-	-
Landside		-	-	-	-	-	-	-	-	-	-	-
Air Cargo		-	-	-	-	-	-	-	-	-	-	-
General Aviation		-	-	-	-	-	-	-	-	-	-	-
Airfield/Airline Maintenance/Support		-	-	-	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-	-	-	-
Capital Costs Ineligible for Federal Grants (d)												
Airfield		-	-	-	-	-	-	-	-	-	-	29,525,000
Terminal Area		-	-	-	-	-	-	-	-	-	-	-
Landside		-	-	1,040,000	-	-	-	-	-	-	-	-
Air Cargo		-	-	-	-	-	-	-	-	-	615,350	-
General Aviation		-	-	-	1,652,000	2,867,000	30,700	102,400	-	-	-	-
Airfield/Airline Maintenance/Support		-	-	-	-	-	-	-	-	5,236,000	-	-
	Total	-	-	1,040,000	1,652,000	2,867,000	30,700	102,400	-	5,236,000	615,350	29,525,000

(a) Table 9-2.
(b) Table 9-4. Many FAA eligible costs are alse eligible for PFC funding.
(c) Table 9-4. Many PFC eligible costs are also eligible for FAA AIP funding.
(d) Table 9-4.

Sources: As noted and HNTB analysis.

Table D8
Summary of Capital Costs by Project Eligibility
(Cost in Escalated Dollars)

MANHATTAN REGIONAL AIRPORT

Project Description		2019	2020	2021	2022	2023	2024	2025	2026	2027	Total
Total Capital Costs (a)											
Airfield		-	9,063,000	4,960,000	-	55,748,000	-	-	-	-	129,807,000
Terminal Area		-	-	4,574,000	-	-	-	-	-	-	7,238,000
Landside		-	-	-	-	-	-	-	-	-	2,711,000
Air Cargo		-	-	-	-	-	-	-	-	-	12,307,000
General Aviation		3,172,000	-	-	5,758,000	-	4,743,000	-	-	-	20,854,000
Airfield/Airline Maintenance/Support		-	995,000	-	-	3,903,000	-	-	-	-	10,134,000
	Total	3,172,000	10,058,000	9,534,000	5,758,000	59,651,000	4,743,000	-	-	-	183,051,000
AIP Eligible Capital Costs (b)											
Airfield		-	8,609,850	4,712,000	-	52,960,600	-	-	-	-	93,815,350
Terminal Area		-	-	4,345,300	-	-	-	-	-	-	6,876,100
Landside		-	-	-	-	-	-	-	-	-	1,587,450
Air Cargo		-	-	-	-	-	-	-	-	-	11,691,650
General Aviation		-	-	-	-	-	-	-	-	-	2,528,900
Airfield/Airline Maintenance/Support		-	-	-	-	3,707,850	-	-	-	-	3,707,850
	Total	-	8,609,850	9,057,300	-	56,668,450	-	-	-	-	120,207,300
PFC Eligible Capital Costs (c)											
Airfield		-	9,063,000	4,960,000	-	55,748,000	-	-	-	-	98,753,000
Terminal Area		-	-	4,574,000	-	-	-	-	-	-	7,238,000
Landside		-	-	-	-	-	-	-	-	-	1,671,000
Air Cargo		-	-	-	-	-	-	-	-	-	-
General Aviation		-	-	-	-	-	-	-	-	-	-
Airfield/Airline Maintenance/Support		-	-	-	-	3,903,000	-	-	-	-	3,903,000
	Total	-	9,063,000	9,534,000	-	59,651,000	-	-	-	-	111,565,000
State Eligible Capital Costs											
Airfield		-	-	-	-	-	-	-	-	-	-
Terminal Area		-	-	-	-	-	-	-	-	-	-
Landside		-	-	-	-	-	-	-	-	-	-
Air Cargo		-	-	-	-	-	-	-	-	-	-
General Aviation		-	-	-	-	-	-	-	-	-	-
Airfield/Airline Maintenance/Support		-	-	-	-	-	-	-	-	-	-
	Total	-	-	-	-	-	-	-	-	-	-
Capital Costs Ineligible for Federal Grants (d)											
Airfield		-	-	-	-	-	-	-	-	-	29,525,000
Terminal Area		-	-	-	-	-	-	-	-	-	-
Landside		-	-	-	-	-	-	-	-	-	1,040,000
Air Cargo		-	-	-	-	-	-	-	-	-	615,350
General Aviation		3,172,000	-	-	5,758,000	-	4,743,000	-	-	-	18,325,100
Airfield/Airline Maintenance/Support		-	995,000	-	-	-	-	-	-	-	6,231,000
	Total	3,172,000	995,000	-	5,758,000	-	4,743,000	-	-	-	55,736,450

(a) Table 9-2.
(b) Table 9-4. Many FAA eligible costs are alse eligible for PFC funding.
(c) Table 9-4. Many PFC eligible costs are also eligible for FAA AIP funding.
(d) Table 9-4.

Sources: As noted and HNTB analysis.

Table D9
Summary of Capital Costs by Estimated Funding Source
(Cost in Escalated Dollars)

MANHATTAN REGIONAL AIRPORT

Project Description	2008	2009	2010	2011	2012	2013	2014
Total Project Costs							
Airfield	-	9,006,000	8,833,000	2,971,000	188,000	4,165,000	599,000
Terminal Area	-	-	-	-	365,000	-	-
Landside	-	-	1,040,000	1,671,000	-	-	-
Air Cargo	-	-	-	-	-	-	-
General Aviation	-	-	-	1,652,000	2,867,000	614,000	2,048,000
Airfield/Airline Maintenance/Support	-	-	-	-	-	-	-
Total	-	9,006,000	9,873,000	6,294,000	3,420,000	4,779,000	2,647,000
AIP Entitlements							
Airfield	-	2,000,000	1,000,000	1,000,000	178,600	1,000,000	-
Terminal Area	-	-	-	-	346,750	-	-
Landside	-	-	-	-	-	-	-
Air Cargo	-	-	-	-	-	-	-
General Aviation	-	-	-	-	-	-	1,000,000
Airfield/Airline Maintenance/Support	-	-	-	-	-	-	-
Total	-	2,000,000	1,000,000	1,000,000	525,350	1,000,000	1,000,000
AIP Discretionary							
Airfield	-	5,555,700	6,391,350	1,822,450	-	1,305,650	569,050
Terminal Area	-	-	-	-	-	-	-
Landside	-	-	-	-	-	-	-
Air Cargo	-	-	-	-	-	-	-
General Aviation	-	-	-	-	-	-	-
Airfield/Airline Maintenance/Support	-	-	-	-	-	-	-
Total	-	5,555,700	6,391,350	1,822,450	-	1,305,650	569,050
PFC Funds							
Airfield	-	-	-	-	-	-	29,950
Terminal Area	-	-	-	-	-	-	-
Landside	-	-	-	-	-	-	-
Air Cargo	-	-	-	-	-	-	-
General Aviation	-	-	-	-	-	-	-
Airfield/Airline Maintenance/Support	-	-	-	-	-	-	-
Total	-	-	-	-	-	-	29,950
State Entitlements							
Airfield	-	-	-	-	-	-	-
Terminal Area	-	-	-	-	-	-	-
Landside	-	-	-	-	-	-	-
Air Cargo	-	-	-	-	-	-	-
General Aviation	-	-	-	-	-	-	-
Airfield/Airline Maintenance/Support	-	-	-	-	-	-	-
Total	-	-	-	-	-	-	-
State Discretionary							
Airfield	-	-	-	-	-	-	-
Terminal Area	-	-	-	-	-	-	-
Landside	-	-	-	-	-	-	-
Air Cargo	-	-	-	-	-	-	-
General Aviation	-	-	-	-	-	-	-
Airfield/Airline Maintenance/Support	-	-	-	-	-	-	-
Total	-	-	-	-	-	-	-
Other							
Airfield	-	-	-	-	-	-	-
Terminal Area	-	-	-	-	-	-	-
Landside	-	-	-	-	-	-	-
Air Cargo	-	-	-	-	-	-	-
General Aviation	-	-	-	-	-	-	-
Airfield/Airline Maintenance/Support	-	-	-	-	-	-	-
Total	-	-	-	-	-	-	-
Airport							
Airfield	-	1,450,300	1,441,650	148,550	9,400	1,859,350	-
Terminal Area	-	-	-	-	18,250	-	-
Landside	-	-	1,040,000	1,671,000	-	-	-
Air Cargo	-	-	-	-	-	-	-
General Aviation	-	-	-	1,652,000	2,867,000	614,000	1,048,000
Airfield/Airline Maintenance/Support	-	-	-	-	-	-	-
Total	-	1,450,300	2,481,650	3,471,550	2,894,650	2,473,350	1,048,000

Sources: Table 9-4 and HNTB analysis.

Table D9
Summary of Capital Costs by Estimated Funding Source
(Cost in Escalated Dollars)

MANHATTAN REGIONAL AIRPORT

Project Description	2015	2016	2017	2018	2019	2020	2021
Total Project Costs							
Airfield	2,840,000	-	1,909,000	29,525,000	-	9,063,000	4,960,000
Terminal Area	-	-	-	2,299,000	-	-	4,574,000
Landside	-	-	-	-	-	-	-
Air Cargo	-	-	12,307,000	-	-	-	-
General Aviation	-	-	-	-	3,172,000	-	-
Airfield/Airline Maintenance/Support	-	5,236,000	-	-	-	995,000	-
Total	2,840,000	5,236,000	14,216,000	31,824,000	3,172,000	10,058,000	9,534,000
AIP Entitlements							
Airfield	1,000,000	-	1,000,000	-	-	2,000,000	1,000,000
Terminal Area	-	-	-	-	-	-	-
Landside	-	-	-	-	-	-	-
Air Cargo	-	-	-	-	-	-	-
General Aviation	-	-	-	-	-	-	-
Airfield/Airline Maintenance/Support	-	-	-	-	-	-	-
Total	1,000,000	-	1,000,000	-	-	2,000,000	1,000,000
AIP Discretionary							
Airfield	-	-	-	-	-	6,609,850	3,712,000
Terminal Area	-	-	-	-	-	-	-
Landside	-	-	-	-	-	-	-
Air Cargo	-	-	-	-	-	-	-
General Aviation	-	-	-	-	-	-	-
Airfield/Airline Maintenance/Support	-	-	-	-	-	-	-
Total	-	-	-	-	-	6,609,850	3,712,000
PFC Funds							
Airfield	218,447	-	397,941	-	-	453,150	248,000
Terminal Area	-	-	-	-	-	-	97,307
Landside	-	-	-	-	-	-	-
Air Cargo	-	-	-	-	-	-	-
General Aviation	-	-	-	-	-	-	-
Airfield/Airline Maintenance/Support	-	-	-	-	-	-	-
Total	218,447	-	397,941	-	-	453,150	345,307
State Entitlements							
Airfield	-	-	-	-	-	-	-
Terminal Area	-	-	-	-	-	-	-
Landside	-	-	-	-	-	-	-
Air Cargo	-	-	-	-	-	-	-
General Aviation	-	-	-	-	-	-	-
Airfield/Airline Maintenance/Support	-	-	-	-	-	-	-
Total	-	-	-	-	-	-	-
State Discretionary							
Airfield	-	-	-	-	-	-	-
Terminal Area	-	-	-	-	-	-	-
Landside	-	-	-	-	-	-	-
Air Cargo	-	-	-	-	-	-	-
General Aviation	-	-	-	-	-	-	-
Airfield/Airline Maintenance/Support	-	-	-	-	-	-	-
Total	-	-	-	-	-	-	-
Other							
Airfield	-	-	-	-	-	-	-
Terminal Area	-	-	-	-	-	-	-
Landside	-	-	-	-	-	-	-
Air Cargo	-	-	-	-	-	-	-
General Aviation	-	-	-	-	-	-	-
Airfield/Airline Maintenance/Support	-	-	-	-	-	-	-
Total	-	-	-	-	-	-	-
Airport							
Airfield	1,621,553	-	511,059	29,525,000	-	-	-
Terminal Area	-	-	-	2,299,000	-	-	4,476,693
Landside	-	-	-	-	-	-	-
Air Cargo	-	-	12,307,000	-	-	-	-
General Aviation	-	-	-	-	3,172,000	-	-
Airfield/Airline Maintenance/Support	-	5,236,000	-	-	-	995,000	-
Total	1,621,553	5,236,000	12,818,059	31,824,000	3,172,000	995,000	4,476,693

Sources: Table 9-4 and HNTB analysis.

Table D9

Summary of Capital Costs by Estimated Funding Source

(Cost in Escalated Dollars)

MANHATTAN REGIONAL AIRPORT

Project Description	2022	2023	2024	2025	2026	2027	Total
Total Project Costs							
Airfield	-	55,748,000	-	-	-	-	129,807,000
Terminal Area	-	-	-	-	-	-	7,238,000
Landside	-	-	-	-	-	-	2,711,000
Air Cargo	-	-	-	-	-	-	12,307,000
General Aviation	5,758,000	-	4,743,000	-	-	-	20,854,000
Airfield/Airline Maintenance/Support	-	3,903,000	-	-	-	-	10,134,000
Total	5,758,000	59,651,000	4,743,000	-	-	-	183,051,000
AIP Entitlements							
Airfield	-	2,000,000	-	-	-	-	12,178,600
Terminal Area	-	-	-	-	-	-	346,750
Landside	-	-	-	-	-	-	-
Air Cargo	-	-	-	-	-	-	-
General Aviation	-	-	-	-	-	-	1,000,000
Airfield/Airline Maintenance/Support	-	-	-	-	-	-	-
Total	-	2,000,000	-	-	-	-	13,525,350
AIP Discretionary							
Airfield	-	50,960,600	-	-	-	-	76,926,650
Terminal Area	-	-	-	-	-	-	-
Landside	-	-	-	-	-	-	-
Air Cargo	-	-	-	-	-	-	-
General Aviation	-	-	-	-	-	-	-
Airfield/Airline Maintenance/Support	-	-	-	-	-	-	-
Total	-	50,960,600	-	-	-	-	76,926,650
PFC Funds							
Airfield	-	562,201	-	-	-	-	1,909,689
Terminal Area	-	-	-	-	-	-	97,307
Landside	-	-	-	-	-	-	-
Air Cargo	-	-	-	-	-	-	-
General Aviation	-	-	-	-	-	-	-
Airfield/Airline Maintenance/Support	-	-	-	-	-	-	-
Total	-	562,201	-	-	-	-	2,006,996
State Entitlements							
Airfield	-	-	-	-	-	-	-
Terminal Area	-	-	-	-	-	-	-
Landside	-	-	-	-	-	-	-
Air Cargo	-	-	-	-	-	-	-
General Aviation	-	-	-	-	-	-	-
Airfield/Airline Maintenance/Support	-	-	-	-	-	-	-
Total	-	-	-	-	-	-	-
State Discretionary							
Airfield	-	-	-	-	-	-	-
Terminal Area	-	-	-	-	-	-	-
Landside	-	-	-	-	-	-	-
Air Cargo	-	-	-	-	-	-	-
General Aviation	-	-	-	-	-	-	-
Airfield/Airline Maintenance/Support	-	-	-	-	-	-	-
Total	-	-	-	-	-	-	-
Other							
Airfield	-	-	-	-	-	-	-
Terminal Area	-	-	-	-	-	-	-
Landside	-	-	-	-	-	-	-
Air Cargo	-	-	-	-	-	-	-
General Aviation	-	-	-	-	-	-	-
Airfield/Airline Maintenance/Support	-	-	-	-	-	-	-
Total	-	-	-	-	-	-	-
Airport							
Airfield	-	2,225,199	-	-	-	-	38,792,061
Terminal Area	-	-	-	-	-	-	6,793,943
Landside	-	-	-	-	-	-	2,711,000
Air Cargo	-	-	-	-	-	-	12,307,000
General Aviation	5,758,000	-	4,743,000	-	-	-	19,854,000
Airfield/Airline Maintenance/Support	-	3,903,000	-	-	-	-	10,134,000
Total	5,758,000	6,128,199	4,743,000	-	-	-	90,592,004

Sources: Table 9-4 and HNTB analysis.

Table D10
Summary of Cash Flow Analysis

MANHATTAN REGIONAL AIRPORT

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Capital Costs and Grants (Calendar Year)																				
Total Costs	-	9,006,000	9,873,000	6,294,000	3,420,000	4,779,000	2,647,000	2,840,000	5,236,000	14,216,000	31,824,000	3,172,000	10,058,000	9,534,000	5,758,000	59,651,000	4,743,000	-	-	-
AIP Entitlements	-	2,000,000	1,000,000	1,000,000	525,350	1,000,000	1,000,000	1,000,000	-	1,000,000	-	-	2,000,000	1,000,000	-	2,000,000	-	-	-	-
AIP Discretionary	-	5,555,700	6,391,350	1,822,450	-	1,305,650	569,050	-	-	-	-	-	6,609,850	3,712,000	-	50,960,600	-	-	-	-
PFCs (b)	-	-	-	-	-	-	29,950	218,447	-	397,941	-	-	453,150	345,307	-	562,201	-	-	-	-
State Entitlement	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
State Discretionary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Airport	-	1,450,300	2,481,650	3,471,550	2,894,650	2,473,350	1,048,000	1,621,553	5,236,000	12,818,059	31,824,000	3,172,000	995,000	4,476,693	5,758,000	6,128,199	4,743,000	-	-	-
Cash Flow (Fiscal Year)																				
Bond Issue	-	12,218,486	-	-	-	-	19,592,793	-	-	-	35,730,783	-	20,912,866	-	-	-	-	-	-	-
Revenues																				
Operating	296,100	364,600	383,800	403,900	460,700	493,400	519,100	545,800	573,600	780,400	813,300	842,600	873,000	904,300	966,500	1,012,100	1,049,900	1,088,800	1,128,500	1,170,200
Total Revenues	296,100	364,600	383,800	403,900	460,700	493,400	519,100	545,800	573,600	780,400	813,300	842,600	873,000	904,300	966,500	1,012,100	1,049,900	1,088,800	1,128,500	1,170,200
Costs																				
Operating	584,923	628,110	648,600	669,600	703,300	725,500	748,200	771,400	796,400	838,500	863,800	889,600	916,100	943,500	981,300	1,010,100	1,039,300	1,069,500	1,100,300	1,131,700
Non-Master Plan Capital Expense	15,000	30,500	31,200	31,900	32,700	33,400	34,200	35,000	35,800	36,600	37,400	38,300	39,200	40,100	41,000	41,900	42,900	43,900	44,900	45,900
Existing Debt Service	174,237	169,523	170,367	170,104	110,148	113,025	115,510	112,611	110,285	117,128	114,007	110,047	66,661	-	-	-	-	-	-	-
New Debt Service	-	903,132	903,132	903,132	903,132	903,132	2,351,339	2,351,339	2,351,339	2,351,339	4,992,388	4,992,388	6,538,168	6,538,168	6,538,168	6,538,168	6,538,168	6,538,168	6,538,168	6,538,168
Total Airport/City Costs	774,160	1,731,265	1,753,299	1,774,737	1,749,280	1,775,058	3,249,248	3,270,350	3,293,823	3,343,566	6,007,595	6,030,335	7,560,129	7,521,768	7,560,468	7,590,168	7,620,368	7,651,568	7,683,368	7,715,768
Net Surplus (Deficit)	(478,060)	(1,366,665)	(1,369,499)	(1,370,837)	(1,288,580)	(1,281,658)	(2,730,148)	(2,724,550)	(2,720,223)	(2,563,166)	(5,194,295)	(5,187,735)	(6,687,129)	(6,617,468)	(6,593,968)	(6,578,068)	(6,570,468)	(6,562,768)	(6,554,868)	(6,545,568)

(a) Airport capital costs presented on fiscal year basis.
(b) Actual expenditures may not coincide with calendar years. Projected expenditures from bond proceeds may differ depending on project phasing.

Sources: HNTB analysis.

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Runway 3-21 and Taxiway A Extension

ITEM	ITEM DESCRIPTION	UNIT		UNIT PRICE	TOTAL
P-100-1	Mobilization	1	Lump Sum	$ 283,200	$ 283,200
P-101-1	PCC Pavement Removal	480	Sq. Yd.	$ 28	$ 13,440
P-101-2	Pavement Marking Removal	113,300	Sq. Ft.	$ 2	$ 169,950
P-151-1	Clearing and Grubbing	1	Lump Sum	$ 20,000	$ 20,000
P-152-1	Excavation	174,600	Cu. Yd.	$ 4	$ 698,400
P-152-2	Embankment	62,540	Cu. Yd.	$ 6	$ 375,240
P-155-1	6" Lime Treated Subgrade	15,910	Sq. Yd.	$ 7	$ 111,370
P-155-2	Lime (4%)	240	Ton	$ 120	$ 28,800
P-156-1	Erosion Control	1	Lump Sum	$ 10,800	$ 10,800
P-209-1	6" Drainable Cement Treated Base Course	15,660	Sq. Yd.	$ 35	$ 548,100
P-501-1	6" PCC Pavement	1,370	Sq. Yd.	$ 50	$ 68,500
P-501-2	13" PCC Pavement	15,405	Sq. Yd.	$ 106	$ 1,636,780
P-620-1	Pavement Marking	139,705	Sq. Ft.	$ 1	$ 146,690
D-701-1	48" RCP, Class V	1,900	Lin. Ft.	$ 300	$ 570,000
D-701-2	48" RCP, Class V End Section	6	Each	$ 700	$ 4,200
D-705-1	Underdrain	3,345	Lin. Ft.	$ 17	$ 56,870
D-705-2	Cleanout Structures	12	Each	$ 400	$ 4,800
D-705-3	Underdrain Outlet Pipe	700	Lin. Ft.	$ 17	$ 11,900
D-705-4	Splash Block	6	Each	$ 400	$ 2,400
L-108-1	1-#8, 1/c, 5 KV, 7 Strand, Type C Cable, in Duct or Conduit	11,040	Lin. Ft.	$ 1	$ 11,040
L-108-2	#6, Bare Counterpoise Wire, Installed in Duct or Conduit	11,040	Lin. Ft.	$ 1	$ 8,280
L-110-1	2" Schedule 40 PVC Conduit, Direct Buried	11,040	Lin. Ft.	$ 4	$ 44,160
L-125-1	HIRL Base Mounted Clear/Yellow Lens, L-862	4	Each	$ 800	$ 3,200
L-125-2	MITL Base Mounted Blue Lens, L-861-T LED	34	Each	$ 1,000	$ 34,000
L-125-3	Relocate HIRL Base Mounted Red/Green Lens, L-862E	16	Each	$ 350	$ 5,600
L-125-4	Relocate MITL Base Mounted Blue Lens, L-861-T LED	11	Each	$ 350	$ 3,850
L-125-6	Relocate RDR Signs	6	Each	$ 1,000	$ 6,000
L-125-7	Update ALCMS Graphics	1	Lump Sum	$ 6,000	$ 6,000
L-125-9	Relocate Supplemental Lighted Wind Cone	2	Each	$ 2,200	$ 4,400
T-901-1	Seeding	38	Acres	$ 1,500	$ 57,000
T-908-1	Mulching	38	Acres	$ 1,500	$ 57,000
n/a	Acquire Easement for Runway 3 RPZ	1	Lump Sum	$ 16,760	$ 16,760
n/a	Glide Slope, ASOS, and MALSR Relocation*	1	Lump Sum	$ 1,323,000	$ 1,323,000
	Construction Cost Subtotal				$ 6,341,730

**Sponsor to enter into Reimbursable Agreement with FAA for this work.*

Construction Services	$ 400,000
Construction Services (FAA)*	$ 200,000
Administration	$ 15,000
2008 Dollars	$ 6,956,730
2009 Dollars	$ 8,813,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Update Pavement Management System

ITEM	ITEM DESCRIPTION	UNIT	UNIT PRICE	TOTAL
1	Pavement Management System Update	1 Lump Sum	$ 75,000	$ 72,000

2008 Dollars	$	72,000
2009 Dollars	$	92,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Runway 13-31 Reconstruction and Extension

ITEM	ITEM DESCRIPTION	UNIT	UNIT PRICE	TOTAL
1	Mobilization	1 Lump Sum	$ 325,200	$ 325,200
2	Mill 0-4" Asphalt	44,800 Sq. Yd.	$ 2	$ 98,560
3	PCC Pavement Removal, 7" Thickness	44,800 Sq. Yd.	$ 6	$ 250,880
4	Barbed Wire Fence Removal	1,500 Lin. Ft.	$ 2	$ 3,000
5	Clearing and Grubbing	1 Lump Sum	$ 25,000	$ 25,000
6	Earthwork	57,400 Sq. Yd.	$ 7	$ 401,800
7	6" Lime Treated Subgrade	47,400 Sq. Yd.	$ 5	$ 218,040
8	Lime	474 Ton	$ 120	$ 56,880
9	Silt Fence	10,000 Sq. Yd.	$ 5	$ 50,000
10	6" Crushed Aggregate Base Course	46,600 Sq. Yd.	$ 12	$ 559,200
11	8" PCC Pavement	43,500 Sq. Yd.	$ 65	$ 2,834,030
12	13" PCC Pavement	1,700 Sq. Yd.	$ 106	$ 180,630
13	Pavement Marking	50,000 Sq. Ft.	$ 2	$ 75,000
14	48" RCP, Class V	300 Lin. Ft.	$ 300	$ 90,000
15	48" RCP, Class V End Section	4 Each	$ 750	$ 3,000
16	Underdrains	10,360 Lin. Ft.	$ 17	$ 176,120
17	Cleanout Structures	21 Each	$ 400	$ 8,290
18	Underdrain Outlet Pipe	1,036 Lin. Ft.	$ 17	$ 17,610
19	Splash Blocks	21 Each	$ 400	$ 8,290
20	1-#8, 1/c, 5 KV, 7 Strand, Type C Cable, in Duct or Conduit	13,050 Lin. Ft.	$ 1	$ 13,050
21	#6, Bare Counterpoise Wire, Installed in Trench w/ Ground	11,010 Lin. Ft.	$ 1	$ 8,260
22	30KW Constant Current Regulator	1 Each	$ 15,000	$ 15,000
23	2" Schedule 40 PVC Conduit, Direct Buried	11,010 Lin. Ft.	$ 4	$ 44,040
24	2" Schedule 80 HDPE, Directional Bore	1,550 Lin. Ft.	$ 50	$ 77,500
25	Electrical Handhole	10 Each	$ 805	$ 8,050
26	Remove R/W Edge and THR Lights	54 Each	$ 56	$ 3,020
27	MIRL Base Mounted, L-862 and THR Lights	74 Each	$ 800	$ 59,200
28	Update ALCMS Graphics	1 Lump Sum	$ 6,000	$ 6,000
29	Segmented Circle and 12' Lighted Wind Cone	1 Lump Sum	$ 21,000	$ 21,000
30	Chain-Link Fence, Class 2, 8-Foot with 2-Foot Skirt	1,500 Lin. Ft.	$ 30	$ 45,000
31	12-Foot Wide ARFF Crash Gate, 8-Foot	1 Each	$ 1,600	$ 1,600
32	Fence Sign	15 Each	$ 100	$ 1,500
33	Seeding	20 Acres	$ 1,500	$ 30,000
34	Mulching	20 Acres	$ 1,500	$ 30,000
	Construction Cost Subtotal			$ 5,744,750

Aircraft Turnaround at Runway 13 End

ITEM	ITEM DESCRIPTION	UNIT	UNIT PRICE	TOTAL
1	Mobilization	1 Lump Sum	$ 27,500	$ 27,500
2	Clearing and Grubbing	1 Lump Sum	$ 6,000	$ 6,000
3	Earthwork	300 Cu. Yd.	$ 7	$ 2,100
4	6" Lime Treated Subgrade	5,500 Sq. Yd.	$ 5	$ 25,300
5	Lime	92 Ton	$ 120	$ 11,000
6	Erosion Control	1 Lump Sum	$ 3,000	$ 3,000
7	6" Crushed Aggregate Base Course	5,100 Sq. Yd.	$ 12	$ 61,200
8	8" PCC Pavement	4,800 Sq. Yd.	$ 65	$ 312,720
9	Pavement Marking	1,005 Sq. Ft.	$ 2	$ 1,510
10	Underdrains	425 Lin. Ft.	$ 17	$ 7,230
11	Cleanout Structures	4 Each	$ 400	$ 1,600
12	Underdrain Outlet Pipe	150 Lin. Ft.	$ 17	$ 2,550
13	Splash Blocks	2 Each	$ 400	$ 800
14	1-#8, 1/c, 5 KV, 7 Strand, Type C Cable, in Duct or Conduit	500 Lin. Ft.	$ 1	$ 500
15	#6, Bare Counterpoise Wire, Installed in Trench w/ Ground	500 Lin. Ft.	$ 1	$ 380
16	2" Schedule 40 PVC Conduit, Direct Buried	450 Lin. Ft.	$ 4	$ 1,800
17	MITL Base Mounted Blue Lens, L-861T, LED	12 Each	$ 1,000	$ 12,000
18	Seeding	3 Acres	$ 1,500	$ 4,500
19	Mulching	3 Acres	$ 1,500	$ 4,500
	Construction Cost Subtotal			$ 486,190

Total Construction Cost	$ 6,230,940
Bidding, Constr. Services	$ 436,200
Administration	$ 12,000
2008 Dollars	$ 6,679,140
2010 Dollars	$ 8,461,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Roadway and Utility Development for Restaurant/Retail

ITEM	ITEM DESCRIPTION	UNIT	UNIT PRICE	TOTAL
1	Mobilization	1 Lump Sum	$ 48,700	$ 48,700
2	Clearing and Grubbing	1 Lump Sum	$ 5,000	$ 5,000
3	Excavation	496 Cu. Yd.	$ 2	$ 870
4	Embankment	500 Cu. Yd.	$ 11	$ 5,630
5	6" Lime Treated Subgrade	1,267 Sq. Yd.	$ 5	$ 5,710
6	Lime (4%)	13 Ton	$ 124	$ 1,560
7	Erosion Control	1 Lump Sum	$ 3,000	$ 3,000
8	6" Crushed Aggregate Base Course	1,267 Sq. Yd.	$ 11	$ 13,310
9	6" PCC Pavement	1,487 Sq. Yd.	$ 50	$ 74,330
10	Curb and Gutter	1,230 Lin. Ft.	$ 28	$ 34,440
11	Pavement Marking	1,026 Sq. Ft.	$ 2	$ 1,540
12	24" RCP, Class V	500 Lin. Ft.	$ 100	$ 50,000
13	Overhead Lighting	1 Lump Sum	$ 50,000	$ 50,000
14	Seeding	0 Acres	$ 1,650	$ 510
15	Mulching	0 Acres	$ 1,500	$ 470
16	Lift Station	1 Each	$ 30,000	$ 30,000
17	8" PVC Sanitary Sewer	700 Lin. Ft.	$ 30	$ 21,000
18	6" PVC Water	700 Lin. Ft.	$ 15	$ 10,500
19	Underground Electrical	800 Lin. Ft.	$ 150	$ 120,000
20	1.5" Natural Gas Line (30 psi)	800 Lin. Ft.	$ 63	$ 50,000
21	Manhole	2 Each	$ 3,950	$ 7,900
22	24" Flared End Section	1 Each	$ 730	$ 730
	Contingency (20%)			$ 97,300
	Construction Cost Subtotal			$ 632,500

Engineering Design	$ 75,000
Bidding Services	$ 10,000
Construction Services	$ 63,300
Sponsor Administration	$ 5,000
2008 Dollars	$ 785,800
2011 Dollars	$ 996,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Construct Commercial Hangar and Apron

ITEM	ITEM DESCRIPTION	UNIT		UNIT PRICE	TOTAL
1	Mobilization	1	Lump Sum	$ 73,800	$ 73,800
2	Clearing and Grubbing	1	Lump Sum	$ 5,000	$ 5,000
3	Excavation	776	Cu. Yd.	$ 2	$ 1,360
4	Embankment	500	Cu. Yd.	$ 11	$ 5,630
5	6" Lime Treated Subgrade	1,515	Sq. Yd.	$ 5	$ 6,820
6	Lime (4%)	15	Ton	$ 124	$ 1,860
7	Erosion Control	1	Lump Sum	$ 3,000	$ 3,000
8	6" Drainable Cement Treated Base Course	1,515	Sq. Yd.	$ 31	$ 46,960
9	13" PCC Pavement	1,470	Sq. Yd.	$ 72	$ 105,880
10	Pavement Marking	123	Sq. Ft.	$ 2	$ 190
11	Underdrains	491	Lin. Ft.	$ 17	$ 8,470
12	1-#8, 1/c, 5 KV, 7 Strand, Type C Cable, in Duct or Conduit	400	Lin. Ft.	$ 2	$ 820
13	#6, Bare Counterpoise Wire, Installed in Duct or Conduit	400	Lin. Ft.	$ 1	$ 420
14	2" Schedule 40 PVC Conduit, Direct Buried	400	Lin. Ft.	$ 15	$ 6,000
15	MITL Base Mounted Blue Lens, L-861-T LED	7	Each	$ 2,550	$ 17,850
16	Seeding	0	Acres	$ 1,650	$ 510
17	Mulching	0	Acres	$ 1,500	$ 460
18	Commercial Hangar (10,350 SF)	1	Lump Sum	$ 501,975	$ 501,980
19	2" PVC Water	100	Lin. Ft.	$ 14	$ 1,400
20	4" PVC Sanitary Sewer	100	Lin. Ft.	$ 25	$ 2,500
21	1.5" Natural Gas Line (30 psi)	100	Lin. Ft.	$ 63	$ 6,250
22	Underground Electrical	100	Lin. Ft.	$ 150	$ 15,000
	Contingency (20%)				$ 147,700
	Construction Cost Subtotal				$ 959,860

Engineering Design	$ 150,000
Bidding Services	$ 10,000
Construction Services	$ 96,000
Sponsor Administration	$ 5,000
2008 Dollars	$ 1,220,860
2011 Dollars	$ 1,547,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Construct Wildlife Fence (Phase II) and Airport Perimeter Service Road

ITEM	ITEM DESCRIPTION	UNIT		UNIT PRICE	TOTAL
1	Mobilization and Maintenance of Traffic	1	Lump Sum	$ 139,800	$ 139,800
2	Clearing and Grubbing	1	Lump Sum	$ 10,000	$ 10,000
3	Barbed Wire Fence Removal	16,150	Lin. Ft.	$ 2	$ 32,300
4	Earthwork	16,000	Cu. Yd.	$ 5	$ 80,000
5	Erosion Control	1	Lump Sum	$ 32,500	$ 32,500
6	6" Crushed Aggregate Surface Course	85,000	Sq. Yd.	$ 6	$ 510,000
7	Drainage Pipes	300	Lin. Ft.	$ 100	$ 30,000
8	Chain-Link Fence, Class 2, 8.5-Foot with 2-Foot Skirt	17,000	Lin. Ft.	$ 30	$ 510,000
9	Chain-Link Fence, Class 2, 8.5-Foot with 2-Foot Skirt*	1,500	Lin. Ft.	$ 21	$ 31,500
10	24-Foot Wide Driveway Gate, 8-Foot	7	Each	$ 3,400	$ 23,800
11	Airport Fence Sign	161	Each	$ 72	$ 11,600
12	Seeding	40	Acres	$ 1,650	$ 66,000
13	Mulching	40	Acres	$ 1,500	$ 60,000
	Contingency (20%)				$ 279,500
	Construction Cost Subtotal				$ 1,817,000

** Owner Furnished*

Engineering Design	$ 181,700
Bidding Services	$ 10,000
Construction Services	$ 181,700
Sponsor Administration	$ 5,000
2008 Dollars	$ 2,195,400
2011 Dollars	$ 2,782,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Reconfigure and Expand Short-Term Parking Lot

ITEM	ITEM DESCRIPTION	UNIT	UNIT PRICE	TOTAL
1	Mobilization	1 Lump Sum	$ 77,300	$ 77,300
2	7" PCC Pavement Removal	1,745 Sq. Yd.	$ 7	$ 12,220
3	Clearing and Grubbing	1 Lump Sum	$ 15,000	$ 15,000
4	Excavation	2,760 Cu. Yd.	$ 2	$ 4,840
5	Embankment	500 Cu. Yd.	$ 11	$ 5,630
6	6" Lime Treated Subgrade	8,530 Sq. Yd.	$ 5	$ 38,390
7	Lime (4%)	84 Ton	$ 124	$ 10,480
8	Erosion Control	1 Lump Sum	$ 10,000	$ 10,000
9	6" Crushed Aggregate Base Course	8,530 Sq. Yd.	$ 11	$ 89,570
10	6" PCC Pavement	8,281 Sq. Yd.	$ 50	$ 414,060
11	Curb and Gutter	3,075 Lin. Ft.	$ 28	$ 86,100
12	Pavement Marking	2,300 Sq. Ft.	$ 2	$ 3,450
13	24" RCP, Class V	150 Lin. Ft.	$ 100	$ 15,000
14	Drainage Structures	1 Lump Sum	$ 25,000	$ 25,000
15	Overhead Lighting	1 Lump Sum	$ 50,000	$ 50,000
16	Landscaping	1 Lump Sum	$ 5,000	$ 5,000
	Contingency (20%)			$ 154,500
	Construction Cost Subtotal			$ 1,016,540

Engineering Design	$ 101,700
Bidding Services	$ 10,000
Construction Services	$ 101,700
Sponsor Administration	$ 5,000
2008 Dollars	$ 1,234,940
2012 Dollars	$ 1,565,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Rehabilitate Terminal Apron

ITEM	ITEM DESCRIPTION	UNIT	UNIT PRICE	TOTAL
1	Mobilization	1 Lump Sum	$ 5,700	$ 5,700
2	Maintenance of Traffic	1 Lump Sum	$ 1,100	$ 1,100
3	13" PCC Removal	189 Sq. Yd.	$ 27	$ 5,110
4	Joint Resealing	18,610 Linear Foot	$ 1	$ 23,270
5	Crack Routing and Sealing	931 Linear Foot	$ 2	$ 1,870
6	6" Lime Treated Subgrade	189 Sq. Yd.	$ 5	$ 860
7	Lime (4%)	2 Ton	$ 124	$ 240
8	Pavement Markings	6,400 Sq. Ft.	$ 1	$ 7,920
9	Install Aircraft Tie Downs	18 Each	$ 361	$ 6,490
10	5" Crushed Aggregate Base Course	189 Sq. Yd.	$ 11	$ 1,990
11	6" PCC Pavement	189 Sq. Yd.	$ 50	$ 9,460
	Contingency (20%)			$ 11,400
	Construction Cost Subtotal			$ 75,410

Engineering Design	$ 25,000
Bidding Services	$ 10,000
Construction Services	$ 20,000
Sponsor Administration	$ 5,000
2008 Dollars	$ 135,410
2012 Dollars	$ 172,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Replace 10-Unit T-Hangar (Building 34)

ITEM	ITEM DESCRIPTION	UNIT	UNIT PRICE	TOTAL
1	Mobilization	1 Lump Sum	$ 50,400	$ 50,400
2	10-Unit T-Hangar	1 Lump Sum	$ 420,000	$ 420,000
	Contingency (20%)			$ 84,000
	Construction Cost Subtotal			$ 554,400

Engineering Design	$ 55,400
Bidding Services	$ 10,000
Construction Services	$ 55,400
Sponsor Administration	$ 5,000
2008 Dollars	$ 680,200
2012 Dollars	$ 862,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Replace 7-Unit T-Hangar (Building 25b)

ITEM	ITEM DESCRIPTION	UNIT	UNIT PRICE	TOTAL
1	Mobilization	1 Lump Sum	$ 38,700	$ 38,700
2	Demolition	1 Lump Sum	$ 28,350	$ 28,350
3	7-Unit T-Hangar	1 Lump Sum	$ 294,000	$ 294,000
	Contingency (20%)			$ 64,500
	Construction Cost Subtotal			$ 425,550

Engineering Design	$ 42,600
Bidding Services	$ 10,000
Construction Services	$ 42,600
Sponsor Administration	$ 5,000
2008 Dollars	$ 525,750
2012 Dollars	$ 667,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Renovate Departure Lounge Room

ITEM	ITEM DESCRIPTION	UNIT	UNIT PRICE	TOTAL
1	Mobilization	1 Lump Sum	$ 15,700	$ 15,700
2	Architectural Improvements	1 Lump Sum	$ 156,600	$ 156,600
	Contingency (20%)			$ 31,300
	Construction Cost Subtotal			$ 203,600

Architectural Design	$ 24,400
Bidding Services	$ 10,000
Construction Services	$ 20,400
Sponsor Administration	$ 5,000
2008 Dollars	$ 263,400
2010 Dollars	$ 334,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Construct 60' x 60' Hangar (Replace Building 32)

ITEM	ITEM DESCRIPTION	UNIT	UNIT PRICE	TOTAL
1	Mobilization	1 Lump Sum	$ 24,400	$ 24,400
2	Demolition	1 Lump Sum	$ 28,350	$ 28,350
3	Hangar (3,600 SF)	1 Lump Sum	$ 174,600	$ 174,600
	Contingency (20%)			$ 40,600
	Construction Cost Subtotal			$ 267,950

Engineering Design	$ 26,800
Bidding Services	$ 10,000
Construction Services	$ 26,800
Sponsor Administration	$ 5,000
2008 Dollars	$ 336,550
2012 Dollars	$ 427,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Construct 7-Unit T-Hangar (Building 28)

ITEM	ITEM DESCRIPTION	UNIT	UNIT PRICE	TOTAL
1	Mobilization	1 Lump Sum	$ 38,700	$ 38,700
2	Demolition	1 Lump Sum	$ 28,350	$ 28,350
3	7-Unit T-Hangar	1 Lump Sum	$ 294,000	$ 294,000
	Contingency (20%)			$ 64,500
	Construction Cost Subtotal			$ 425,550

Engineering Design	$ 42,600
Bidding Services	$ 10,000
Construction Services	$ 42,600
Sponsor Administration	$ 5,000
2008 Dollars	$ 525,750
2012 Dollars	$ 667,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Reconstruct Taxiway E (Portion East of Taxiway A)

ITEM	ITEM DESCRIPTION	UNIT		UNIT PRICE	TOTAL
1	Mobilization	1	Lump Sum	$ 68,600	$ 68,600
2	7" PCC Pavement Removal	7,379	Sq. Yd.	$ 7	$ 51,660
3	Clearing and Grubbing	1	Lump Sum	$ 15,000	$ 15,000
4	Excavation	1,230	Cu. Yd.	$ 2	$ 2,160
5	Embankment	500	Cu. Yd.	$ 11	$ 5,630
6	6" Lime Treated Subgrade	7,601	Sq. Yd.	$ 5	$ 34,210
7	Lime (4%)	75	Ton	$ 124	$ 9,340
8	Erosion Control	1	Lump Sum	$ 10,000	$ 10,000
9	6" Crushed Aggregate Base Course	7,601	Sq. Yd.	$ 11	$ 79,810
10	6" PCC Pavement	7,379	Sq. Yd.	$ 50	$ 368,970
11	Pavement Marking	613	Sq. Ft.	$ 2	$ 920
12	24" RCP, Class V	200	Lin. Ft.	$ 100	$ 20,000
13	Drainage Structures	1	Lump Sum	$ 25,000	$ 25,000
14	Underdrains	2,976	Lin. Ft.	$ 17	$ 51,340
15	Cleanout Structures	8	Each	$ 905	$ 7,240
16	Seeding	2	Acres	$ 1,650	$ 2,520
17	Mulching	2	Acres	$ 1,500	$ 2,290
18	Fixture & Base Can Removal	75	Each	$ 100	$ 7,500
19	Update ALCMS Graphics	1	Lump Sum	$ 6,000	$ 6,000
20	1-#8, 1/c, 5 KV, 7 Strand, Type C Cable, in Duct or Conduit	9,122	Lin. Ft.	$ 2	$ 18,710
21	#6, Bare Counterpoise Wire, Installed in Duct or Conduit	4,561	Lin. Ft.	$ 1	$ 4,790
22	2" Schedule 40 PVC Conduit, Direct Buried	4,561	Lin. Ft.	$ 15	$ 68,420
23	MITL Base Mounted Blue Lens and Base Can, L-861-T LED	75	Each	$ 2,550	$ 191,250
	Contingency (20%)				$ 196,600
	Construction Cost Subtotal				$ 1,247,960

Engineering Design	$ 124,800
Bidding Services	$ 10,000
Construction Services	$ 124,800
Administration	$ 5,000
2008 Dollars	$ 1,512,560
2013 Dollars	$ 1,917,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Reconstruct T-Hangar Taxilanes - Phase 1

ITEM	ITEM DESCRIPTION	UNIT	UNIT PRICE	TOTAL
1	Mobilization	1 Lump Sum	$ 77,700	$ 77,700
2	7" PCC Pavement Removal	3,250 Sq. Yd.	$ 7	$ 22,750
3	Clearing and Grubbing	1 Lump Sum	$ 15,000	$ 15,000
4	Excavation	1,968 Cu. Yd.	$ 2	$ 3,450
5	Embankment	500 Cu. Yd.	$ 11	$ 5,630
6	6" Lime Treated Subgrade	7,529 Sq. Yd.	$ 5	$ 33,890
7	Lime (4%)	75 Ton	$ 124	$ 9,250
8	Erosion Control	1 Lump Sum	$ 10,000	$ 10,000
9	6" Crushed Aggregate Base Course	7,529 Sq. Yd.	$ 11	$ 79,060
10	6" PCC Pavement	7,310 Sq. Yd.	$ 50	$ 365,510
11	Pavement Marking	450 Sq. Ft.	$ 2	$ 680
12	24" RCP, Class V	900 Lin. Ft.	$ 100	$ 90,000
13	Drainage Structures	6 Each	$ 15,000	$ 90,000
14	Underdrains	2,550 Lin. Ft.	$ 17	$ 43,990
15	Cleanout Structures	7 Each	$ 905	$ 6,340
16	Seeding	1 Acres	$ 1,650	$ 830
17	Mulching	1 Acres	$ 1,500	$ 750
	Contingency (20%)			$ 155,400
	Construction Cost Subtotal			$ 1,010,230

Engineering Design	$ 101,000
Bidding Services	$ 10,000
Construction Services	$ 101,000
Administration	$ 5,000
2008 Dollars	$ 1,227,230
2013 Dollars	$ 1,555,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Rehabilitate GA Apron East

ITEM	ITEM DESCRIPTION	UNIT		UNIT PRICE	TOTAL
1	Mobilization	1	Lump Sum	$ 21,400	$ 21,400
2	Joint and Crack Sealing	16,530	Linear Foot	$ 2	$ 24,800
3	Crack Repair	331	Sq. Yd.	$ 28	$ 9,260
4	Cold Milling (0"-3")	11,859	Sq. Yd.	$ 2	$ 26,690
5	Tiedown Removal	33	Each	$ 185	$ 6,110
6	Bituminous Surface Course	2,068	Ton	$ 63	$ 130,280
7	Tiedown Anchors	33	Each	$ 361	$ 11,900
8	Bituminous Tack Coat	1,779	Gal.	$ 2	$ 3,380
9	Pavement Marking	750	Sq. Ft.	$ 2	$ 1,130
	Contingency (20%)				$ 42,700
	Construction Cost Subtotal				$ 277,650

Engineering Design	$ 70,000
Bidding Services	$ 10,000
Construction Services	$ 70,000
Administration	$ 5,000
2008 Dollars	$ 432,650
2013 Dollars	$ 549,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Reseal Runway 3-21 Pavement Joints

ITEM	ITEM DESCRIPTION	UNIT	UNIT PRICE	TOTAL
1	Mobilization	1 Lump Sum	$ 10,700	$ 10,700
2	Maintenance of Traffic	1 Lump Sum	$ 2,100	$ 2,100
3	Joint Resealing	79,000 Linear Foot	$ 1	$ 98,750
4	Crack Routing and Sealing	3,950 Linear Foot	$ 2	$ 7,900
	Contingency (20%)			$ 21,300
	Construction Cost Subtotal			$ 140,750

Engineering Design	$ 25,000
Bidding Services	$ 10,000
Construction Services	$ 20,000
Sponsor Administration	$ 5,000
2008 Dollars	$ 200,750
2013 Dollars	$ 255,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Environmental Assessment (EA) for 1000 ft. Runway 3-21 Extension

ITEM	ITEM DESCRIPTION	UNIT	UNIT PRICE	TOTAL
1	Conduct Environmental Assessment	1 Lump Sum	$ 413,300	$ 413,300

2008 Dollars	$	413,300
2014 Dollars	$	524,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Reconstruct and Expand GA Apron West

ITEM	ITEM DESCRIPTION	UNIT		UNIT PRICE	TOTAL
1	Mobilization	1	Lump Sum	$ 89,600	$ 89,600
2	7" PCC Pavement Removal	5,722	Sq. Yd.	$ 7	$ 40,060
3	Clearing and Grubbing	1	Lump Sum	$ 15,000	$ 15,000
4	Excavation	2,157	Cu. Yd.	$ 2	$ 3,780
5	Embankment	500	Cu. Yd.	$ 11	$ 5,630
6	6" Lime Treated Subgrade	9,331	Sq. Yd.	$ 5	$ 42,000
7	Lime (4%)	92	Ton	$ 124	$ 11,460
8	Erosion Control	1	Lump Sum	$ 10,000	$ 10,000
9	6" Crushed Aggregate Base Course	9,331	Sq. Yd.	$ 11	$ 97,980
10	6" PCC Pavement	9,060	Sq. Yd.	$ 50	$ 452,980
11	Pavement Marking	1,523	Sq. Ft.	$ 2	$ 2,290
12	Install Aircraft Tie Downs	15	Each	$ 361	$ 5,410
13	24" RCP, Class V	1,210	Lin. Ft.	$ 100	$ 121,000
14	Drainage Structures	1	Lump Sum	$ 25,000	$ 25,000
15	Underdrains	1,487	Lin. Ft.	$ 17	$ 25,660
16	Cleanout Structures	4	Each	$ 905	$ 3,620
17	Seeding	1	Acres	$ 1,650	$ 830
18	Mulching	1	Acres	$ 1,500	$ 750
19	Fixture & Base Can Removal	25	Each	$ 100	$ 2,500
20	Update ALCMS Graphics	1	Lump Sum	$ 6,000	$ 6,000
21	1-#8, 1/c, 5 KV, 7 Strand, Type C Cable, in Duct or Conduit	2,420	Lin. Ft.	$ 2	$ 4,970
22	#6, Bare Counterpoise Wire, Installed in Duct or Conduit	1,210	Lin. Ft.	$ 1	$ 1,280
23	2" Schedule 40 PVC Conduit, Direct Buried	1,210	Lin. Ft.	$ 15	$ 18,150
	Contingency (20%)				$ 179,300
	Construction Cost Subtotal				$ 1,165,250

Engineering Design	$ 116,500
Bidding Services	$ 10,000
Construction Services	$ 116,500
Administration	$ 5,000
2008 Dollars	$ 1,413,250
2014 Dollars	$ 1,791,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Renovate Stone Hangar

ITEM	ITEM DESCRIPTION	UNIT	UNIT PRICE	TOTAL
1	Mobilization	1 Lump Sum	$ 135,000	$ 135,000
2	Demolition	1 Lump Sum	$ 25,500	$ 25,500
3	General Cleaning after Demolition	1 Lump Sum	$ 2,200	$ 2,200
4	Masonry (Tuckpointing)	1 Lump Sum	$ 63,000	$ 63,000
5	Finish Carpentry	1 Lump Sum	$ 11,500	$ 11,500
6	Rough Carpentry	1 Lump Sum	$ 2,200	$ 2,200
7	Caulking	1 Lump Sum	$ 1,100	$ 1,100
8	Roofing	1 Lump Sum	$ 79,200	$ 79,200
9	Exterior Finish System - Skim Coat	1 Lump Sum	$ 9,800	$ 9,800
10	Doors and Windows	1 Lump Sum	$ 102,500	$ 102,500
11	Finishes	1 Lump Sum	$ 76,900	$ 76,900
12	Specialties	1 Lump Sum	$ 3,000	$ 3,000
13	Plumbing	1 Lump Sum	$ 6,000	$ 6,000
14	HVAC	1 Lump Sum	$ 101,000	$ 101,000
15	Electrical	1 Lump Sum	$ 52,100	$ 52,100
16	Fire Protection (Bid Alternate)*	1 Lump Sum	$ 45,900	$ 45,900
	Contingency (20%)			$ 116,400
	Construction Cost Subtotal			$ 833,300

*Assuming proper water pressure with existing service
*Estimate exlcudes Asbestos and Lead Abatement

Engineering Design	$ 100,000
Bidding Services	$ 10,000
Construction Services	$ 83,300
Administration	$ 5,000
2008 Dollars	$ 1,031,600
2015 Dollars	$ 1,307,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Reconstruct T-Hangar Taxilanes - Phase 2

ITEM	ITEM DESCRIPTION	UNIT		UNIT PRICE	TOTAL
1	Mobilization	1	Lump Sum	$ 55,700	$ 55,700
2	7" PCC Pavement Removal	2,412	Sq. Yd.	$ 7	$ 16,890
3	Clearing and Grubbing	1	Lump Sum	$ 15,000	$ 15,000
4	Excavation	1,571	Cu. Yd.	$ 2	$ 2,750
5	Embankment	500	Cu. Yd.	$ 11	$ 5,630
6	6" Lime Treated Subgrade	5,920	Sq. Yd.	$ 5	$ 26,640
7	Lime (4%)	59	Ton	$ 124	$ 7,270
8	Erosion Control	1	Lump Sum	$ 10,000	$ 10,000
9	6" Crushed Aggregate Base Course	5,920	Sq. Yd.	$ 11	$ 62,160
10	6" PCC Pavement	5,747	Sq. Yd.	$ 50	$ 287,370
11	Pavement Marking	300	Sq. Ft.	$ 2	$ 450
12	24" RCP, Class V	600	Lin. Ft.	$ 100	$ 60,000
13	Drainage Structures	1	Lump Sum	$ 25,000	$ 25,000
14	Underdrains	1,857	Lin. Ft.	$ 17	$ 32,040
15	Cleanout Structures	5	Each	$ 905	$ 4,530
16	Seeding	1	Acres	$ 1,650	$ 830
17	Mulching	1	Acres	$ 1,500	$ 750
	Contingency (20%)				$ 111,500
	Construction Cost Subtotal				$ 724,510

Engineering Design	$ 72,500
Bidding Services	$ 10,000
Construction Services	$ 72,500
Administration	$ 5,000
2008 Dollars	$ 884,510
2015 Dollars	$ 1,121,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Construct FBO Complex

ITEM	ITEM DESCRIPTION	UNIT	UNIT PRICE	TOTAL
1	Mobilization	1 Lump Sum	$ 220,500	$ 220,500
2	Clearing and Grubbing	1 Lump Sum	$ 15,000	$ 15,000
3	Excavation	5,150 Cu. Yd.	$ 2	$ 9,020
4	Embankment	500 Cu. Yd.	$ 11	$ 5,630
5	6" Lime Treated Subgrade	13,316 Sq. Yd.	$ 5	$ 59,930
6	Lime (4%)	132 Ton	$ 124	$ 16,350
7	Erosion Control	1 Lump Sum	$ 10,000	$ 10,000
8	6" Crushed Aggregate Base Course	13,316 Sq. Yd.	$ 11	$ 139,830
9	6" PCC Pavement	2,843 Sq. Yd.	$ 50	$ 142,180
10	9" PCC Pavement	10,085 Sq. Yd.	$ 60	$ 605,110
11	Curb and Gutter	854 Lin. Ft.	$ 28	$ 23,920
12	Pavement Marking	2,472 Sq. Ft.	$ 2	$ 3,710
13	Install Aircraft Tie Downs	18 Each	$ 361	$ 6,490
14	Underdrains	1,546 Lin. Ft.	$ 17	$ 26,670
15	Cleanout Structures	4 Each	$ 905	$ 3,620
16	24" RCP, Class V	885 Lin. Ft.	$ 100	$ 88,500
17	Drainage Structures	1 Lump Sum	$ 25,000	$ 25,000
18	Overhead Lighting	1 Lump Sum	$ 50,000	$ 50,000
19	Landscaping	1 Lump Sum	$ 5,000	$ 5,000
20	Seeding	1 Acres	$ 1,650	$ 830
21	Mulching	1 Acres	$ 1,500	$ 750
22	Lift Station	1 Each	$ 30,000	$ 30,000
23	8" PVC Sanitary Sewer	885 Lin. Ft.	$ 30	$ 26,550
24	6" PVC Water	885 Lin. Ft.	$ 15	$ 13,280
25	Underground Electrical	885 Lin. Ft.	$ 150	$ 132,750
26	1.5" Natural Gas Line (30 psi)	885 Lin. Ft.	$ 63	$ 55,320
27	Update ALCMS Graphics	1 Lump Sum	$ 6,000	$ 6,000
28	Hangar (2,500 SF)	1 Lump Sum	$ 121,250	$ 121,250
29	Hangar (6,000 SF)	1 Lump Sum	$ 291,000	$ 291,000
30	Hangar (6,000 SF)	1 Lump Sum	$ 291,000	$ 291,000
	Contingency (20%)			$ 440,900
	Construction Cost Subtotal			$ 2,866,090

Engineering Design	$ 286,600
Bidding Services	$ 10,000
Construction Services	$ 286,600
Sponsor Administration	$ 5,000
2008 Dollars	$ 3,454,290
2016 Dollars	$ 4,376,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Construct Cargo Apron

ITEM	ITEM DESCRIPTION	UNIT		UNIT PRICE	TOTAL
1	Mobilization	1	Lump Sum	$ 570,800	$ 570,800
2	Demolition	1	Lump Sum	$ 20,000	$ 20,000
3	Clearing and Grubbing	1	Lump Sum	$ 10,000	$ 10,000
4	Earthwork	31,700	CY	$ 7	$ 206,050
5	6" Lime Treated Subgrade	48,200	Sq. Yd.	$ 5	$ 216,900
6	Lime (4%)	477	Ton	$ 124	$ 59,180
7	Erosion Control	1	LS	$ 8,000	$ 8,000
8	6" Drainable Cement Treated Base Course	47,900	Sq. Yd.	$ 31	$ 1,484,900
9	13" PCC Pavement	47,500	Sq. Yd.	$ 72	$ 3,420,000
10	Pavement Marking	25,000	Sq. Ft.	$ 2	$ 37,500
11	24" RCP, Class V	600	Lin. Ft.	$ 100	$ 60,000
12	48" RCP, Class V End Section	2	Each	$ 730	$ 1,460
13	Drainage Structures	1	Lump Sum	$ 20,000	$ 20,000
14	Underdrains	2,850	Lin. Ft.	$ 17	$ 49,170
15	Connections to Manholes	4	Each	$ 500	$ 2,000
16	Airfield Lighting	1	Lump Sum	$ 75,000	$ 75,000
17	Update ALCMS Graphics	1	Lump Sum	$ 6,000	$ 6,000
18	Seeding	10	Acres	$ 1,650	$ 16,500
19	Mulching	10	Acres	$ 1,500	$ 15,000
	Contingency (20%)				$ 1,141,500
	Construction Cost Subtotal				$ 7,419,960

Engineering Design	$ 250,000
Bidding Services	$ 10,000
Construction Services	$ 250,000
Administration	$ 5,000
2008 Dollars	$ 7,934,960
2017 Dollars	$ 10,052,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Reconstruct T-Hangar Taxilanes - Phase 3

ITEM	ITEM DESCRIPTION	UNIT		UNIT PRICE	TOTAL
1	Mobilization	1	Lump Sum	$ 75,600	$ 75,600
2	7" PCC Pavement Removal	3,089	Sq. Yd.	$ 7	$ 21,630
3	Clearing and Grubbing	1	Lump Sum	$ 15,000	$ 15,000
4	Excavation	1,963	Cu. Yd.	$ 2	$ 3,440
5	Embankment	500	Cu. Yd.	$ 11	$ 5,630
6	6" Lime Treated Subgrade	7,433	Sq. Yd.	$ 5	$ 33,450
7	Lime (4%)	74	Ton	$ 124	$ 9,130
8	Erosion Control	1	Lump Sum	$ 10,000	$ 10,000
9	6" Crushed Aggregate Base Course	7,433	Sq. Yd.	$ 11	$ 78,050
10	6" PCC Pavement	7,217	Sq. Yd.	$ 50	$ 360,830
11	Pavement Marking	540	Sq. Ft.	$ 2	$ 810
12	24" RCP, Class V	1,080	Lin. Ft.	$ 100	$ 108,000
13	Drainage Structures	4	Each	$ 15,000	$ 60,000
14	Underdrains	2,438	Lin. Ft.	$ 17	$ 42,060
15	Cleanout Structures	7	Each	$ 905	$ 6,340
16	Seeding	1	Acres	$ 1,650	$ 830
17	Mulching	1	Acres	$ 1,500	$ 750
	Contingency (20%)				$ 151,200
	Construction Cost Subtotal				$ 982,750

Engineering Design	$ 98,300
Bidding Services	$ 10,000
Construction Services	$ 98,300
Administration	$ 5,000
2008 Dollars	$ 1,194,350
2017 Dollars	$ 1,559,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Extend Runway 3-21 by 1,000 Feet and Construct Overruns

ITEM	ITEM DESCRIPTION	UNIT		UNIT PRICE	TOTAL
1	Mobilization	1	Lump Sum	$ 1,199,800	$ 1,199,800
2	Demolition	1	Lump Sum	$ 20,000	$ 20,000
3	Pavement Marking Removal	32,134	Sq. Ft.	$ 2	$ 56,240
4	Clearing and Grubbing	1	Lump Sum	$ 20,000	$ 20,000
5	Excavation	41,854	Cu. Yd.	$ 2	$ 73,250
6	Embankment	5,000	Cu. Yd.	$ 11	$ 56,250
7	6" Lime Treated Subgrade	81,681	Sq. Yd.	$ 5	$ 367,570
8	Lime (4%)	809	Ton	$ 124	$ 100,280
9	Erosion Control	1	Lump Sum	$ 10,000	$ 10,000
10	6" Drainable Cement Treated Base Course	81,681	Sq. Yd.	$ 31	$ 2,532,100
11	13" PCC Pavement	79,302	Sq. Yd.	$ 72	$ 5,709,720
12	Pavement Marking	62,144	Sq. Ft.	$ 2	$ 93,220
13	24" RCP, Class V	150	Lin. Ft.	$ 100	$ 15,000
14	48" RCP, Class V	150	Lin. Ft.	$ 200	$ 30,000
15	Drainage Structures	1	Lump Sum	$ 20,000	$ 20,000
16	Underdrains	14,070	Lin. Ft.	$ 17	$ 242,710
17	Cleanout Structures	36	Each	$ 905	$ 32,580
18	1-#8, 1/c, 5 KV, 7 Strand, Type C Cable, in Duct or Conduit	28,140	Lin. Ft.	$ 2	$ 57,690
19	#6, Bare Counterpoise Wire, Installed in Duct or Conduit	14,070	Lin. Ft.	$ 1	$ 14,780
20	2" Schedule 40 PVC Conduit, Direct Buried	14,070	Lin. Ft.	$ 15	$ 211,050
21	HIRL Base Mounted Clear/Yellow Lens, L-862	32	Each	$ 2,000	$ 64,000
22	MITL Base Mounted Blue Lens, L-861-T LED	80	Each	$ 2,550	$ 204,000
23	Relocate HIRL Base Mounted Red/Green Lens, L-862E	8	Each	$ 350	$ 2,800
24	Relocate MALSR	1	Lump Sum	$ 345,000	$ 345,000
25	Guidance Signs	15	Each	$ 8,000	$ 120,000
26	Update ALCMS Graphics	1	Lump Sum	$ 6,000	$ 6,000
27	Relocate VASI	1	Each	$ 8,000	$ 8,000
28	Relocate Supplemental Lighted Wind Cone	1	Each	$ 2,200	$ 2,200
29	Glide Slope, ASOS, and MALSR Relocation*	1	Each	$ 1,323,000	$ 1,323,000
30	Relocate Localizer Antenna	1	Each	$ 250,000	$ 250,000
31	Seeding	3	Acres	$ 1,650	$ 5,330
32	Mulching	3	Acres	$ 1,500	$ 4,850
	Contingency (20%)				$ 2,399,500
	Construction Cost Subtotal				$ 15,596,920

**Sponsor to enter into Reimbursable Agreement with FAA for this work.*

Engineering Design	$ 779,800
Bidding Services	$ 10,000
Construction Services	$ 779,800
FAA Design, Bidding, Construction Services*	$ 372,000
Administration	$ 5,000
2008 Dollars	$ 17,543,520
2018 Dollars	$ 23,578,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Install Passenger Boarding Bridge and Construct Terminal Addition

ITEM	ITEM DESCRIPTION	UNIT	UNIT PRICE	TOTAL
1	Mobilization	1 Lump Sum	$ 85,200	$ 85,200
2	Passenger Boarding Bridge	1 Lump Sum	$ 485,000	$ 485,000
3	PBB-suspended 480v to 400hz Converter Unit	1 Lump Sum	$ 36,000	$ 36,000
4	Power cable from Converter Unit to Aircraft	20 Lin. Ft.	$ 45	$ 900
5	Disconnect Switches	5 Each	$ 400	$ 2,000
6	Breakers (inside Distribution Center)	4 Each	$ 300	$ 1,200
7	2" RGC (Conduit)	900 Lin. Ft.	$ 23	$ 20,700
8	Cable	1,200 Lin. Ft.	$ 14	$ 16,800
9	Pre-conditioned Air Unit	1 Each	$ 30,000	$ 30,000
10	Passenger Boarding Bridge Foundation	1 Lump Sum	$ 20,000	$ 20,000
11	New service construction	1 Lump Sum	$ 12,000	$ 12,000
12	Service entrance gear	1 Lump Sum	$ 6,500	$ 6,500
13	Service entrance conductors	1 Lump Sum	$ 1,200	$ 1,200
14	Westar charges	1 Lump Sum	$ 25,000	$ 25,000
15	Distribution equipment and circuitry	1 Lump Sum	$ 13,460	$ 13,460
16	Exterior Ramp Addition	1 Lump Sum	$ 180,800	$ 180,800
	Contingency (20%)			$ 170,300
	Construction Cost Subtotal			$ 1,107,060

Architectural Design	$ 132,800
Bidding Services	$ 10,000
Construction Services	$ 110,700
Sponsor Administration	$ 5,000
2008 Dollars	$ 1,365,560
2018 Dollars	$ 1,836,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Construct 100' x 100' Hangar and Apron

ITEM	ITEM DESCRIPTION	UNIT		UNIT PRICE	TOTAL
1	Mobilization	1	Lump Sum	$ 113,700	$ 113,700
2	Clearing and Grubbing	1	Lump Sum	$ 15,000	$ 15,000
3	Excavation	3,084	Cu. Yd.	$ 2	$ 5,400
4	Embankment	500	Cu. Yd.	$ 11	$ 5,630
5	6" Lime Treated Subgrade	7,623	Sq. Yd.	$ 5	$ 34,310
6	Lime (4%)	75	Ton	$ 124	$ 9,360
7	Erosion Control	1	Lump Sum	$ 10,000	$ 10,000
8	6" Crushed Aggregate Base Course	7,623	Sq. Yd.	$ 11	$ 80,050
9	9" PCC Pavement	7,401	Sq. Yd.	$ 60	$ 444,070
10	Pavement Marking	1,257	Sq. Ft.	$ 2	$ 1,890
11	Install Aircraft Tie Downs	4	Each	$ 361	$ 1,450
12	Underdrains	1,173	Lin. Ft.	$ 17	$ 20,240
13	Cleanout Structures	3	Each	$ 905	$ 2,720
14	24" RCP, Class V	100	Lin. Ft.	$ 100	$ 10,000
15	Drainage Structures	1	Lump Sum	$ 10,000	$ 10,000
16	Seeding	1	Acres	$ 1,650	$ 830
17	Mulching	1	Acres	$ 1,500	$ 750
18	Hangar (10,000 SF)	1	Lump Sum	$ 485,000	$ 485,000
	Contingency (20%)				$ 227,300
	Construction Cost Subtotal				$ 1,477,700

Engineering Design	$ 147,800
Bidding Services	$ 10,000
Construction Services	$ 147,800
Sponsor Administration	$ 5,000
2008 Dollars	$ 1,788,300
2019 Dollars	$ 2,476,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Expand Fuel Farm

ITEM	ITEM DESCRIPTION	UNIT		UNIT PRICE	TOTAL
1	Mobilization	1	Lump Sum	$ 33,100	$ 33,100
2	7" PCC Pavement Removal	1,042	Sq. Yd.	$ 7	$ 7,300
3	Clearing and Grubbing	1	Lump Sum	$ 15,000	$ 15,000
4	Excavation	500	Cu. Yd.	$ 2	$ 880
5	Embankment	500	Cu. Yd.	$ 11	$ 5,630
6	6" Lime Treated Subgrade	1,073	Sq. Yd.	$ 5	$ 4,830
7	Lime (4%)	11	Ton	$ 124	$ 1,320
8	Erosion Control	1	Lump Sum	$ 10,000	$ 10,000
9	6" Crushed Aggregate Base Course	1,073	Sq. Yd.	$ 11	$ 11,270
10	6" PCC Pavement	1,042	Sq. Yd.	$ 50	$ 52,080
11	Pavement Marking	985	Sq. Ft.	$ 2	$ 1,480
12	24" RCP, Class V	100	Lin. Ft.	$ 100	$ 10,000
13	Drainage Structures	1	Lump Sum	$ 10,000	$ 10,000
14	Aerial Lighting	1	Lump Sum	$ 50,000	$ 50,000
15	Seeding	1	Acres	$ 1,650	$ 830
16	Mulching	1	Acres	$ 1,500	$ 750
17	3 Fuel Tanks (20,000 Gal)	3	Each	$ 50,000	$ 150,000
	Contingency (20%)				$ 66,300
	Construction Cost Subtotal				$ 430,770

Engineering Desig	$ 43,100
Bidding Services	$ 10,000
Construction Services	$ 43,100
Administration	$ 5,000
2008 Dollars	$ 531,970
2020 Dollars	$ 759,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Widen Parallel Taxiway A to 75'

ITEM	ITEM DESCRIPTION	UNIT		UNIT PRICE	TOTAL
1	Mobilization	1	Lump Sum	$ 326,300	$ 326,300
2	Electrical Removals	1	Lump Sum	$ 10,000	$ 10,000
3	Clearing and Grubbing	1	Lump Sum	$ 15,000	$ 15,000
4	Earthwork	12,963	Cu. Yd.	$ 7	$ 84,260
5	6" Lime Treated Subgrade	20,028	Sq. Yd.	$ 5	$ 90,130
6	Lime (4%)	198	Ton	$ 124	$ 24,590
7	Erosion Control	1	Lump Sum	$ 21,000	$ 21,000
8	6" Drainable Cement Treated Base Course	20,028	Sq. Yd.	$ 31	$ 620,870
9	13" PCC Pavement	19,444	Sq. Yd.	$ 72	$ 1,400,000
10	Pavement Marking	45,500	Sq. Ft.	$ 2	$ 68,250
11	48" RCP, Class V	500	Lin. Ft.	$ 230	$ 115,000
12	48" RCP, Class V End Section	4	Each	$ 700	$ 2,800
13	Underdrains	15,600	Lin. Ft.	$ 17	$ 269,100
14	Underdrain Outlet Pipe	7,000	Lin. Ft.	$ 9	$ 63,000
15	Cleanout Structures	39	Each	$ 905	$ 35,300
16	Splash Blocks	39	Each	$ 300	$ 11,700
17	Airfield Lighting	1	Lump Sum	$ 400,000	$ 400,000
18	Seeding	10	Acres	$ 1,650	$ 16,500
19	Mulching	10	Acres	$ 1,500	$ 15,000
	Contingency (20%)				$ 652,500
	Construction Cost Subtotal				$ 4,241,300

Engineering Design	$ 296,900
Bidding Services	$ 10,000
Construction Services	$ 296,900
Administration	$ 5,000
2008 Dollars	$ 4,850,100
2020 Dollars	$ 6,916,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Widen Taxiways B, C, and D to 75'

ITEM	ITEM DESCRIPTION	UNIT	UNIT PRICE	TOTAL
1	Mobilization	1 Lump Sum	$ 160,500	$ 160,500
2	Electrical Removals	1 Lump Sum	$ 4,000	$ 4,000
3	Clearing and Grubbing	1 Lump Sum	$ 2,000	$ 2,000
4	Earthwork	3,000 Cu. Yd.	$ 7	$ 19,500
5	6" Lime Treated Subgrade	11,673 Sq. Yd.	$ 5	$ 52,530
6	Lime (4%)	116 Ton	$ 124	$ 14,340
7	Erosion Control	1 Lump Sum	$ 12,000	$ 12,000
8	6" Drainable Cement Treated Base Course	11,673 Sq. Yd.	$ 31	$ 361,880
9	13" PCC Pavement	11,333 Sq. Yd.	$ 72	$ 816,000
10	Pavement Marking	6,750 Sq. Ft.	$ 2	$ 10,130
11	Underdrains	1,800 Lin. Ft.	$ 17	$ 31,050
12	Underdrain Outlet Pipe	5,600 Lin. Ft.	$ 9	$ 50,400
13	Cleanout Structures	5 Each	$ 905	$ 4,530
14	Splash Blocks	5 Each	$ 300	$ 1,500
15	Airfield Lighting	1 Lump Sum	$ 200,000	$ 200,000
16	Seeding	8 Acres	$ 1,650	$ 13,200
17	Mulching	8 Acres	$ 1,500	$ 12,000
	Contingency (20%)			$ 321,000
	Construction Cost Subtotal			$ 2,086,560

Engineering Design	$ 208,700
Bidding Services	$ 10,000
Construction Services	$ 208,700
Administration	$ 5,000
2008 Dollars	$ 2,518,960
2021 Dollars	$ 3,700,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Renovate and Expand Terminal Building

ITEM	ITEM DESCRIPTION	UNIT	UNIT PRICE	TOTAL
1	Mobilization	1 Lump Sum	$ 145,500	$ 145,500
2	Expand Public Waiting Room	1 Lump Sum	$ 304,140	$ 304,140
3	Renovate Airline Offices and Add TSA/EDS Space	1 Lump Sum	$ 344,340	$ 344,340
4	Replace Entry Lobby/Corridor Carpeting	1 Lump Sum	$ 31,420	$ 31,420
5	Replace Airport Administration Office, Expand Rental Car Office, and Remodel Restrooms	1 Lump Sum	$ 395,320	$ 395,320
6	Expand Baggage Claim	1 Lump Sum	$ 280,250	$ 280,250
7	Baggage Conveyor Unit	1 Lump Sum	$ 100,000	$ 100,000
	Contingency (20%)			$ 291,100
	Construction Cost Subtotal			$ 1,892,070

Architectural Design	$ 227,000
Bidding Services	$ 10,000
Construction Services	$ 189,200
Sponsor Administration	$ 5,000
2008 Dollars	$ 2,323,270
2021 Dollars	$ 3,412,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Construct 75' x 80' Hangar and Apron

ITEM	ITEM DESCRIPTION	UNIT	UNIT PRICE	TOTAL
1	Mobilization	1 Lump Sum	$ 66,500	$ 66,500
2	Clearing and Grubbing	1 Lump Sum	$ 15,000	$ 15,000
3	Excavation	1,626 Cu. Yd.	$ 2	$ 2,850
4	Embankment	500 Cu. Yd.	$ 11	$ 5,630
5	6" Lime Treated Subgrade	4,018 Sq. Yd.	$ 5	$ 18,090
6	Lime (4%)	40 Ton	$ 124	$ 4,940
7	Erosion Control	1 Lump Sum	$ 10,000	$ 10,000
8	6" Crushed Aggregate Base Course	4,018 Sq. Yd.	$ 11	$ 42,200
9	9" PCC Pavement	3,901 Sq. Yd.	$ 60	$ 234,090
10	Pavement Marking	912 Sq. Ft.	$ 2	$ 1,370
11	Install Aircraft Tie Downs	4 Each	$ 361	$ 1,450
12	Underdrains	828 Lin. Ft.	$ 17	$ 14,290
13	Cleanout Structures	3 Each	$ 905	$ 2,720
14	24" RCP, Class V	100 Lin. Ft.	$ 100	$ 10,000
15	Drainage Structures	1 Lump Sum	$ 10,000	$ 10,000
16	Seeding	1 Acres	$ 1,650	$ 830
17	Mulching	1 Acres	$ 1,500	$ 750
18	Hangar (6,000 SF)	1 Lump Sum	$ 291,000	$ 291,000
19	Contingency (20%)			$ 133,000
	Construction Cost Subtotal			$ 864,710

Engineering Design	$ 86,500
Bidding Services	$ 10,000
Construction Services	$ 86,500
Sponsor Administration	$ 5,000
2008 Dollars	$ 1,052,710
2022 Dollars	$ 1,593,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Replace FBO Building (GATTS) with 140' x 140' Hangar

ITEM	ITEM DESCRIPTION	UNIT	UNIT PRICE	TOTAL
1	Mobilization	1 Lump Sum	$ 108,200	$ 108,200
2	Demolition	1 Lump Sum	$ 28,350	$ 28,350
3	7" PCC Pavement Removal	780 Sq. Yd.	$ 7	$ 5,460
4	Clearing and Grubbing	1 Lump Sum	$ 15,000	$ 15,000
5	Excavation	500 Cu. Yd.	$ 2	$ 880
6	Embankment	500 Cu. Yd.	$ 11	$ 5,630
7	6" Lime Treated Subgrade	803 Sq. Yd.	$ 5	$ 3,620
8	Lime (4%)	8 Ton	$ 124	$ 990
9	Erosion Control	1 Lump Sum	$ 5,000	$ 5,000
10	6" Crushed Aggregate Base Course	803 Sq. Yd.	$ 11	$ 8,440
11	6" PCC Pavement	780 Sq. Yd.	$ 50	$ 39,000
12	Pavement Marking	360 Sq. Ft.	$ 2	$ 540
13	24" RCP, Class V	60 Lin. Ft.	$ 100	$ 6,000
14	Drainage Structures	1 Lump Sum	$ 5,000	$ 5,000
15	Underdrains	360 Lin. Ft.	$ 17	$ 6,210
16	Seeding	1 Acres	$ 1,650	$ 830
17	Mulching	1 Acres	$ 1,500	$ 750
18	Hangar (19,600 SF)	1 Lump Sum	$ 950,600	$ 950,600
	Contingency (20%)			$ 216,500
	Construction Cost Subtotal			$ 1,407,000

Engineering Design	$ 150,000
Bidding Services	$ 10,000
Construction Services	$ 150,000
Sponsor Administration	$ 5,000
2008 Dollars	$ 1,722,000
2022 Dollars	$ 2,605,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Construct Airport Vehicle Maintenance Building

ITEM	ITEM DESCRIPTION	UNIT	UNIT PRICE	TOTAL
1	Mobilization	1 Lump Sum	$ 113,500	$ 113,500
2	Demolish existing 5-bay Shop	1 Lump Sum	$ 25,000	$ 25,000
3	7-Bay Airport Vehicle Maintenance Building (130' x 50')	1 Lump Sum	$ 1,041,625	$ 1,041,700
4	Site Grading	1 Lump Sum	$ 10,000	$ 10,000
5	6" Reinforced Concrete Pavement	300 Sq. Yd.	$ 50	$ 15,000
6	Misc. Site Improvements	1 Lump Sum	$ 30,000	$ 30,000
7	Electrical Improvements	1 Lump Sum	$ 12,000	$ 12,000
8	4" PVC SDR 35 Sanitary sewer Service Line	50 Lin. Feet	$ 25	$ 1,300
	Contingency (20%)			$ 227,000
	Construction Cost Subtotal			$ 1,475,500

Engineering Design	$ 147,550
Bidding Services	$ 10,000
Construction Services	$ 147,550
Sponsor Administration	$ 5,000
2008 Dollars	$ 1,785,600
2023 Dollars	$ 2,782,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Reconstruct Runway 3-21; Construct Shoulders and Blast Pads

ITEM	ITEM DESCRIPTION	UNIT		UNIT PRICE	TOTAL
1	Mobilization	1	Lump Sum	$ 1,782,400	$ 1,782,400
2	13" PCC Pavement Removal	116,667	Sq. Yd.	$ 14	$ 1,633,340
3	Clearing and Grubbing	1	Lump Sum	$ 15,000	$ 15,000
4	Excavation	38,025	Cu. Yd.	$ 2	$ 66,550
5	Embankment	5,000	Cu. Yd.	$ 11	$ 56,250
6	6" Lime Treated Subgrade	169,378	Sq. Yd.	$ 5	$ 762,200
7	Lime (4%)	1,677	Ton	$ 124	$ 207,930
8	Erosion Control	1	Lump Sum	$ 20,000	$ 20,000
9	6" Crushed Aggregate Base Course	49,211	Sq. Yd.	$ 11	$ 516,720
10	6" Drainable Cement Treated Base Course	120,167	Sq. Yd.	$ 31	$ 3,725,170
11	Bituminous Surface Course	5,554	Ton	$ 63	$ 349,920
12	Bituminous Base Course	16,663	Ton	$ 60	$ 999,750
13	Bituminous Prime Coat	24,606	Gal.	$ 5	$ 123,030
14	Bituminous Tack Coat	14,333	Gal.	$ 2	$ 27,240
15	13" PCC Pavement	116,667	Sq. Yd.	$ 72	$ 8,400,000
16	Pavement Marking	110,000	Sq. Ft.	$ 2	$ 165,000
17	Underdrains	15,900	Lin. Ft.	$ 17	$ 274,280
18	Cleanout Structures	40	Each	$ 905	$ 36,200
19	Seeding	3	Acres	$ 1,650	$ 5,460
20	Mulching	3	Acres	$ 1,500	$ 4,960
21	Fixture & Base Can Removal	70	Each	$ 100	$ 7,000
22	1-#8, 1/c, 5 KV, 7 Strand, Type C Cable, in Duct or Conduit	28,600	Lin. Ft.	$ 2	$ 58,630
23	#6, Bare Counterpoise Wire, Installed in Duct or Conduit	14,300	Lin. Ft.	$ 1	$ 15,020
24	2" Schedule 40 PVC Conduit, Direct Buried	14,300	Lin. Ft.	$ 15	$ 214,500
25	HIRL Base Mounted Clear/Yellow Lens, L-862	70	Each	$ 2,000	$ 140,000
	Contingency (20%)				$ 3,564,800
	Construction Cost Subtotal				$ 23,171,350

Engineering Design	$ 1,158,600
Bidding Services	$ 10,000
Construction Services	$ 1,158,600
Administration	$ 5,000
2008 Dollars	$ 25,503,550
2023 Dollars	$ 39,734,000

ENGINEER'S OPINION OF PROBABLE COST

Manhattan Regional Airport
Manhattan, Kansas

Construct 75' x 80' Hangar, 80' x 180' Hangar, and Aprons

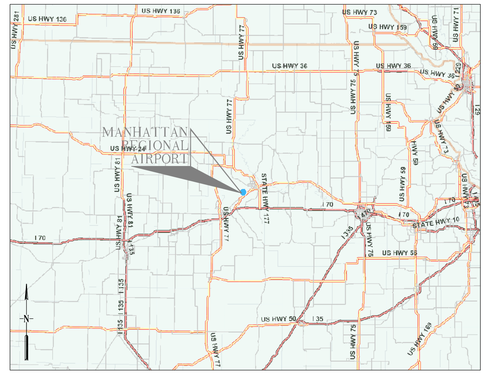
ITEM	ITEM DESCRIPTION	UNIT		UNIT PRICE	TOTAL
1	Mobilization	1	Lump Sum	$ 249,200	$ 249,200
2	Clearing and Grubbing	1	Lump Sum	$ 15,000	$ 15,000
3	Excavation	4,829	Cu. Yd.	$ 2	$ 8,460
4	Embankment	500	Cu. Yd.	$ 11	$ 5,630
5	6" Lime Treated Subgrade	12,289	Sq. Yd.	$ 5	$ 55,310
6	Lime (4%)	122	Ton	$ 124	$ 15,090
7	Erosion Control	1	Lump Sum	$ 10,000	$ 10,000
8	6" Crushed Aggregate Base Course	12,289	Sq. Yd.	$ 11	$ 129,040
9	6" PCC Pavement	1,709	Sq. Yd.	$ 50	$ 85,430
10	9" PCC Pavement	10,222	Sq. Yd.	$ 60	$ 613,350
11	Curb and Gutter	815	Lin. Ft.	$ 28	$ 22,820
12	Pavement Marking	2,381	Sq. Ft.	$ 2	$ 3,580
13	Install Aircraft Tie Downs	18	Each	$ 361	$ 6,490
14	Underdrains	1,555	Lin. Ft.	$ 17	$ 26,830
15	Cleanout Structures	4	Each	$ 905	$ 3,620
16	24" RCP, Class V	100	Lin. Ft.	$ 100	$ 10,000
17	Drainage Structures	1	Lump Sum	$ 20,000	$ 20,000
18	Overhead Lighting	1	Lump Sum	$ 50,000	$ 50,000
19	Landscaping	1	Lump Sum	$ 5,000	$ 5,000
20	Seeding	1	Acres	$ 1,650	$ 830
21	Mulching	1	Acres	$ 1,500	$ 750
22	Hangar (6,000 SF)	1	Lump Sum	$ 291,000	$ 291,000
23	Hangar (14,400 SF)	1	Lump Sum	$ 698,400	$ 698,400
	Contingency (20%)				$ 415,300
	Construction Cost Subtotal				$ 2,741,130

Engineering Design	$ 274,100
Bidding Services	$ 10,000
Construction Services	$ 274,100
Sponsor Administration	$ 5,000
2008 Dollars	$ 3,304,330
2024 Dollars	$ 5,303,000

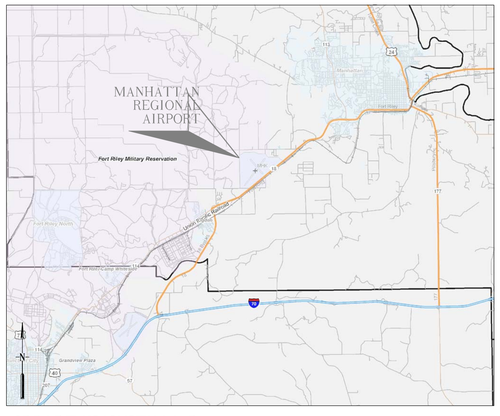
AIRPORT LAYOUT PLAN
MANHATTAN REGIONAL AIRPORT
MANHATTAN, KANSAS

AIPORT MASTER PLAN UPDATE
AIP PROJECT NO. 3-20-0052-30
FEBRUARY 5, 2009

SHEET INDEX



AIRPORT LOCATION MAP
NOT TO SCALE



AIRPORT VICINITY MAP
NOT TO SCALE

HNTB

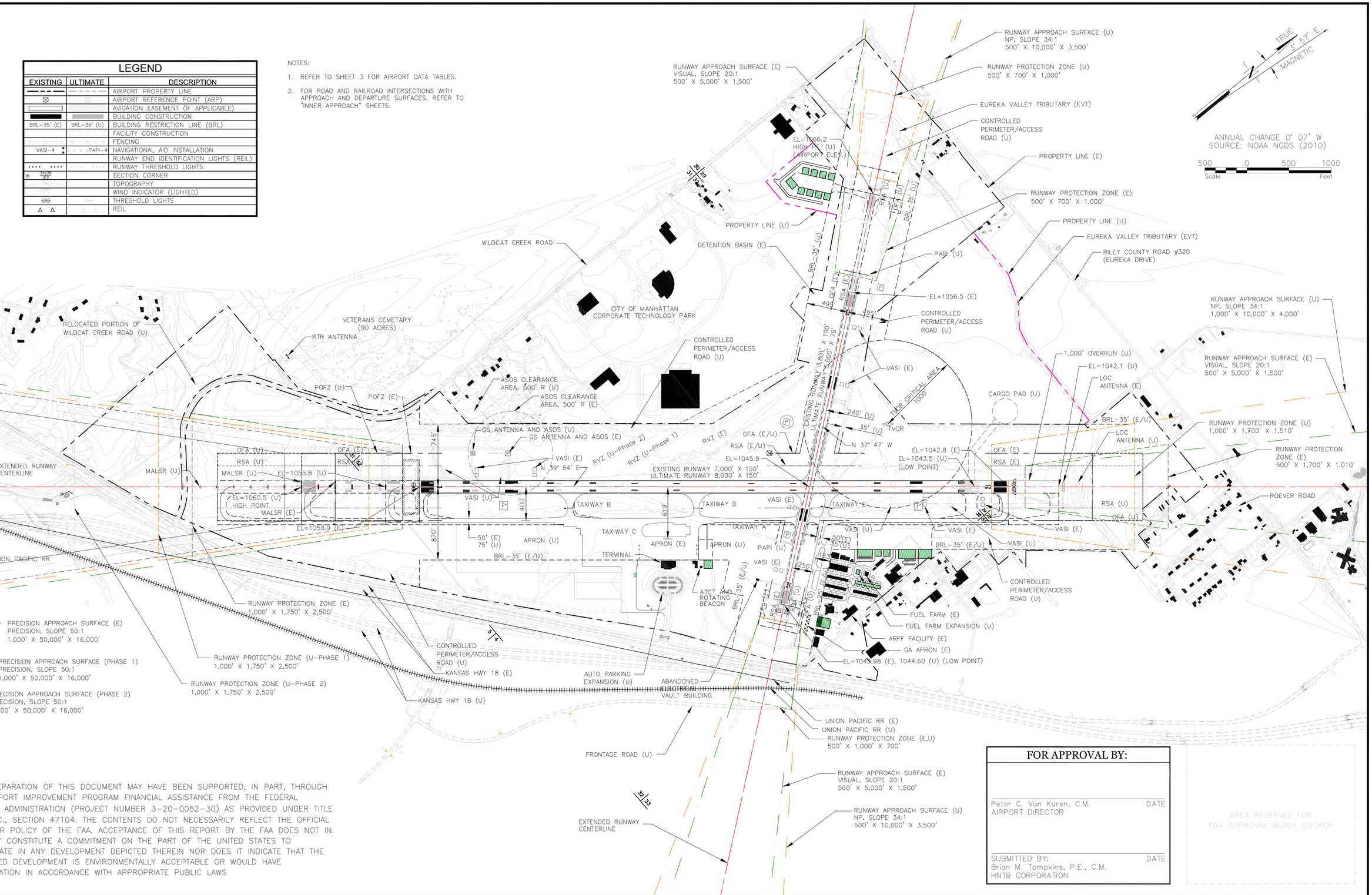
HNTB PROJECT NO.
44703-PL-001

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
⊗	⊗	AIRPORT REFERENCE POINT (ARP)
		AVIGATION EASEMENT (IF APPLICABLE)
		BUILDING CONSTRUCTION
BRL–35' (E)	BRL–35' (U)	BUILDING RESTRICTION LINE (BRL)
		FACILITY CONSTRUCTION
		FENCING
VASI–4	PAPI–4	NAVIGATIONAL AID INSTALLATION
		RUNWAY END IDENTIFICATION LIGHTS (REIL)
		RUNWAY THRESHOLD LIGHTS
34|35 / 312		SECTION CORNER
		TOPOGRAPHY
		WIND INDICATOR (LIGHTED)
		THRESHOLD LIGHTS
		REIL

NOTES:

1. REFER TO SHEET 3 FOR AIRPORT DATA TABLES.
2. FOR ROAD AND RAILROAD INTERSECTIONS WITH APPROACH AND DEPARTURE SURFACES, REFER TO "INNER APPROACH" SHEETS.



THE PREPARATION OF THIS DOCUMENT MAY HAVE BEEN SUPPORTED, IN PART, THROUGH THE AIRPORT IMPROVEMENT PROGRAM FINANCIAL ASSISTANCE FROM THE FEDERAL AVIATION ADMINISTRATION (PROJECT NUMBER 3–20–0052–30) AS PROVIDED UNDER TITLE 49 U.S.C., SECTION 47104. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THIS REPORT BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED THEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE OR WOULD HAVE JUSTIFICATION IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS

FOR APPROVAL BY:

Peter C. Van Kuren, C.M. — DATE
AIRPORT DIRECTOR

SUBMITTED BY: — DATE
Brian M. Tompkins, P.E., C.M.
HNTB CORPORATION

AREA RESERVED FOR
FAA APPROVAL BLOCK STICKER

HNTB
7450 WEST 130TH STREET
SUITE 400
OVERLAND PARK, KS 66213

REVISIONS

NO.	DESCRIPTION	DATE	BY	APP'D

Manhattan Regional Airport

AIRPORT LAYOUT PLAN

AIRPORT LAYOUT DRAWING

DESIGNED: L. BORNTREGER
DRAWN: J. PETERS
CHECKED: B. TOMPKINS
APPROVED: B. TOMPKINS

DATE: FEBRUARY 2009

RUNWAY DATA TABLE

	RUNWAY 3-21				RUNWAY 13-31			
	EXISTING		ULTIMATE[2]		EXISTING		ULTIMATE[3]	
	3	21	3	21	13	31	13	31
APPROACH CAT./DESIGN GROUP	C-III		C-IV		B-I		B-II	
RUNWAY LENGTH AND WIDTH	7,000' x 150'		8,000' x 150'		3,800' x 100'		5,000' x 75'	
TAKEOFF RUN AVAILABLE (TORA)	7000'	7000'	9000'	9000'	3800'	3800'	5000'	5000'
TAKEOFF DISTANCE AVAILABLE (TODA)	7000'	7000'	9000'	9000'	3800'	3800'	5000'	5000'
ACCELERATE STOP DISTANCE AVAILABLE (ASDA)	6660'	7000'	9000'	9000'	3800'	3800'	5000'	5000'
LANDING DISTANCE AVAILABLE (LDA)	6660'	7000'	8000'	8000'	3800'	3800'	5000'	5000'
RUNWAY SHOULDER SURFACE TREATMENT	TURF		PAVED		TURF		TURF	
RUNWAY INSTRUMENTATION	PRECISION	VISUAL	PRECISION	NP	VISUAL	NP	NP	NP
PART 77 APPROACH USE TYPE	PIR	VISUAL (B)	PIR	NP (D)	VISUAL (B)	NP (D)	VISUAL (B)	NP (D)
RUNWAY APPROACH SURFACE SLOPE	50:1	20:1	50:1	34:1	20:1	20:1	34:1	34:1
APPROACH VISIBILITY MINIMUM	1/2 MILE	VISUAL	1/2 MILE	3/4 MILE	VISUAL	VISUAL	1 MILE	1 MILE
AERONAUTICAL SURVEY TYPE REQUIRED	ANAPC	TYPE D	ANAPC	TYPE D	TYPE D	TYPE D	TYPE D	TYPE D
RUNWAY BEARING (TRUE)	N 39° 54' E		N 39° 54' E		N 37° 47'W		N 37° 47'W	
RUNWAY OBJECT FREE AREA (OFA)	9,000' x 800'		10,000' x 800'		4,280' x 400'		5,600' x 500'	
RUNWAY SAFETY AREA (RSA)	9,000' x 500'		10,000' x 500'		4,280' x 120'		5,600' x 150'	
RUNWAY OBSTACLE FREE ZONE (OFZ)	7,400' x 400'		8,400' x 400'		4,200' x 400'		5,400' x 400'	
RUNWAY PAVEMENT MATERIAL	CONCRETE		CONCRETE		ASPHALT ON CONCRETE		CONCRETE	
RUNWAY PAVEMENT SURFACE TREATMENT	GROOVED		GROOVED		NONE		GROOVED	
RUNWAY PVMNT. DESIGN STRENGTH[1] (1,000 LB)	45 (S), 90 (D), 270 (DT)		45 (S), 90 (D), 270 (DT)		24 (S), 33 (D)		30 (D)	
RUNWAY EFFECTIVE GRADIENT	0.16%		0.18%		0.33%		0.43%	
RUNWAY TOUCHDOWN ZONE ELEVATION (MSL)	1053.5'	1050.0'	1055.8'	1047.2'	1056.5'	1050.0'	1066.2'	1050.0'
RUNWAY MARKING	PRECISION		PRECISION		VISUAL		NON-PRECISION	
RUNWAY LIGHTING	HIRL		HIRL		MIRL		MIRL	
RUNWAY ELECTRONIC NAVIGATION AIDS	TVOR, ILS, GPS	GPS	SAME		NONE		GPS	
RUNWAY VISUAL NAVIGATION AIDS	MALSR	REIL	MALSR	REIL	VASI-4	VASI-4	PAPI-4	PAPI-4
	VASI-4	VASI-4	PAPI-4	PAPI-4		REIL	REIL	REIL
RUNWAY/TAXIWAY SEPARATION	400'		400'		250'		240'	
RUNWAY/TAXIWAY HOLD POSITION MARKING	250'		250'		200'		200'	
TAXIWAY WIDTH	50'		75'		50'		35'	
TAXIWAY SHOULDER TREATMENT	TURF		PAVED		TURF		TURF	
TAXIWAY SAFETY AREA WIDTH	79'		118'		49'		79'	
TAXIWAY OBJECT FREE AREA WIDTH	131'		186'		89'		131'	
TAXIWAY MARKING	CENTERLINE		CENTERLINE		CENTERLINE		CENTERLINE	
TAXIWAY LIGHTING	MITL		MITL		MITL		MITL	

1. PAVEMENT STRENGTHS ARE EXPRESSED IN SINGLE(S), DUAL(D), AND/OR DUAL TANDEM(DT) WHEEL LOADING CAPACITIES.
2. DUE TO MAGNETIC DECLINATION CHANGE, RUNWAY 3-21 SHALL BE REMARKED 4-22 DURING NEXT FEASIBLE RUNWAY MAINTENANCE OR REMARKING PROJECT.
3. DUE TO MAGNETIC DECLINATION CHANGE, RUNWAY 13-31 SHALL BE REMARKED 14-32 DURING NEXT FEASIBLE RUNWAY MAINTENANCE OR REMARKING PROJECT.

AIRPORT DATA

OWNER: CITY OF MANHATTAN		AIRPORT IDENTIFIER: MHK	
CITY/STATE: MANHATTAN, KANSAS		COUNTY: RILEY	
		EXISTING	ULTIMATE
AIRPORT REFERENCE CODE		C-III	C-IV
CRITICAL DESIGN AIRCRAFT		C-III FAMILY	B757-300
AIRPORT ELEVATION (MSL NAVD88)		1056.5'	1066.2'
MEAN MAX. TEMP. OF HOTTEST MONTH (JULY)		92.5° F	92.5° F
AIRPORT REFERENCE POINT (ARP) COORDINATES (NAD 83)	LATITUDE	N 39° 08' 27"	N 39° 08' 25"
	LONGITUDE	W 96° 40' 15"	W 96° 40' 21"
AIRPORT AND TERMINAL NAVIGATIONAL AIDS		NDB, TVOR, GPS VOR/DME ROTATING BEACON	SAME

RUNWAY END COORDINATES

		EXISTING (a)	ULTIMATE (b)	ULTIMATE (c)
RUNWAY 3	LATITUDE	N 39° 07' 56.61"	N 39° 07' 53.58"	N 39° 07' 46.00"
	LONGITUDE	W 96° 40' 45.48"	W 96° 40' 48.74"	W 96° 40' 56.88"
RUNWAY 21	LATITUDE	N 39° 08' 49.68"	N 39° 08' 46.65"	SAME
	LONGITUDE	W 96° 39' 48.49"	W 96° 39' 51.75"	SAME
RUNWAY 13	LATITUDE	N 39° 08' 50.25"	N 39° 08' 59.64"	SAME
	LONGITUDE	W 96° 40' 26.10"	W 96° 40' 35.45"	SAME
RUNWAY 31	LATITUDE	N 39° 08' 20.57"	SAME	SAME
	LONGITUDE	W 96° 39' 56.55"	SAME	SAME

a) EXISTING COORDINATES PER NGS ADS (APRIL 2005)
b) Runway 3-21 is 7,000 x 150 and Runway 13-31 is 5,000 x 75.
c) Runway 3-21 is 8,000 x 150 and Runway 13-31 is 5,000 x 75.

MODIFICATION OF FAA STANDARDS

DESCRIPTION	STANDARD MODIFIED	AIRSPACE CASE	APPROVAL DATE
NONE			

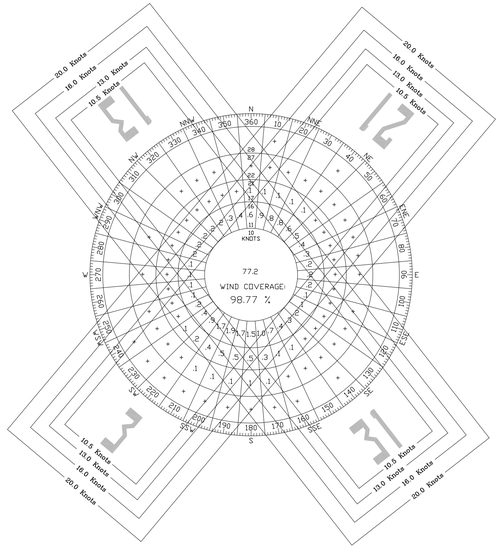
OBSTACLE FREE ZONE (OFZ) OBSTRUCTIONS

DESCRIPTION	LOCATION	ELEVATION	OBSTRUCTION	SURFACE	DISPOSITION
NONE					

THRESHOLD SITING SURFACE OBSTRUCTIONS

RUNWAY END	OBJECT*	ELEVATION	PENETRATION	SURFACE	DISPOSITION
R/W 3	2-TREE	1120	0.9	34:1 OCS	REMOVE
R/W 3	4-TREE	1160	10.9	34:1 OCS	REMOVE
R/W 3	5-TREE	1159	3.0	34:1 OCS	REMOVE
R/W 3	6-TREE	1167	9.2	34:1 OCS	REMOVE
R/W 3	11-TREE	1183	3.1	34:1 OCS	REMOVE
R/W 3	12-TREE	1188	4.8	34:1 OCS	REMOVE
R/W 3	13-TREE	1192	4.6	34:1 OCS	REMOVE
R/W 13	1-TREE	1133	44	34:1 OCS	REMOVE
R/W 21	2-TREE	1116	1	34:1 OCS	REMOVE

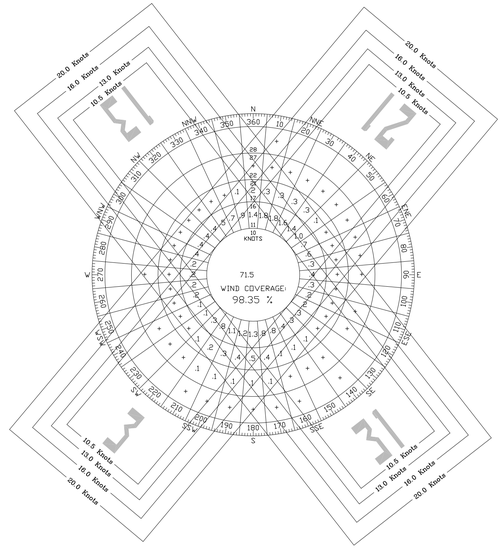
*REFER TO SHEETS 7, 8, 9, AND 10 FOR OBJECTS



ALL WEATHER WIND COVERAGE

	10.5 Kts.	13 Kts.	16 Kts.	20 Kts.
Runway 3-21	94.22%	97.34%	99.42%	99.91%
Runway 13-31	87.77%	93.33%	98.03%	99.56%
Combined Coverage	98.78%	99.78%	99.96%	100.00%

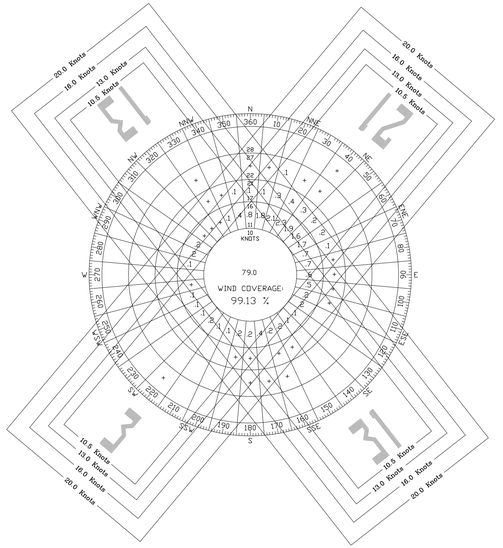
78,711 Observations



VFR WIND COVERAGE

	10.5 Kts.	13 Kts.	16 Kts.	20 Kts.
Runway 3-21	91.45%	95.89%	99.07%	99.84%
Runway 13-31	85.37%	92.30%	97.78%	99.52%
Combined Coverage	98.35%	99.69%	99.95%	100.00%

17,764 Observations



IFR WIND COVERAGE

	10.5 Kts.	13 Kts.	16 Kts.	20 Kts.
Runway 3-21	96.40%	98.48%	99.72%	99.95%
Runway 13-31	85.93%	92.37%	98.13%	99.60%
Combined Coverage	99.12%	99.88%	99.99%	100.00%

4,010 Observations

SOURCE:

US Department of Commerce
National Oceanic and Atmospheric Administration
National Environmental Satellite Data and Information Service
National Climatic Data Center
151 Patton Ave Room 120
Ashville NC, 28801-5001

DATA STATION:
Manhattan Regional Airport (MHK) ASOS
Station No. 72455

OBSERVATION PERIOD:
January 1997-December 2006

HNTB
7450 WEST 130TH STREET
SUITE 400
OVERLAND PARK, KS 66213

REVISIONS

NO.	DESCRIPTION	DATE	BY	APP'D

Manhattan Regional Airport
AIRPORT LAYOUT PLAN

AIRPORT DATA TABLES

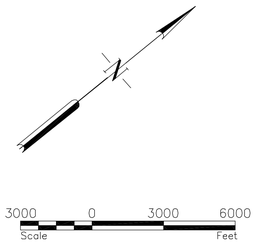
DESIGNED: L. BORNTREGER
DRAWN: J. PETERS
CHECKED: B. TOMPKINS
APPROVED: B. TOMPKINS
DATE: FEBRUARY 2009

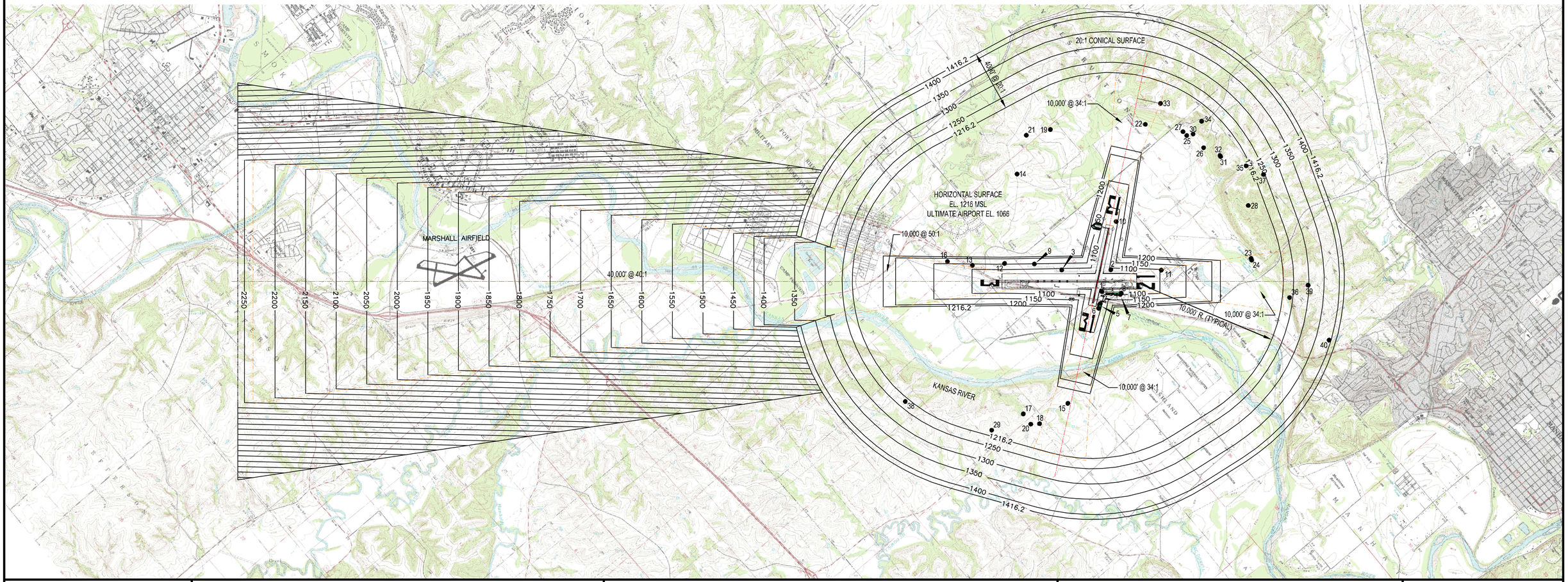
OBSTRUCTION TABLE

OBJECT NO. AND DESCRIPTION	OBJECT ELEVATION	PART 77 SURFACE ELEVATION	OBJECT PENETRATION	PROPOSED OBJECT DISPOSITION
1. POLE	1071	1070.8	0.2	TO BE LOWERED/LIT
2. ANT ON OL POLE	1088	1084.6	3.4	NO ACTION, LIGHTED
3. TREE	1092	1088.1	3.9	TO BE LOWERED/REMOVED
4. LTD WSK ON OL HGR	1087	1085.0	2.0	NO ACTION, LIGHTED
5. LT POLE	1086	1078.3	7.7	TO BE LOWERED/LIT
6. FLDLT	1083	1079.8	3.2	TO BE LOWERED/LIT
7. TREE	1118	1099.7	18.3	TO BE LOWERED/REMOVED
8. TREE	1106	1087.5	18.5	TO BE LOWERED/REMOVED
9. TREE	1152	1150.1	1.9	TO BE LOWERED/REMOVED
10. TREE	1125	1084.8	40.2	TO BE LOWERED/REMOVED
11. TREE	1109	1102.3	6.2	TO BE LOWERED/REMOVED
12. TREE	1160	1159.3	0.7	TO BE LOWERED/REMOVED
13. TREE	1169	1138.7	30.3	TO BE LOWERED/REMOVED
14. TREE	1235	1216.2	18.8	TO BE LOWERED/REMOVED
15. TREE	1221	1216.2	4.8	TO BE LOWERED/REMOVED
16. TREE	1194	1172.7	21.3	TO BE LOWERED/REMOVED
17. POLE	1224	1216.2	7.8	TO BE LOWERED/LIT
18. TREE	1228	1216.2	11.8	TO BE LOWERED/REMOVED
19. TREE	1221	1216.2	4.8	TO BE LOWERED/REMOVED
20. ANT ON TWR	1261	1216.2	44.8	TO BE LOWERED/LIT

OBSTRUCTION TABLE

OBJECT NO. AND DESCRIPTION	OBJECT ELEVATION	PART 77 SURFACE ELEVATION	OBJECT PENETRATION	PROPOSED OBJECT DISPOSITION
21. TREE	1235	1216.2	18.8	TO BE LOWERED/REMOVED
22. TREE	1314	1216.2	97.8	TO BE LOWERED/REMOVED
23. TREE	1285	1216.2	68.8	TO BE LOWERED/REMOVED
24. TREE	1284	1216.2	67.8	TO BE LOWERED/REMOVED
25. CHIMNEY	1348	1216.2	131.8	TO BE LIGHTED
26. GRD	1326	1216.2	109.8	NO ACTION
27. GRD	1343	1216.2	126.8	NO ACTION
28. TREE	1389	1216.2	172.8	TO BE LOWERED/REMOVED
29. GRD	1266	1216.2	49.8	NO ACTION
30. WIND MACHINE	1345	1216.2	128.8	NO ACTION
31. TREE	1341	1216.2	124.8	TO BE LOWERED/REMOVED
32. GRD	1342	1216.2	125.8	NO ACTION
33. GRD	1336	1216.2	119.8	NO ACTION
34. SILO	1385	1216.2	168.8	NO ACTION
35. TREE	1371	1216.2	154.8	NO ACTION
36. TREE	1277	1239.4	37.6	TO BE LOWERED/REMOVED
37. TREE	1295	1246.2	48.8	NO ACTION
38. GRD	1316	1254.0	62	NO ACTION
39. GRD	1284	1297.6	−13.6	NO ACTION
40. ANT ON OL TANK	1425	1393.6	31.4	NO ACTION, LIGHTED





HNTB
7450 WEST 130TH STREET
SUITE 400
OVERLAND PARK, KS 66213

REVISIONS

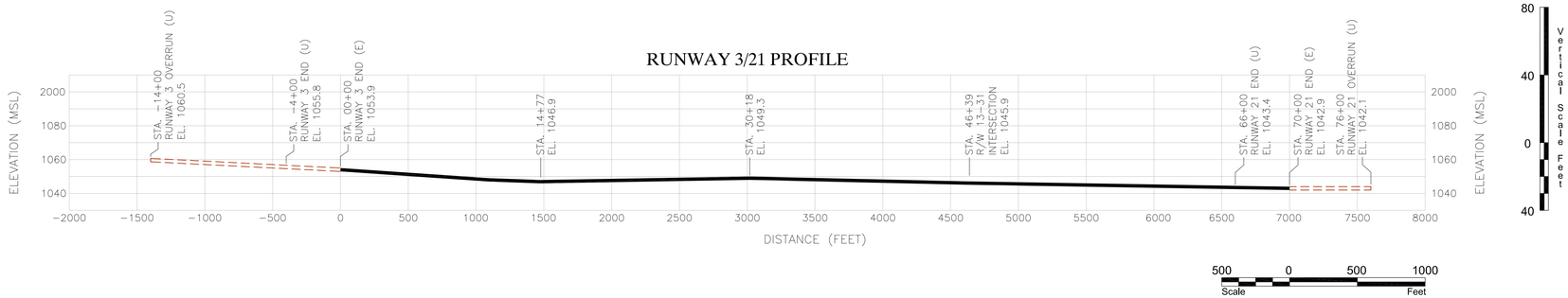
NO.	DESCRIPTION	DATE	BY	APP'D

Manhattan Regional Airport
AIRPORT LAYOUT PLAN

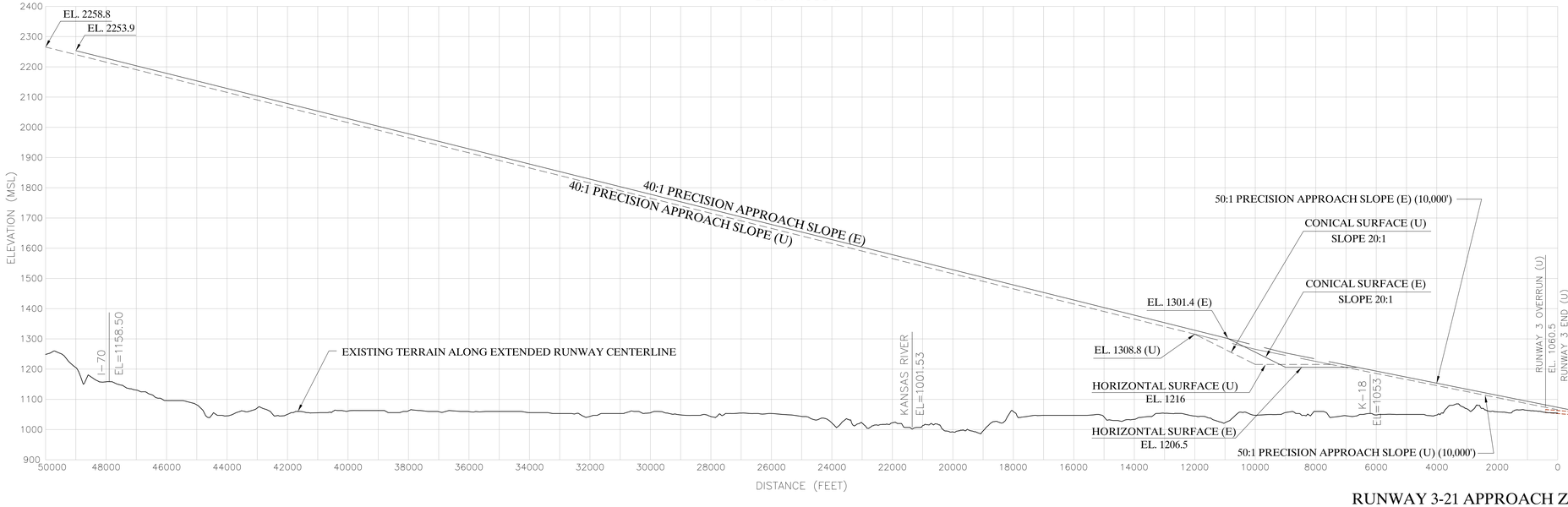
AIRPORT AIRSPACE DRAWING

DESIGNED: L. BORNTREGER
DRAWN: J. PETERS
CHECKED: B. TOMPKINS
APPROVED: B. TOMPKINS
DATE: FEBRUARY 2009
SHEET 4 of 23

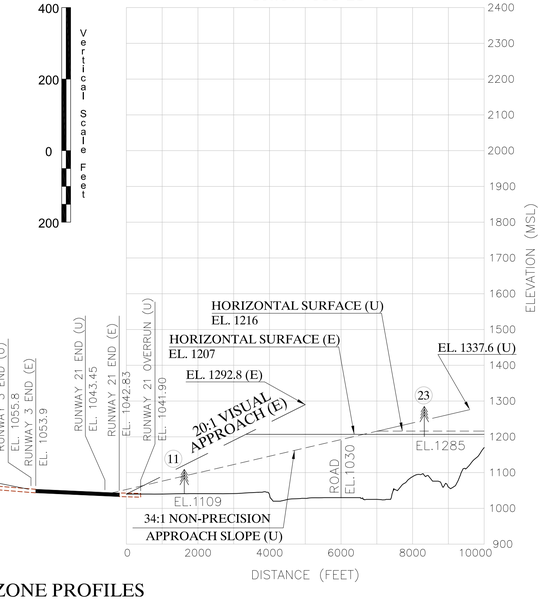
RUNWAY 3/21 PROFILE



RUNWAY 3



RUNWAY 21



RUNWAY 3-21 APPROACH ZONE PROFILES

2000 0 2000 4000
Scale Feet

GENERAL NOTES

1. OBJECT NUMBERS CORRELATE TO OBJECT NUMBERS ON AIRPORT AIRSPACE DRAWING, SHEET 4.
2. REFER TO THE INNER PORTION OF THE APPROACH AND DEPARTURE SURFACE DRAWINGS FOR CLOSE-IN OBSTRUCTIONS.

HNTB
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SUITE 400
OVERLAND PARK, KS 66213

REVISIONS

NO.	DESCRIPTION	DATE	BY	APP'D

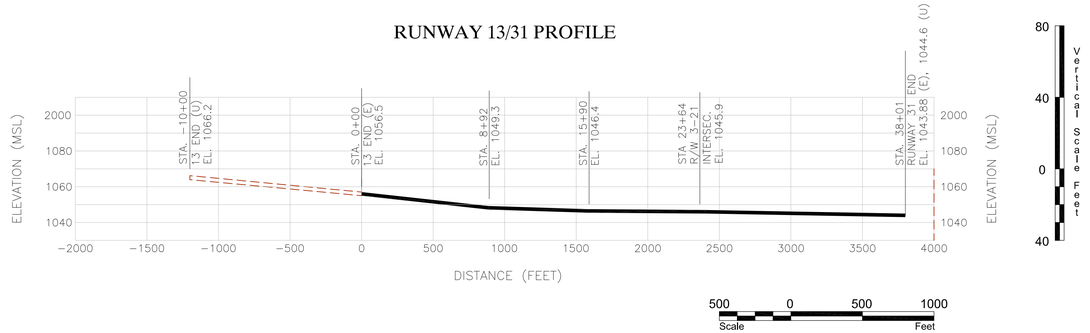
Manhattan Regional Airport

AIRPORT LAYOUT PLAN

RUNWAY 3-21 CENTERLINE AND APPROACH PROFILES

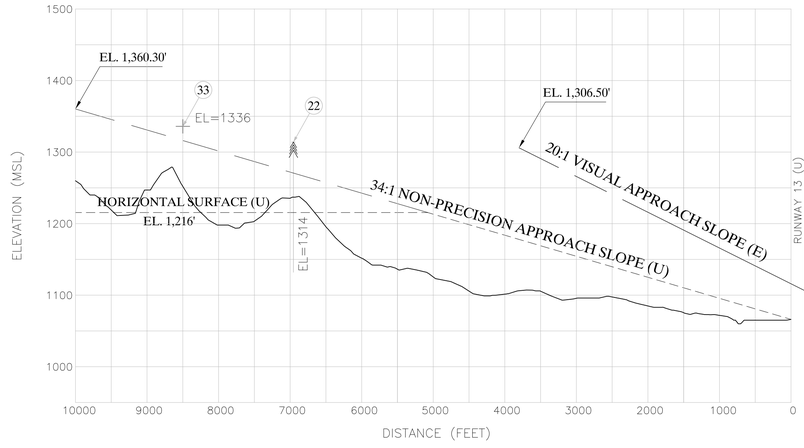
DESIGNED: L. BORNTREGER
DRAWN: J. PETERS
CHECKED: B. TOMPKINS
APPROVED: B. TOMPKINS
DATE: FEBRUARY 2009

RUNWAY 13/31 PROFILE

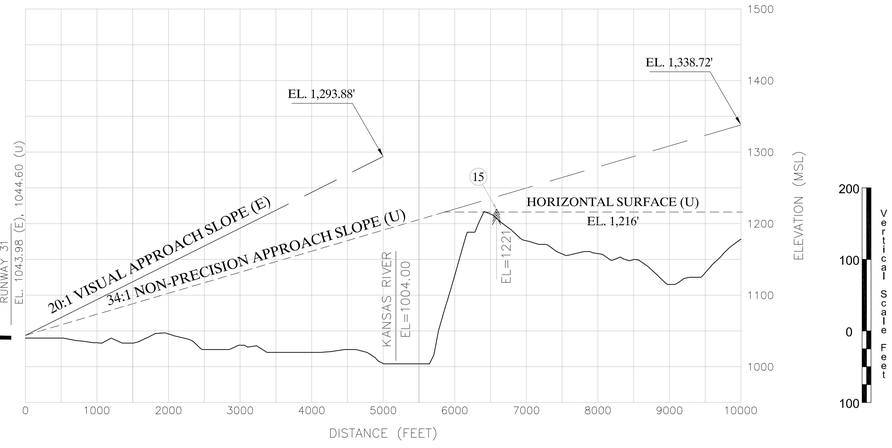


RUNWAY 13/31 APPROACH ZONE PROFILES

RUNWAY 13



RUNWAY 31



GENERAL NOTES

1.) OBJECT NUMBERS CORRELATE TO OBJECT NUMBERS ON AIRPORT AIRSPACE DRAWING, SHEET 4.

2.) REFER TO THE INNER PORTION OF THE APPROACH AND DEPARTURE SURFACE DRAWINGS FOR CLOSE-IN OBSTRUCTIONS.

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REVISIONS

NO.	DESCRIPTION	DATE	BY	APP'D

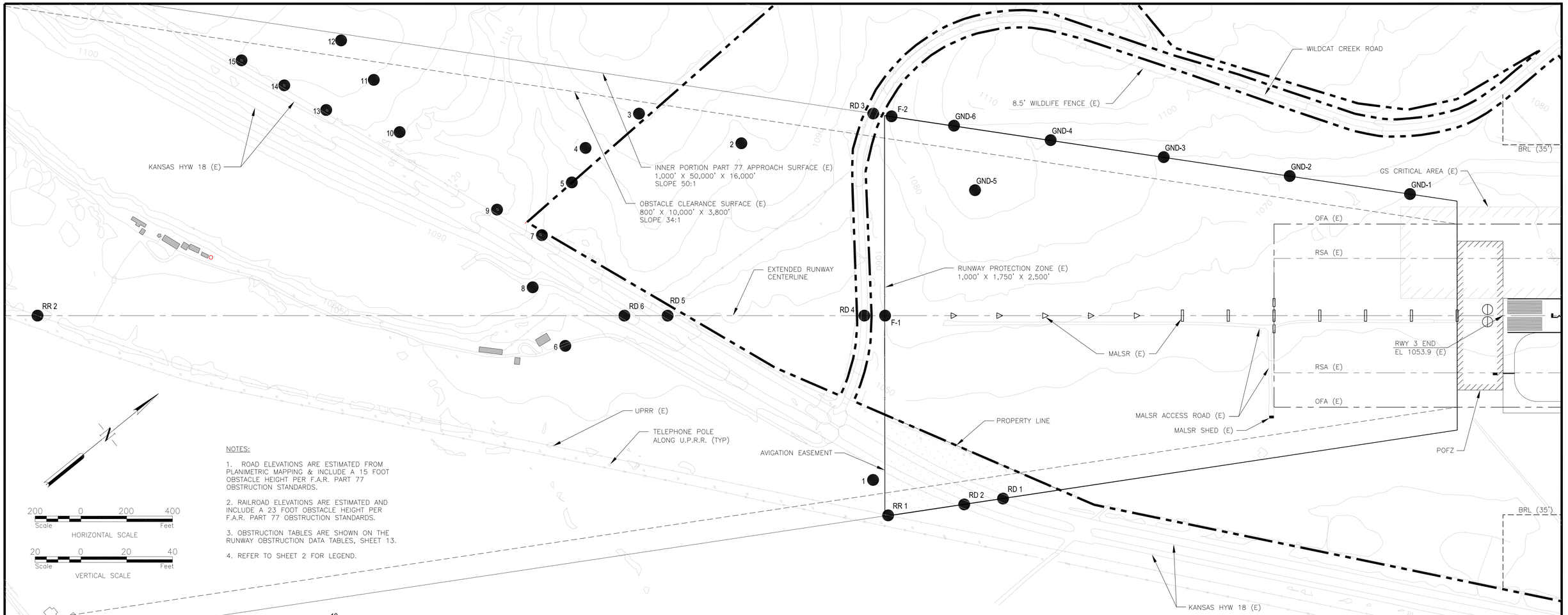
Manhattan Regional Airport

AIRPORT LAYOUT PLAN

RUNWAY 13-31 CENTERLINE AND APPROACH PROFILES

DESIGNED: L. BORNTREGER
DRAWN: J. PETERS
CHECKED: B. TOMPKINS
APPROVED: B. TOMPKINS

DATE: FEBRUARY 2009



NOTES:

1. ROAD ELEVATIONS ARE ESTIMATED FROM PLANIMETRIC MAPPING & INCLUDE A 15 FOOT OBSTACLE HEIGHT PER F.A.R. PART 77 OBSTRUCTION STANDARDS.

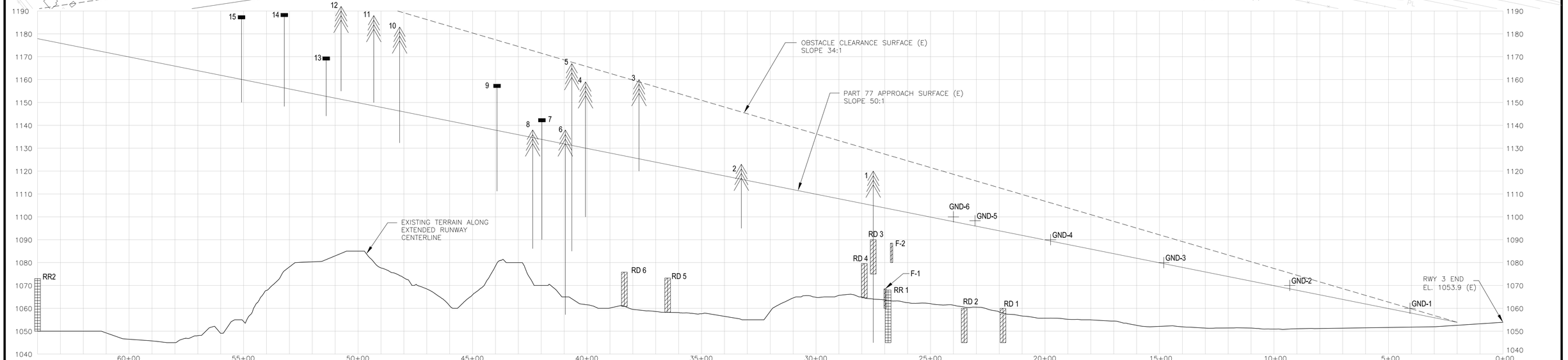
2. RAILROAD ELEVATIONS ARE ESTIMATED AND INCLUDE A 23 FOOT OBSTACLE HEIGHT PER F.A.R. PART 77 OBSTRUCTION STANDARDS.

3. OBSTRUCTION TABLES ARE SHOWN ON THE RUNWAY OBSTRUCTION DATA TABLES, SHEET 13.

4. REFER TO SHEET 2 FOR LEGEND.

200 0 200 400
Scale Feet
HORIZONTAL SCALE

20 0 20 40
Scale Feet
VERTICAL SCALE



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SUITE 400
OVERLAND PARK, KS 66213

REVISIONS

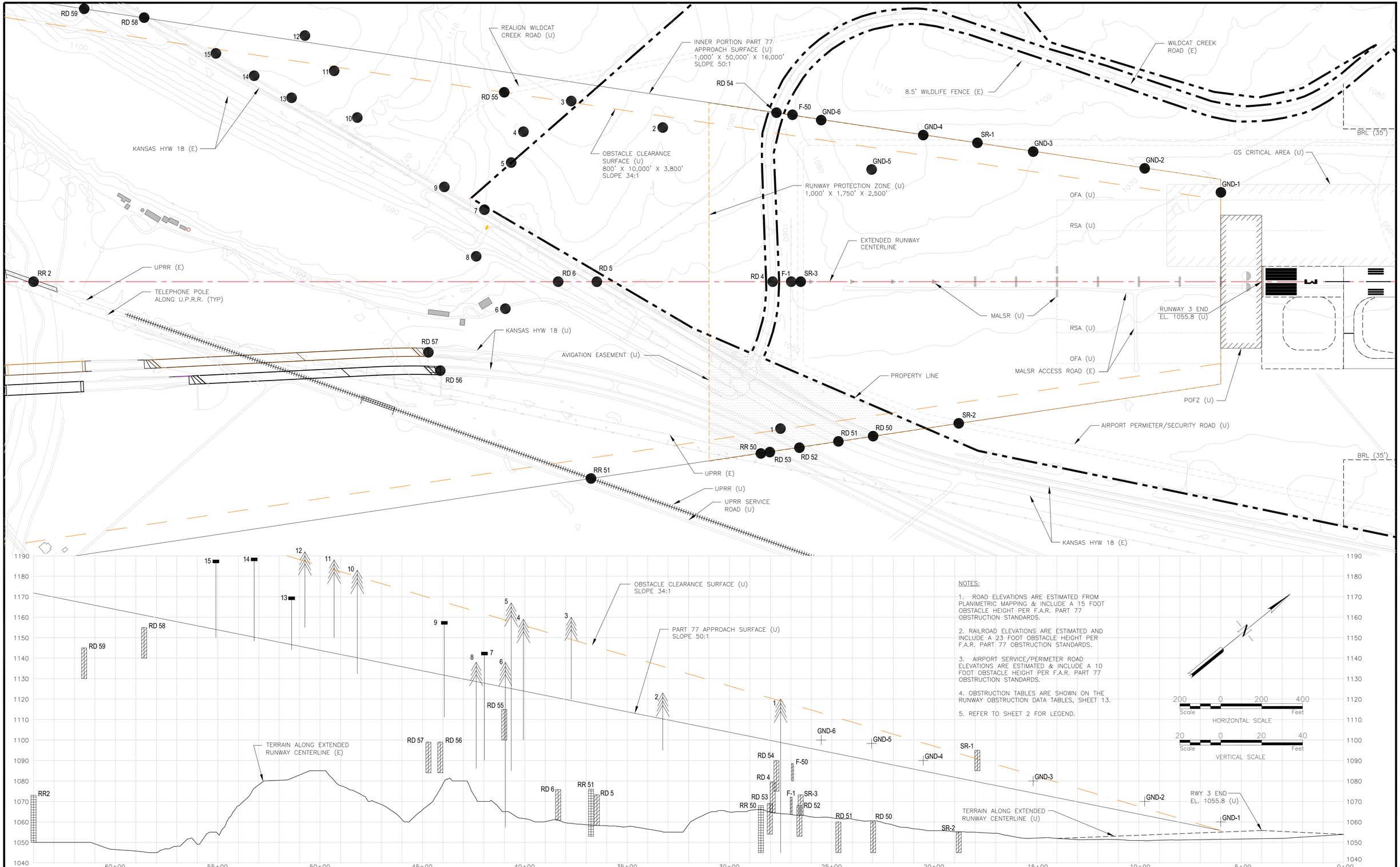
NO.	DESCRIPTION	DATE	BY	APP'D

Manhattan Regional Airport

AIRPORT LAYOUT PLAN

INNER PORTION OF RUNWAY 3 APPROACH SURFACE DRAWING EXISTING

DESIGNED: L. BORNTREGER
DRAWN: J. PETERS
CHECKED: B. TOMPKINS
APPROVED: B. TOMPKINS
DATE: FEBRUARY 2009



NOTES:

1. ROAD ELEVATIONS ARE ESTIMATED FROM PLANIMETRIC MAPPING & INCLUDE A 15 FOOT OBSTACLE HEIGHT PER F.A.R. PART 77 OBSTRUCTION STANDARDS.

2. RAILROAD ELEVATIONS ARE ESTIMATED AND INCLUDE A 23 FOOT OBSTACLE HEIGHT PER F.A.R. PART 77 OBSTRUCTION STANDARDS.

3. AIRPORT SERVICE/PERIMETER ROAD ELEVATIONS ARE ESTIMATED & INCLUDE A 10 FOOT OBSTACLE HEIGHT PER F.A.R. PART 77 OBSTRUCTION STANDARDS.

4. OBSTRUCTION TABLES ARE SHOWN ON THE RUNWAY OBSTRUCTION DATA TABLES, SHEET 13.

5. REFER TO SHEET 2 FOR LEGEND.

200 0 200 400 Scale Feet
HORIZONTAL SCALE

20 0 20 40 Scale Feet
VERTICAL SCALE

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SUITE 400
OVERLAND PARK, KS 66213

REVISIONS

NO.	DESCRIPTION	DATE	BY	APP'D

Manhattan Regional Airport

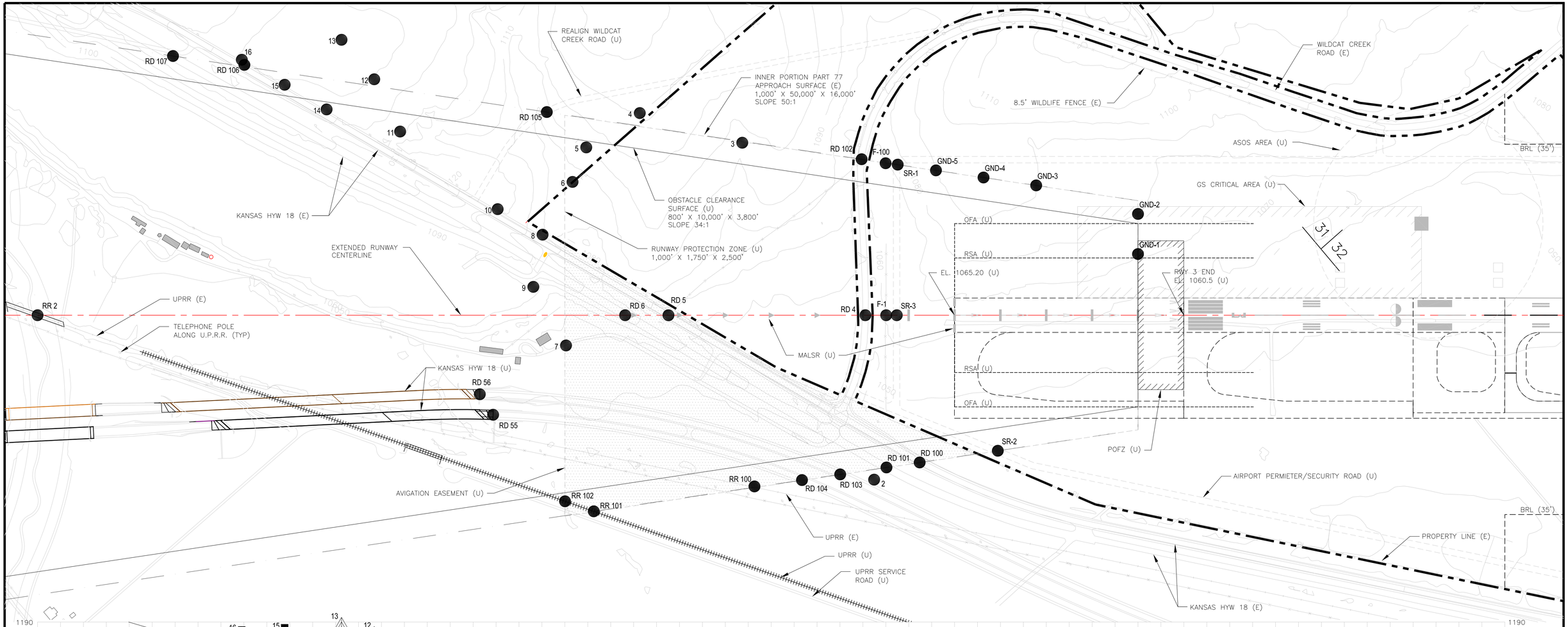
AIRPORT LAYOUT PLAN

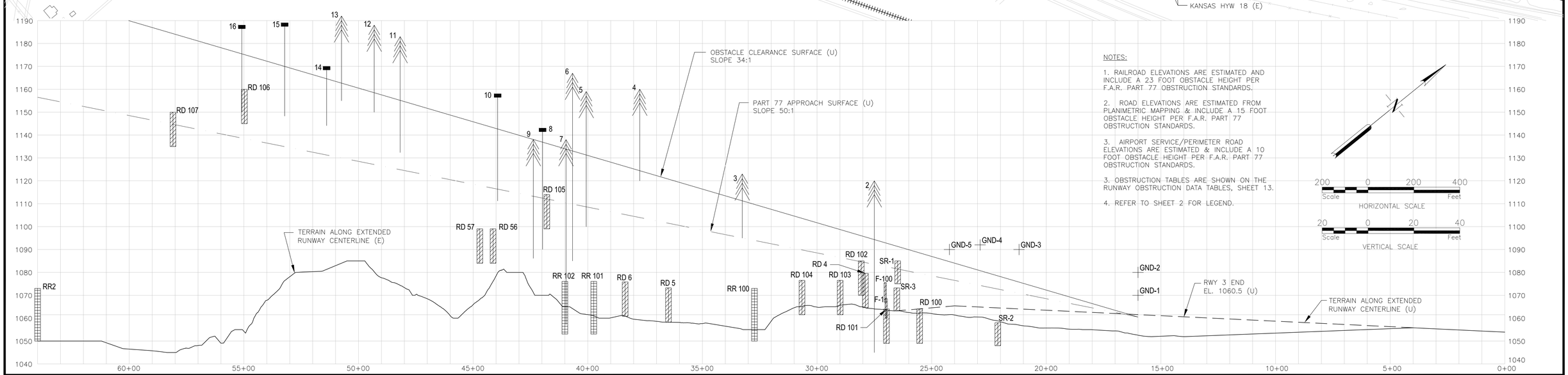
INNER PORTION OF RUNWAY 3 APPROACH SURFACE DRAWING ULTIMATE 400' EXTENSION

DESIGNED: L. BORNTREGER
DRAWN: J. PETERS
CHECKED: B. TOMPKINS
APPROVED: B. TOMPKINS

DATE: FEBRUARY 2009

SHEET 8 of 23





NOTES:

1. RAILROAD ELEVATIONS ARE ESTIMATED AND INCLUDE A 23 FOOT OBSTACLE HEIGHT PER F.A.R. PART 77 OBSTRUCTION STANDARDS.
2. ROAD ELEVATIONS ARE ESTIMATED FROM PLANIMETRIC MAPPING & INCLUDE A 15 FOOT OBSTACLE HEIGHT PER F.A.R. PART 77 OBSTRUCTION STANDARDS.
3. AIRPORT SERVICE/PERIMETER ROAD ELEVATIONS ARE ESTIMATED & INCLUDE A 10 FOOT OBSTACLE HEIGHT PER F.A.R. PART 77 OBSTRUCTION STANDARDS.
3. OBSTRUCTION TABLES ARE SHOWN ON THE RUNWAY OBSTRUCTION DATA TABLES, SHEET 13.
4. REFER TO SHEET 2 FOR LEGEND.

200 0 200 400 Scale Feet
HORIZONTAL SCALE
20 0 20 40 Scale Feet
VERTICAL SCALE

HNTB
7450 WEST 130TH STREET
SUITE 400
OVERLAND PARK, KS 66213

REVISIONS

NO.	DESCRIPTION	DATE	BY	APP'D

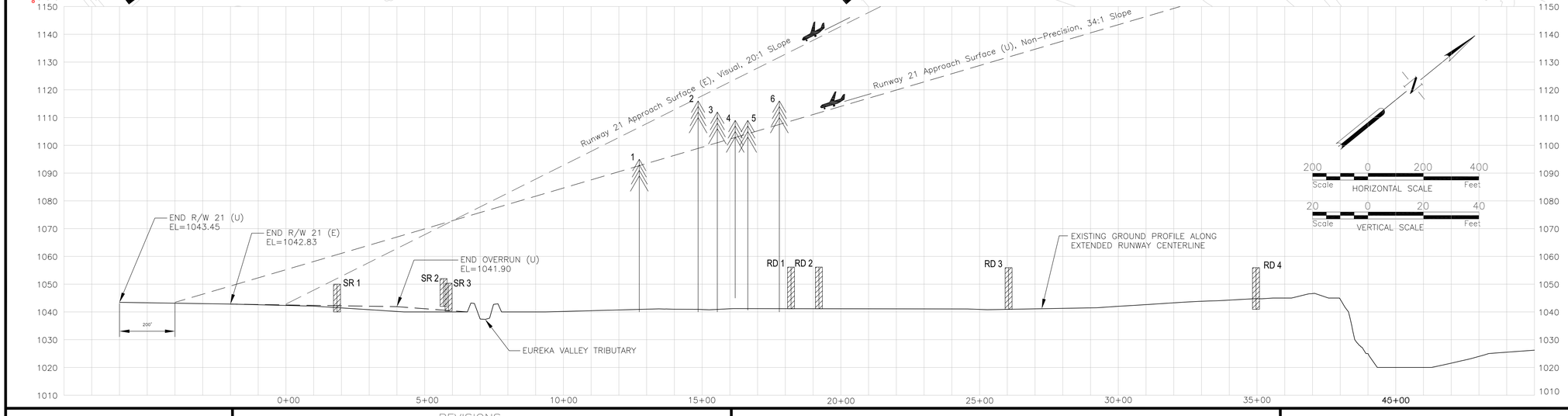
Manhattan Regional Airport

AIRPORT LAYOUT PLAN

INNER PORTION OF RUNWAY 3 APPROACH SURFACE DRAWING ULTIMATE 1,000' EXTENSION

DESIGNED: L. BORNTREGER
DRAWN: J. PETERS
CHECKED: B. TOMPKINS
APPROVED: B. TOMPKINS

DATE: FEBRUARY 2009



NOTES:

1. PUBLIC ROAD ELEVATIONS ARE ESTIMATED FROM PLANIMETRIC MAPPING & INCLUDE A 15 FOOT OBSTACLE HEIGHT PER F.A.R. PART 77 OBSTRUCTION STANDARDS.

2. AIRPORT SERVICE/PERIMETER ROAD ELEVATIONS ARE ESTIMATED & INCLUDE A 10 FOOT OBSTACLE HEIGHT PER F.A.R. PART 77 OBSTRUCTION STANDARDS.

3. OBSTRUCTION TABLES ARE SHOWN ON SHEET 13.

4. THERE ARE NO OBSTRUCTIONS TO THE EXISTING RUNWAY 21 APPROACH SURFACE. THEREFORE, NO OBSTRUCTION DATA TABLE IS PROVIDED ON SHEET 13.

5. REFER TO SHEET 2 FOR LEGEND.

HNTB
7450 WEST 130TH STREET
SUITE 400
OVERLAND PARK, KS 66213

REVISIONS

NO.	DESCRIPTION	DATE	BY	APP'D

Manhattan Regional Airport

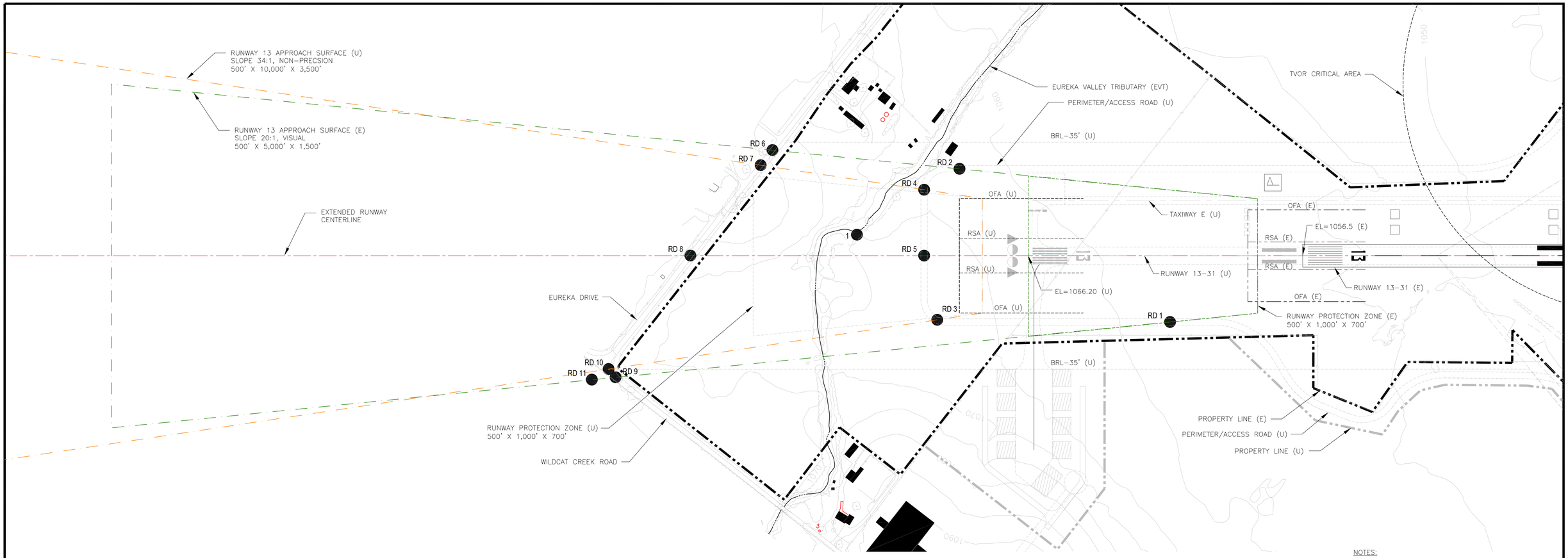
AIRPORT LAYOUT PLAN

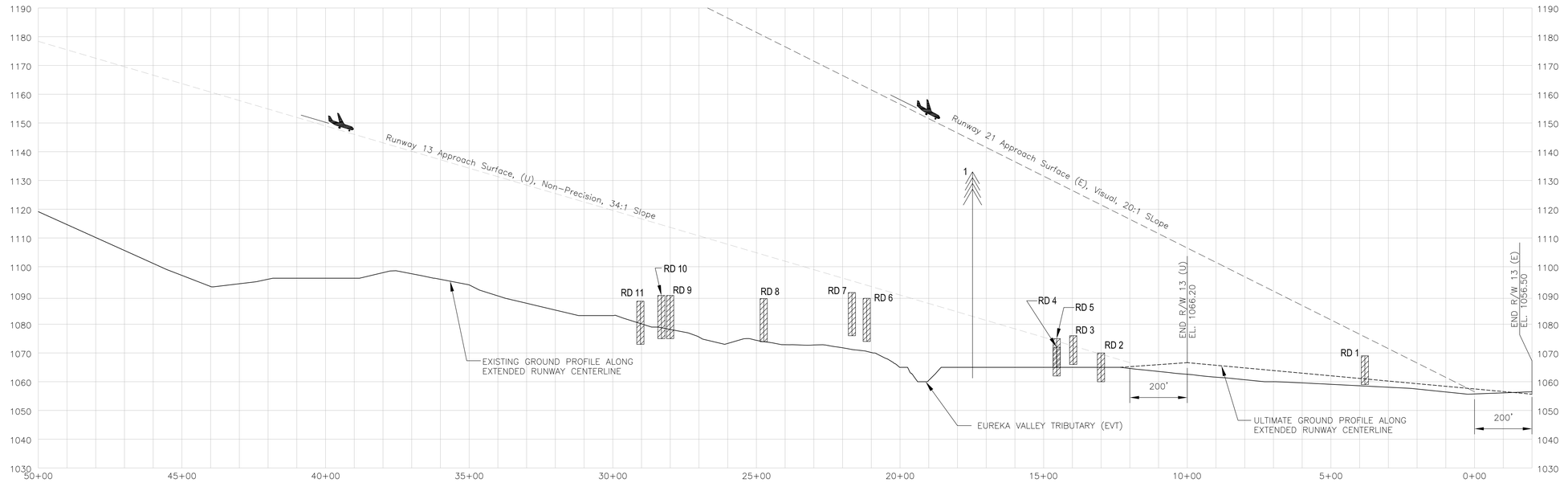
INNER PORTION OF RUNWAY 21 APPROACH SURFACE DRAWING

DESIGNED: L. BORNTREGER
DRAWN: J. PETERS
CHECKED: B. TOMPKINS
APPROVED: B. TOMPKINS

DATE: FEBRUARY 2009

SHEET 10 of 23





NOTES:

1. PUBLIC ROAD ELEVATIONS (RD6 TO RD11) ARE ESTIMATED FROM PLANIMETRIC MAPPING AND INCLUDE A 15 FOOT OBSTACLE HEIGHT PER F.A.R. PART 77 OBSTRUCTION STANDARDS.

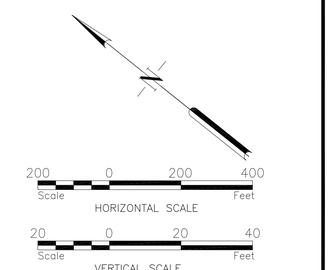
2. AIRPORT SERVICE/PERIMETER ROAD (RD1 TO RD5) ELEVATIONS ARE ESTIMATED AND INCLUDE A 10 FOOT OBSTACLE HEIGHT PER F.A.R. PART 77 OBSTRUCTION STANDARDS.

3. OBSTRUCTION TABLES ARE SHOWN ON, SHEET 13.

4. THERE ARE NO OBSTRUCTION TO THE EXISTING RUNWAY 13 VISUAL APPROACH SURFACE. THEREFORE, NO OBSTRUCTION DATA TABLE IS PROVIDED ON SHEET 13.

5. REFER TO SHEET 2 FOR LEGEND.

6. RD11 IS UNPAVED ROAD USED BY FORT RILEY TO ACCESS THEIR PROPERTY.



HNTB
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SUITE 400
OVERLAND PARK, KS 66213

REVISIONS

NO.	DESCRIPTION	DATE	BY	APP'D

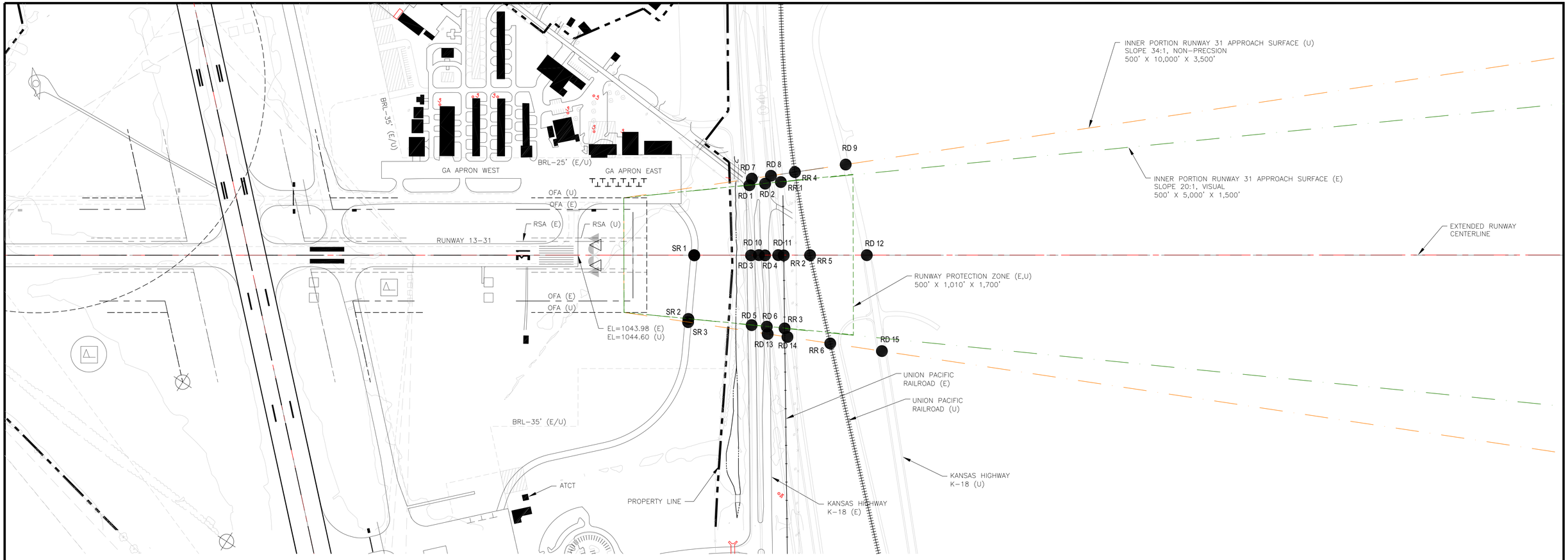
Manhattan Regional Airport

AIRPORT LAYOUT PLAN

INNER PORTION OF RUNWAY 13 APPROACH SURFACE DRAWING

DESIGNED: L. BORNTREGER
DRAWN: J. PETERS
CHECKED: B. TOMPKINS
APPROVED: B. TOMPKINS

DATE: FEBRUARY 2009



NOTES:

1. RAILROAD ELEVATIONS ARE ESTIMATED AND INCLUDE A 23 FOOT OBSTACLE HEIGHT PER F.A.R. PART 77 OBSTRUCTION STANDARDS.

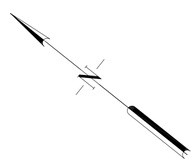
2. ROAD ELEVATIONS ARE ESTIMATED FROM PLANIMETRIC MAPPING & INCLUDE A 15 FOOT OBSTACLE HEIGHT PER F.A.R. PART 77 OBSTRUCTION STANDARDS.

3. AIRPORT SERVICE/PERIMETER ROAD ELEVATIONS ARE ESTIMATED & INCLUDE A 10 FOOT OBSTACLE HEIGHT PER F.A.R. PART 77 OBSTRUCTION STANDARDS.

4. OBSTRUCTION TABLES ARE SHOWN ON, SHEET 13.

5. THERE ARE NO OBSTRUCTION TO THE EXISTING OR ULTIMATE RUNWAY 31 APPROACH SURFACES. THEREFORE, NO OBSTRUCTION DATA TABLES ARE PROVIDED ON SHEET 13.

6. REFER TO SHEET 2 FOR LEGEND.



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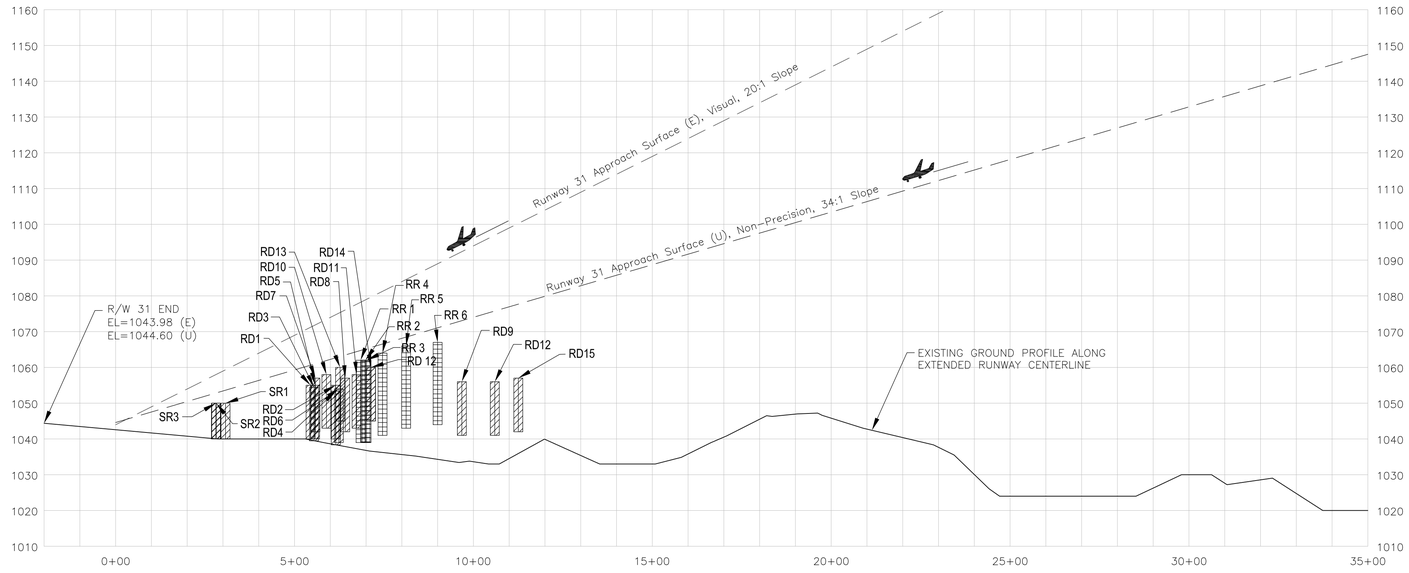
Scale Feet
HORIZONTAL SCALE

20 0 20 40
Scale Feet
VERTICAL SCALE



HNTB
7450 WEST 130TH STREET
SUITE 400
OVERLAND PARK, KS 66213

REVISIONS

NO.	DESCRIPTION	DATE	BY	APP'D

Manhattan Regional Airport

AIRPORT LAYOUT PLAN

INNER PORTION OF RUNWAY 31 APPROACH SURFACE DRAWING

DESIGNED: L. BORNTREGER
DRAWN: J. PETERS
CHECKED: B. TOMPKINS
APPROVED: B. TOMPKINS

DATE: FEBRUARY 2009

SHEET 12 of 23

Runway 3 Approach Surface (Ex.) Obstruction Table

Object No.	Description	Object Elevation	Approach Surface Elevation (1)	Object Penetration (2)	Proposed Object Disposition
1	TREE	1,120.0	1,104.9	15.1	REMOVE/LOWER
2	TREE	1,123.0	1,116.4	6.6	REMOVE/LOWER
3	TREE	1,160.0	1,125.4	34.6	REMOVE/LOWER
4	TREE	1,159.0	1,130.0	29.0	REMOVE/LOWER
5	TREE	1,167.0	1,131.2	35.8	REMOVE/LOWER
6	TREE	1,138.0	1,131.8	6.2	REMOVE/LOWER
7	POLE	1,143.0	1,133.8	9.2	REMOVE/LOWER
8	TREE	1,138.0	1,134.6	3.4	REMOVE/LOWER
9	POLE	1,158.0	1,137.8	20.2	REMOVE/LOWER
10	TREE	1,183.0	1,146.3	36.7	REMOVE/LOWER
11	TREE	1,188.0	1,148.5	39.5	REMOVE/LOWER
12	TREE	1,192.0	1,151.4	40.6	REMOVE/LOWER
13	POLE	1,170.0	1,152.7	17.3	REMOVE/LOWER
14	POLE	1,189.0	1,156.3	32.7	REMOVE/LOWER
15	POLE	1,188.0	1,160.1	27.9	REMOVE/LOWER
F-1	8.5' FENCE	1,072.1	1,103.9	-31.8	NO ACTION
F-2	8.5' FENCE	1,088.5	1,103.3	-14.8	NO ACTION
GND-1	GROUND	1,060.0	1,058.0	2.0	LOWER
GND-2	GROUND	1,070.0	1,068.5	1.5	LOWER
GND-3	GROUND	1,080.0	1,079.5	0.5	LOWER
GND-4	GROUND	1,090.0	1,089.4	0.6	LOWER
GND-5	GROUND	1,098.3	1,096.0	2.3	LOWER
GND-6	GROUND	1,100.0	1,097.8	2.2	LOWER
RD1	K-18	1,060.0	1,093.6	-33.6	NO ACTION
RD2	K-18	1,060.0	1,097.0	-37.0	NO ACTION
RD3	WILDCAT CRK RD	1,090.0	1,104.9	-14.9	NO ACTION
RD4	WILDCAT CRK RD	1,079.5	1,105.7	-26.2	NO ACTION
RD5	K-18	1,073.2	1,122.9	-49.7	NO ACTION
RD6	K-18	1,075.8	1,126.6	-50.8	NO ACTION
RR1	RAIL ROAD	1,068.0	1,103.6	-35.6	NO ACTION
RR2	RAIL ROAD	1,073.0	1,177.9	-104.9	NO ACTION

(1) Part 77 Approach Surface, 50:1 Slope

(2) Negative values denote below surface

Runway 21 Approach Surface (Ult.) Obstruction Table

Object No.	Description	Object Elevation	Approach Surface Elevation (1)	Object Penetration (2)	Proposed Object Disposition
1	TREE	1,095.0	1,092.7	2.3	REMOVE/LOWER
2	TREE	1,116.0	1,098.9	17.1	REMOVE/LOWER
3	TREE	1,112.0	1,100.9	11.1	REMOVE/LOWER
4	TREE	1,109.0	1,102.8	6.2	REMOVE/LOWER
5	TREE	1,109.0	1,104.2	4.8	REMOVE/LOWER
6	TREE	1,116.0	1,107.5	8.5	REMOVE/LOWER
SR1	SERVICE ROAD	1,040.0	1,060.6	-10.6	NO ACTION
SR2	SERVICE ROAD	1,042.0	1,071.9	-19.9	NO ACTION
SR3	SERVICE ROAD	1,041.0	1,072.5	-21.5	NO ACTION
RD 1	ROVER ROAD	1,041.0	1,108.8	-52.8	NO ACTION
RD 2	EUREKA DRIVE	1,041.0	1,111.7	-55.7	NO ACTION
RD 3	EUREKA DRIVE	1,041.0	1,131.8	-75.8	NO ACTION
RD 4	EUREKA DRIVE	1,041.0	1,158.0	-102.0	NO ACTION

(1) Part 77 Approach Surface, 34:1 Slope

(2) Negative values denote below surface

Runway 3 Approach Surface (Ult. 400' Extension) Obstruction Table

Object No.	Description	Object Elevation	Approach Surface Elevation (1)	Object Penetration (2)	Proposed Object Disposition
1	TREE	1,120.0	1,098.8	21.2	REMOVE/LOWER
2	TREE	1,123.0	1,110.3	12.7	REMOVE/LOWER
3	TREE	1,160.0	1,119.3	40.7	REMOVE/LOWER
4	TREE	1,159.0	1,123.9	35.1	REMOVE/LOWER
5	TREE	1,167.0	1,125.1	41.9	REMOVE/LOWER
6	TREE	1,138.0	1,125.7	12.3	REMOVE/LOWER
7	POLE	1,143.0	1,127.7	15.3	REMOVE/LOWER
8	TREE	1,138.0	1,128.5	9.5	REMOVE/LOWER
9	POLE	1,158.0	1,131.7	26.3	REMOVE/LOWER
10	TREE	1,183.0	1,140.2	42.8	REMOVE/LOWER
11	TREE	1,188.0	1,142.4	45.6	REMOVE/LOWER
12	TREE	1,192.0	1,145.3	46.7	REMOVE/LOWER
13	POLE	1,170.0	1,146.6	23.4	REMOVE/LOWER
14	POLE	1,189.0	1,150.2	38.8	REMOVE/LOWER
15	POLE	1,188.0	1,154.0	34.0	REMOVE/LOWER
F-1	8.5' FENCE	1,072.1	1,097.8	-25.7	NO ACTION
F-50	8.5' FENCE	1,088.5	1,097.6	-9.1	NO ACTION
GND-1	GROUND	1,060.0	1,055.8	4.2	LOWER
GND-2	GROUND	1,070.0	1,063.2	6.8	LOWER
GND-3	GROUND	1,080.0	1,074.1	5.9	LOWER
GND-4	GROUND	1,090.0	1,084.9	5.1	LOWER
GND-5	GROUND	1,098.3	1,089.9	8.4	LOWER
GND-6	GROUND	1,100.0	1,094.8	5.2	LOWER
SR-1	SERVICE RD.	1,095.0	1,079.6	15.4	NO ACTION
SR-2	SERVICE RD.	1,055.0	1,081.4	-26.4	NO ACTION
SR-3	SERVICE RD.	1,073.2	1,096.8	-23.6	NO ACTION
RD50	K-18 (E)	1,060.0	1,089.8	-29.8	NO ACTION
RD51	K-18 (E)	1,060.0	1,093.2	-33.2	NO ACTION
RD52	K-18 (U)	1,090.0	1,097.0	-7.0	NO ACTION
RD53	K-18 (U)	1,069.0	1,099.9	-30.9	NO ACTION
RD54	WILDCAT RD (E)	1,090.0	1,099.2	-9.2	NO ACTION
RD55	WILDCAT RD (U)	1,115.0	1,125.8	-10.8	NO ACTION
RD56	K-18 (U)	1,099.0	1,132.1	-33.1	NO ACTION
RD57	K-18 (U)	1,099.0	1,133.2	-34.2	NO ACTION
RD58	K-18 (E)	1,155.0	1,161.0	-6.0	NO ACTION
RD59	K-18 (E)	1,145.0	1,166.8	-21.8	NO ACTION
RD4	WILDCAT CRK RD	1,079.5	1,166.8	-87.3	NO ACTION
RD5	K-18 (E)	1,073.2	1,166.8	-93.6	NO ACTION
RD6	K-18 (E)	1,075.8	1,166.8	-91.0	NO ACTION
RR50	RAIL ROAD	1,068.0	1,166.8	-98.8	NO ACTION
RR51	RAIL ROAD	1,076.0	1,166.8	-90.8	NO ACTION
RR2	RAIL ROAD	1,073.0	1,171.8	-98.8	NO ACTION

(1) Part 77 Approach Surface, 50:1 Slope

(2) Negative values denote below surface

Runway 3 Approach Surface (Ult. 1,000' Extension) Obstruction Table

Object No.	Description	Object Elevation	Approach Surface Elevation (1)	Object Penetration (2)	Proposed Object Disposition
1	TREE	1,120.0	1,091.5	28.5	REMOVE/LOWER
2	TREE	1,123.0	1,103.0	20.0	REMOVE/LOWER
3	TREE	1,160.0	1,112.0	48.0	REMOVE/LOWER
4	TREE	1,159.0	1,116.6	42.4	REMOVE/LOWER
5	TREE	1,167.0	1,117.8	49.2	REMOVE/LOWER
6	TREE	1,138.0	1,118.4	19.6	REMOVE/LOWER
7	POLE	1,143.0	1,120.4	22.6	REMOVE/LOWER
8	TREE	1,138.0	1,121.2	16.8	REMOVE/LOWER
9	POLE	1,158.0	1,124.4	33.6	REMOVE/LOWER
10	TREE	1,183.0	1,132.9	50.1	REMOVE/LOWER
11	TREE	1,188.0	1,135.1	52.9	REMOVE/LOWER
12	TREE	1,192.0	1,138.0	54.0	REMOVE/LOWER
13	POLE	1,170.0	1,139.3	30.7	REMOVE/LOWER
14	POLE	1,189.0	1,142.9	46.1	REMOVE/LOWER
15	POLE	1,188.0	1,146.7	41.3	REMOVE/LOWER
F-1	8.5' FENCE	1,072.1	1,090.5	-18.4	NO ACTION
F-100	8.5' FENCE	1,075.5	1,082.6	-7.1	NO ACTION
GND-1	GROUND	1,070.0	1,060.5	9.5	LOWER
GND-2	GROUND	1,080.0	1,060.5	19.5	LOWER
GND-3	GROUND	1,090.0	1,069.4	20.6	LOWER
GND-4	GROUND	1,092.0	1,074.0	18.0	LOWER
GND-5	GROUND	1,090.0	1,078.1	11.9	LOWER
RD100	K-18 (E)	1,064.0	1,079.5	-15.5	NO ACTION
RD101	K-18 (E)	1,064.0	1,082.4	-18.4	NO ACTION
RD102	WILDCAT RD (E)	1,085.0	1,084.6	0.4	NO ACTION
RD103	K-18 (U)	1,076.5	1,086.5	-10.0	NO ACTION
RD104	K-18 (U)	1,076.5	1,089.8	-13.3	NO ACTION
RD105	WILDCAT RD (U)	1,105.0	1,112.1	-7.1	NO ACTION
RD106	K-18 (E)	1,060.0	1,138.5	-78.5	NO ACTION
RD107	K-18 (E)	1,050.0	1,144.7	-94.7	NO ACTION
RD4	WILDCAT RD (E)	1,079.5	1,092.3	-12.8	NO ACTION
RD5	K-18 (E)	1,073.2	1,109.5	-36.3	NO ACTION
RD56	K-18 (U)	1,099.0	1,124.8	-25.8	NO ACTION
RD57	K-18 (U)	1,099.0	1,125.9	-26.9	NO ACTION
RD6	K-18 (E)	1,075.8	1,113.2	-37.4	NO ACTION
RR2	RAIL ROAD (E)	1,073.0	1,164.5	-91.5	NO ACTION
RR100	RAIL ROAD (E)	1,073.0	1,094.0	-21.0	NO ACTION
RR101	RAIL ROAD (U)	1,076.0	1,108.0	-32.0	NO ACTION
RR102	RAIL ROAD (U)	1,076.0	1,110.5	-34.5	NO ACTION
SR-1	SERVICE RD.	1,085.0	1,081.5	3.5	NO ACTION
SR-2	SERVICE RD.	1,058.0	1,072.7	-14.7	NO ACTION
SR-3	SERVICE RD.	1,073.2	1,089.5	-16.3	NO ACTION

(1) Part 77 Approach Surface, 50:1 Slope

(2) Negative values denote below surface

Runway 13 Approach Surface (Ult.) Obstruction Table

Object No.	Description	Object Elevation	Approach Surface Elevation (1)	Object Penetration (2)	Proposed Object Disposition
1	TREE	1,133.0	1,082.3	50.7	REMOVE/LOWER
RD1	SERVICE ROAD	1,069.0	N/A	N/A	N/A
RD2	SERVICE ROAD	1,070.0	1,069.1	0.9	NO ACTION
RD3	SERVICE ROAD	1,076.0	1,072.0	4.0	NO ACTION
RD4	SERVICE ROAD	1,072.0	1,073.7	-1.7	NO ACTION
RD5	SERVICE ROAD	1,075.0	1,073.7	1.3	NO ACTION
RD6	EUREKA DR.	1,089.0	1,093.1	-4.1	NO ACTION
RD7	EUREKA DR.	1,091.0	1,094.7	-3.7	NO ACTION
RD8	EUREKA DR.	1,089.0	1,103.7	-14.7	NO ACTION
RD9	EUREKA DR.	1,090.0	1,113.3	-23.3	NO ACTION
RD10	EUREKA DR.	1,090.0	1,114.2	-24.2	NO ACTION
RD11	EUREKA DR.	1,088.0	1,116.3	-28.3	NO ACTION
RD12	EUREKA DR.	1,089.0	N/A	N/A	N/A
RD13	WILDCAT CR RD.	1,089.0	N/A	N/A	N/A

(1) Part 77 Approach Surface, 34:1 Slope

(2) Negative values denote below surface

HNTB
7450 WEST 130TH STREET
SUITE 400
OVERLAND PARK, KS 66213

REVISIONS

NO.	DESCRIPTION	DATE	BY	APP'D

Manhattan Regional Airport

AIRPORT LAYOUT PLAN

APPROACH SURFACE
OBSTRUCTION DATA TABLES

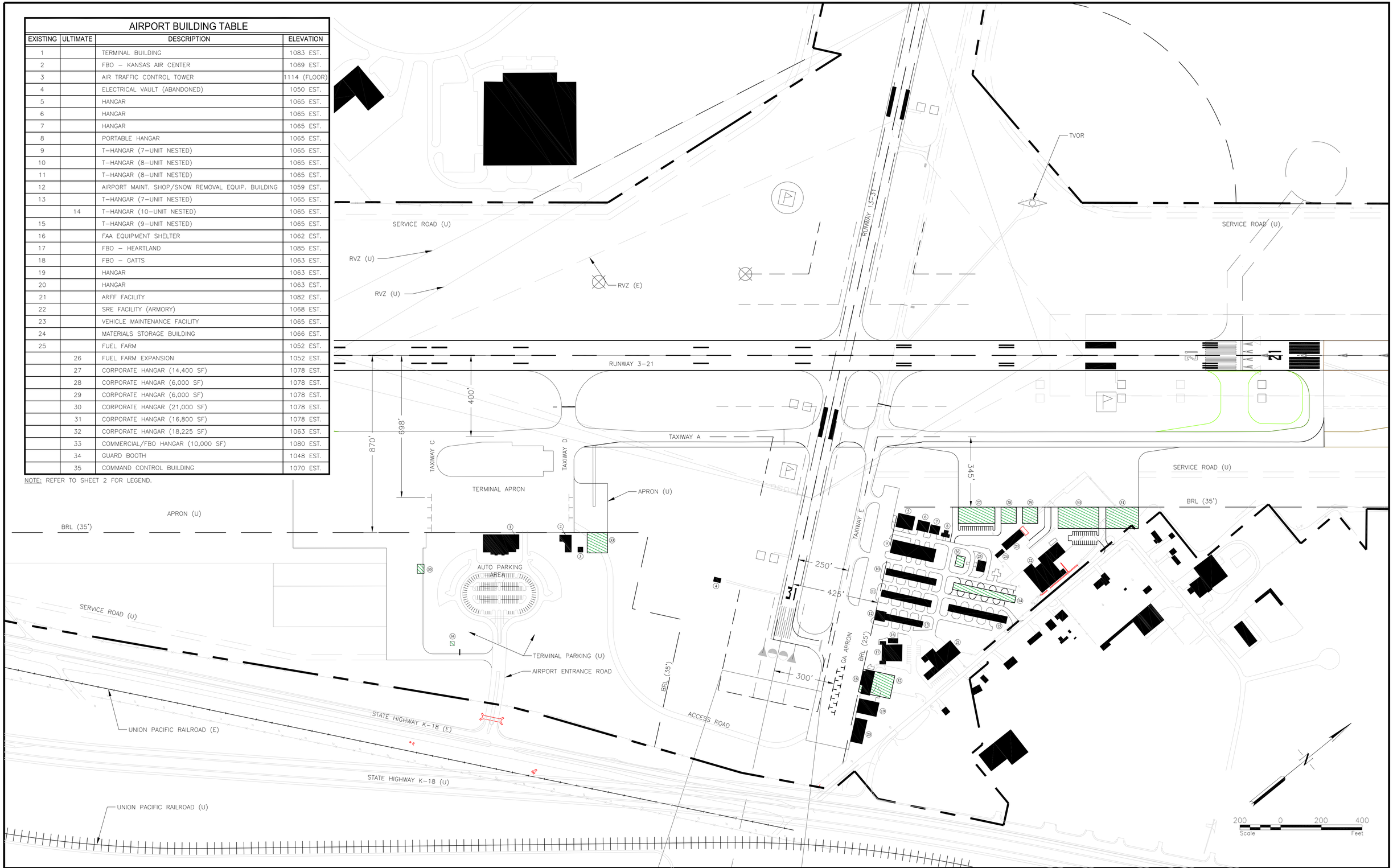
DESIGNED: L. BORNTREGER
DRAWN: J. PETERS
CHECKED: B. TOMPKINS
APPROVED: B. TOMPKINS

DATE: FEBRUARY 2009

AIRPORT BUILDING TABLE

EXISTING	ULTIMATE	DESCRIPTION	ELEVATION
1		TERMINAL BUILDING	1083 EST.
2		FBO – KANSAS AIR CENTER	1069 EST.
3		AIR TRAFFIC CONTROL TOWER	1114 (FLOOR)
4		ELECTRICAL VAULT (ABANDONED)	1050 EST.
5		HANGAR	1065 EST.
6		HANGAR	1065 EST.
7		HANGAR	1065 EST.
8		PORTABLE HANGAR	1065 EST.
9		T–HANGAR (7–UNIT NESTED)	1065 EST.
10		T–HANGAR (8–UNIT NESTED)	1065 EST.
11		T–HANGAR (8–UNIT NESTED)	1065 EST.
12		AIRPORT MAINT. SHOP/SNOW REMOVAL EQUIP. BUILDING	1059 EST.
13		T–HANGAR (7–UNIT NESTED)	1065 EST.
	14	T–HANGAR (10–UNIT NESTED)	1065 EST.
15		T–HANGAR (9–UNIT NESTED)	1065 EST.
16		FAA EQUIPMENT SHELTER	1062 EST.
17		FBO – HEARTLAND	1085 EST.
18		FBO – GATTS	1063 EST.
19		HANGAR	1063 EST.
20		HANGAR	1063 EST.
21		ARFF FACILITY	1082 EST.
22		SRE FACILITY (ARMORY)	1068 EST.
23		VEHICLE MAINTENANCE FACILITY	1065 EST.
24		MATERIALS STORAGE BUILDING	1066 EST.
25		FUEL FARM	1052 EST.
	26	FUEL FARM EXPANSION	1052 EST.
	27	CORPORATE HANGAR (14,400 SF)	1078 EST.
	28	CORPORATE HANGAR (6,000 SF)	1078 EST.
	29	CORPORATE HANGAR (6,000 SF)	1078 EST.
	30	CORPORATE HANGAR (21,000 SF)	1078 EST.
	31	CORPORATE HANGAR (16,800 SF)	1078 EST.
	32	CORPORATE HANGAR (18,225 SF)	1063 EST.
	33	COMMERCIAL/FBO HANGAR (10,000 SF)	1080 EST.
	34	GUARD BOOTH	1048 EST.
	35	COMMAND CONTROL BUILDING	1070 EST.

NOTE: REFER TO SHEET 2 FOR LEGEND.



HNTB
7450 WEST 130TH STREET
SUITE 400
OVERLAND PARK, KS 66213

REVISIONS

NO.	DESCRIPTION	DATE	BY	APP'D

Manhattan Regional Airport

AIRPORT LAYOUT PLAN

TERMINAL AREA PLAN

DESIGNED: L. BORNTREGER
DRAWN: J. PETERS
CHECKED: B. TOMPKINS
APPROVED: B. TOMPKINS
DATE: FEBRUARY 2009
SHEET 14 of 23

LAND USE LEGEND		
ABBREVIATION	PATTERN	DESCRIPTION
AG (E) / AG (U)	NONE	EXISTING AGRICULTURAL UTIMATE AGRICULTURAL
CA (E) / CA (U)	NONE	EXISTING COMMERCIAL ACTIVITY ULTIMATE COMMERCIAL ACTIVITY
RES (E) / RES (U)	NONE	EXISTING RESIDENTIAL USE ULTIMATE RESIDENTIAL USE
CA (E) / AV (U)		EXISTING COMMERCIAL ACTIVITY ULTIMATE AVIATION USE
AV (E) / AV (U)		EXISTING AVIATION USE ULTIMATE AVIATION USE
AG (E) / AV (U)		EXISTING AGRICULTURAL UTIMATE AVIATION USE
RES (E) / AV (U)		EXISTING RESIDENTIAL ULTIMATE AVIATION USE

LEGEND		
EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
		BUILDING CONSTRUCTION
		FACILITY CONSTRUCTION

AG (E) / AV (U)

PROPERTY LINE (U)

PROPERTY LINE (E)

AG (E) / AV (U)

RILEY COUNTY ROAD #320

AG (E) / AG (U)

WILDCAT CREEK ROAD

CA (E) / AV (U)

CA (E) / CA (U)

PROPERTY LINE (U)

RES (E) / RES (U)

PROPERTY LINE (E)

AG (E) / AG (U)

AG (E) / AG (U)

CRL (U)

RUNWAY 3-21

CRL (U)

PROPERTY LINE (E)

CA (E) / AV (U)

PROPERTY LINE (U)

RUNWAY 3-21

TAXIWAY B

TAXIWAY D

TAXIWAY E

CRL (U)

APRON (U)

TAXIWAY C

TAXIWAY A

TERMINAL

APRON (U)

RES (E) / RES (U)

STATE HIGHWAY K-18 (E)

ATCT AND ROTATING BEACON

CA (E) / CA (U)

CA (E) / AV (U)

UNION PACIFIC RAILROAD

STATE HIGHWAY K-18 (U)

PROPERTY LINE (U)

RES (E) / AV (U)

500 0 500 1000

Scale Feet

HNTB
7450 WEST 130TH STREET
SUITE 400
OVERLAND PARK, KS 66213

REVISIONS				
NO.	DESCRIPTION	DATE	BY	APP'D

Manhattan Regional Airport

AIRPORT LAYOUT PLAN

LAND USE PLAN

DESIGNED: L. BORNTREGER
DRAWN: J. PETERS
CHECKED: B. TOMPKINS
APPROVED: B. TOMPKINS

DATE: FEBRUARY 2009

EXISTING PROPERTY				
TRACT	ACREAGE	DATE ACQUIRED	FEDERAL PROJECT NO.	PROPERTY INTEREST
1	120.2	MARCH 1953	9-14-022-303	FEE SIMPLE
2	2.61	MARCH 1953	9-14-022-303	FEE SIMPLE
3	2.56	MARCH 1953	9-14-022-303	FEE SIMPLE
4	28.61	MARCH 1953	9-14-022-303	FEE SIMPLE
5	26.16	APRIL 1963	9-14-022-C205	FEE SIMPLE
6	57.44	SEPTEMBER 1977	6-20-0052-02	FEE SIMPLE
7	13.30	APRIL 1963	9-14-022-C205	FEE SIMPLE
8	1.55	APRIL 1963	9-14-022-C205	FEE SIMPLE
9	1.25	APRIL 1963	9-14-022-C205	FEE SIMPLE
10	.97	APRIL 1963	9-14-022-C205	FEE SIMPLE
11	.97	APRIL 1963	9-14-022-C205	FEE SIMPLE
12	.97	APRIL 1963	9-14-022-C205	FEE SIMPLE
13	6.03	MARCH 1953	9-14-022-303	FEE SIMPLE
14	13.30	APRIL 1963	9-14-022-C205	FEE SIMPLE
15	13.12	APRIL 1963	9-14-022-C205	FEE SIMPLE
16	46.72	APRIL 1963	9-14-022-C205	FEE SIMPLE
17	203.64	SEPTEMBER 1977	6-20-0052-02	FEE SIMPLE
18	46.87	APRIL 1963	9-14-022-C205	FEE SIMPLE
19	17.31	APRIL 1963	9-14-022-C205	FEE SIMPLE
20	48.93	SEPTEMBER 1977	6-20-0052-02	FEE SIMPLE
21	4.00	SEPTEMBER 1981	6-20-0052-02(A4)	FEE SIMPLE
22	3.47	MAY 1999	NON-FEDERAL	FEE SIMPLE
23	5.00	JULY 2007	NON-FEDERAL	FEE SIMPLE
24	73.8	OCTOBER 2008	3-20-0052-34	FEE SIMPLE
E1	19.7	SEPTEMBER 1977	6-20-0052-02	AVIGATION EASEMENT
E2	1.83	MARCH 1963	9-14-022-C205	AVIGATION EASEMENT
E3	24.16	SEPTEMBER 1963	6-20-0052-02	AVIGATION EASEMENT
TOTAL	784.47			

FUTURE PROPERTY TO BE ACQUIRED				
TRACT	ACREAGE	DATE ACQUIRED	FEDERAL PROJECT NO.	PROPERTY INTEREST
100	96.4	--	--	FEE SIMPLE
101	0.25	--	--	FEE SIMPLE
102	1.1	--	--	AVIGATION EASEMENT
103	9.6	--	--	FEE SIMPLE
104	1.5	--	--	AVIGATION EASEMENT
105	7.5	--	--	AVIGATION EASEMENT
106	10.1	--	--	AVIGATION EASEMENT
107	0.8	--	--	AVIGATION EASEMENT
108	1.0	--	--	FEE SIMPLE
109	7.4	--	--	FEE SIMPLE
110	10.7	--	--	FEE SIMPLE*
TOTAL	146.35			

*TRANSFER CITY-OWNED TRACT TO AIRPORT.

LEGEND		
EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPORTY
		AIRPORT PROPERTY LINE
		AVIGATION EASEMENT
		FACILITY CONSTRUCTION
		PARCEL BOUNDARY

NOTE: REFER TO SHEET 2 FOR ADDITIONAL LEGEND.

PROPERTY LINE (E)
PROPERTY LINE (U)
STATE HIGHWAY K-18 (E)
RUNWAY 3-21
RUNWAY 13-31
TAXIWAY A
TAXIWAY B
TAXIWAY C
TAXIWAY D
TAXIWAY E
E1
E2
E3
500 0 500 1000
Scale Feet

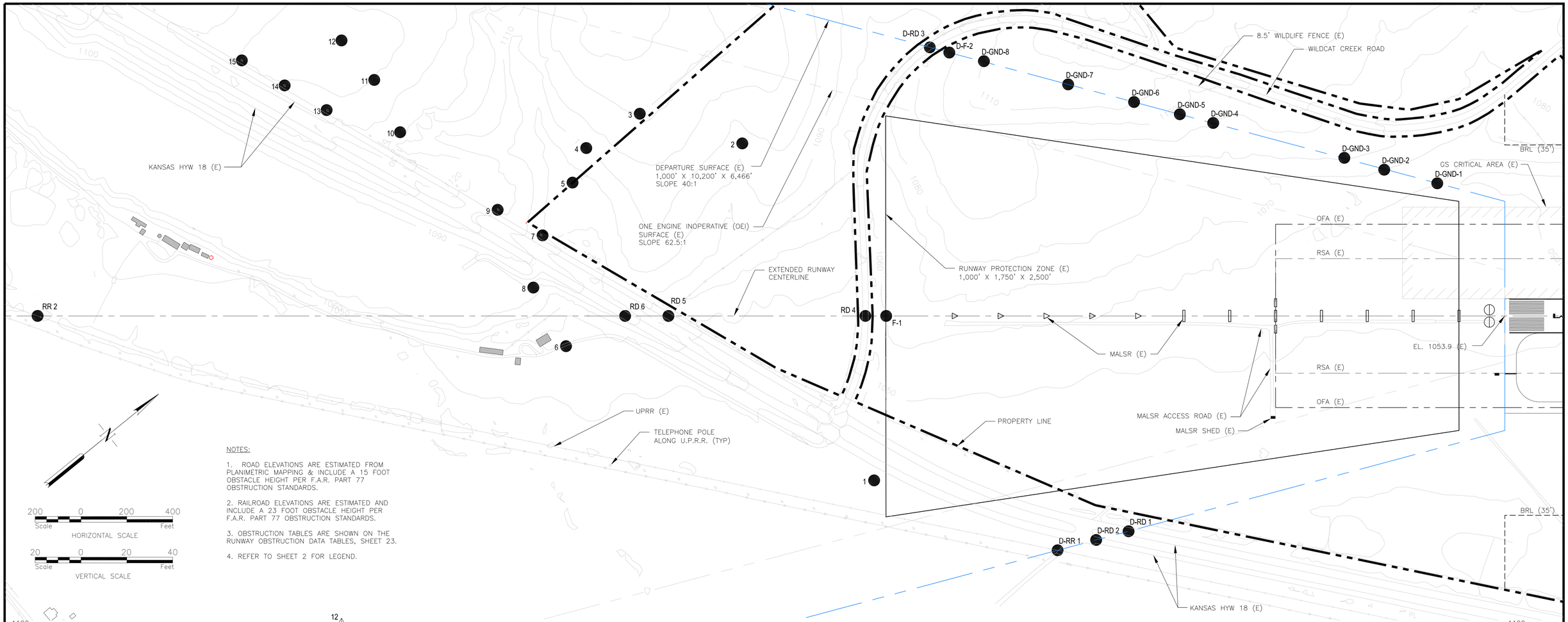
HNTB
7450 WEST 130TH STREET
SUITE 400
OVERLAND PARK, KS 66213

REVISIONS				
NO.	DESCRIPTION	DATE	BY	APP'D
2	Ultimate Tract 108 divided into Tract 107s and 108	3/06/08	LJB	BMT
1	Ultimate Tract 107 Quit Claim Deed to Existing Property	7/13/07	KJF	BMT

Manhattan Regional Airport
AIRPORT LAYOUT PLAN

EXHIBIT A PROPERTY MAP

DESIGNED: L. BORNTREGER
DRAWN: J. PETERS
CHECKED: B. TOMPKINS
APPROVED: B. TOMPKINS
DATE: FEBRUARY 2009

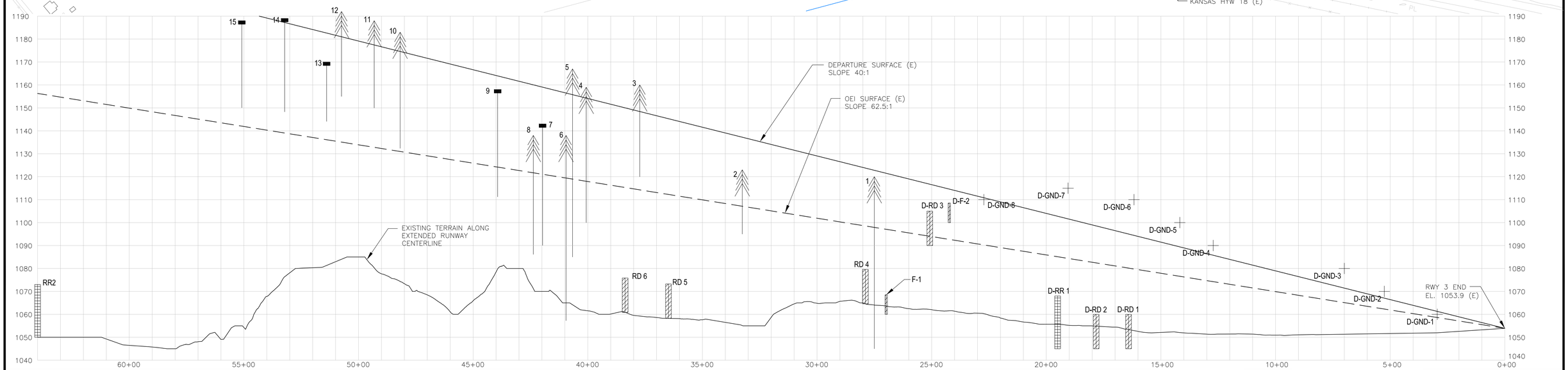


NOTES:

1. ROAD ELEVATIONS ARE ESTIMATED FROM PLANIMETRIC MAPPING & INCLUDE A 15 FOOT OBSTACLE HEIGHT PER F.A.R. PART 77 OBSTRUCTION STANDARDS.
2. RAILROAD ELEVATIONS ARE ESTIMATED AND INCLUDE A 23 FOOT OBSTACLE HEIGHT PER F.A.R. PART 77 OBSTRUCTION STANDARDS.
3. OBSTRUCTION TABLES ARE SHOWN ON THE RUNWAY OBSTRUCTION DATA TABLES, SHEET 23.
4. REFER TO SHEET 2 FOR LEGEND.

200 0 200 400
Scale Feet
HORIZONTAL SCALE

20 0 20 40
Scale Feet
VERTICAL SCALE



HNTB
7450 WEST 130TH STREET
SUITE 400
OVERLAND PARK, KS 66213

REVISIONS

NO.	DESCRIPTION	DATE	BY	APP'D

Manhattan Regional Airport

AIRPORT LAYOUT PLAN

INNER PORTION OF RUNWAY 21 DEPARTURE SURFACE DRAWING EXISTING

DESIGNED: L. BORNTREGER
DRAWN: J. PETERS
CHECKED: B. TOMPKINS
APPROVED: B. TOMPKINS

DATE: FEBRUARY 2009

REALIGN WILDCAT CREEK ROAD (U)

WILDCAT CREEK ROAD (E)

WILDLIFE FENCE (E)

KANSAS HYW 18 (E)

DEPARTURE SURFACE (E)
1,000' X 10,200' X 6,466'
SLOPE 40:1

ONE ENGINE INOPERATIVE (OEI)
SURFACE (E)
SLOPE 62.5:1

RUNWAY PROTECTION ZONE (U)
1,000' X 1,750' X 2,500'

ASOS CRITICAL AREA (U)

GS CRITICAL AREA (U)

BRL (35')

OFA (U)

RSA (U)

EXTENDED RUNWAY CENTERLINE

EL. 1055.8 (U)

UPRR (E)

TELEPHONE POLE ALONG U.P.R.R. (TYP)

KANSAS HYW 18 (U)

MALSR (U)

MALSR ACCESS ROAD (E)

PROPERTY LINE

UPRR (U)

UPRR SERVICE ROAD (U)

AIRPORT PERMIETER/SECURITY ROAD (U)

KANSAS HYW 18 (E)

DEPARTURE SURFACE (U)
SLOPE 40:1

OEI SURFACE (U)
SLOPE 62.5:1

TERRAIN ALONG EXTENDED RUNWAY CENTERLINE (E)

TERRAIN ALONG EXTENDED RUNWAY CENTERLINE (U)

END RWY 3 (U)
EL. 1055.8

NOTES:

1. ROAD ELEVATIONS ARE ESTIMATED FROM PLANIMETRIC MAPPING & INCLUDE A 15 FOOT OBSTACLE HEIGHT PER F.A.R. PART 77 OBSTRUCTION STANDARDS.

2. RAILROAD ELEVATIONS ARE ESTIMATED AND INCLUDE A 23 FOOT OBSTACLE HEIGHT PER F.A.R. PART 77 OBSTRUCTION STANDARDS.

3. AIRPORT SERVICE/PERIMETER ROAD ELEVATIONS ARE ESTIMATED & INCLUDE A 10 FOOT OBSTACLE HEIGHT PER F.A.R. PART 77 OBSTRUCTION STANDARDS.

4. OBSTRUCTION TABLES ARE SHOWN ON THE RUNWAY OBSTRUCTION DATA TABLES, SHEET 23.

5. REFER TO SHEET 2 FOR LEGEND.

HORIZONTAL SCALE
200 0 200 400
Scale Feet

VERTICAL SCALE
20 0 20 40
Scale Feet

HNTB
7450 WEST 130TH STREET
SUITE 400
OVERLAND PARK, KS 66213

REVISIONS

NO.	DESCRIPTION	DATE	BY	APP'D

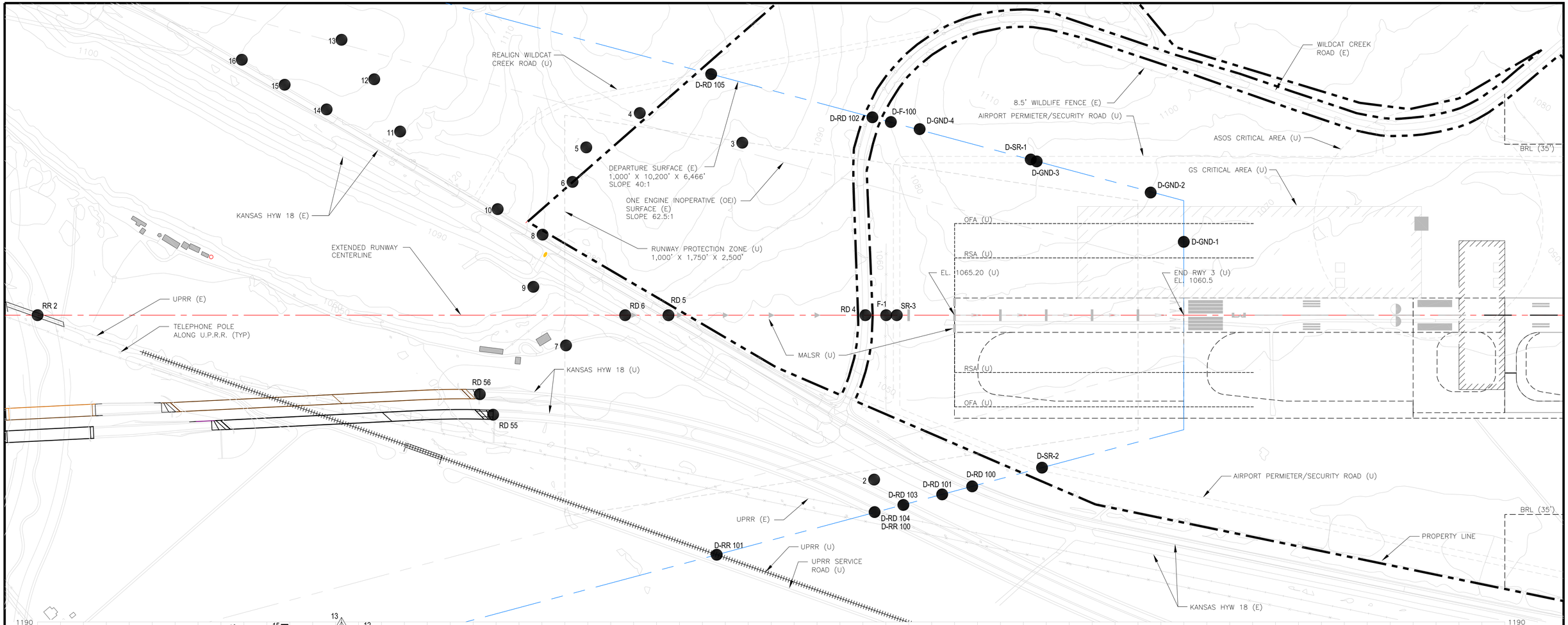
Manhattan Regional Airport

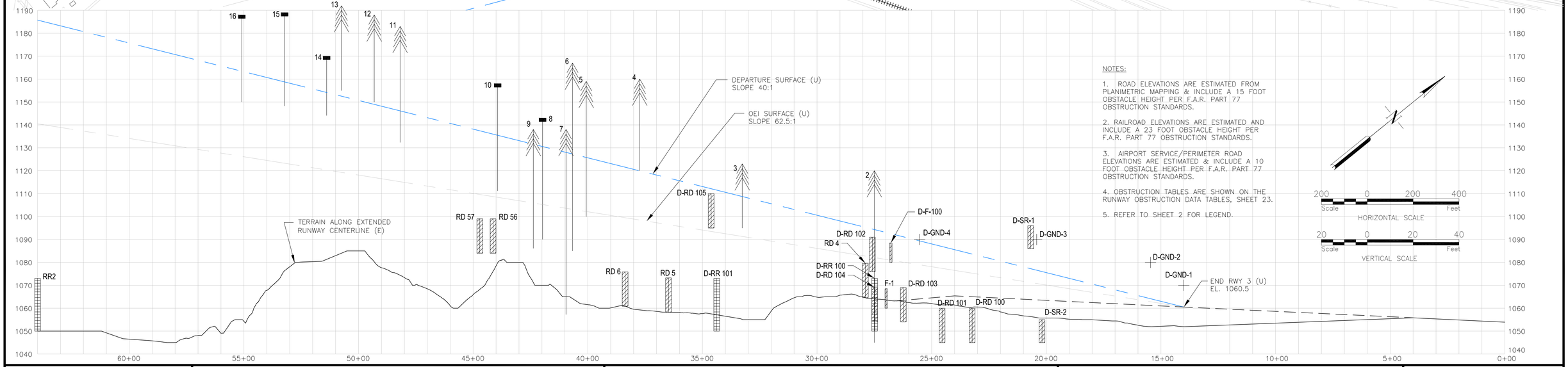
AIRPORT LAYOUT PLAN

INNER PORTION OF RUNWAY 21 DEPARTURE SURFACE DRAWING ULTIMATE 400' EXTENSION

DESIGNED: L. BORNTREGER
DRAWN: J. PETERS
CHECKED: B. TOMPKINS
APPROVED: B. TOMPKINS

DATE: FEBRUARY 2009





NOTES:

1. ROAD ELEVATIONS ARE ESTIMATED FROM PLANIMETRIC MAPPING & INCLUDE A 15 FOOT OBSTACLE HEIGHT PER F.A.R. PART 77 OBSTRUCTION STANDARDS.
2. RAILROAD ELEVATIONS ARE ESTIMATED AND INCLUDE A 23 FOOT OBSTACLE HEIGHT PER F.A.R. PART 77 OBSTRUCTION STANDARDS.
3. AIRPORT SERVICE/PERIMETER ROAD ELEVATIONS ARE ESTIMATED & INCLUDE A 10 FOOT OBSTACLE HEIGHT PER F.A.R. PART 77 OBSTRUCTION STANDARDS.
4. OBSTRUCTION TABLES ARE SHOWN ON THE RUNWAY OBSTRUCTION DATA TABLES, SHEET 23.
5. REFER TO SHEET 2 FOR LEGEND.

200 0 200 400 Feet
Scale HORIZONTAL SCALE

20 0 20 40 Feet
Scale VERTICAL SCALE

HNTB
7450 WEST 130TH STREET
SUITE 400
OVERLAND PARK, KS 66213

REVISIONS

NO.	DESCRIPTION	DATE	BY	APP'D

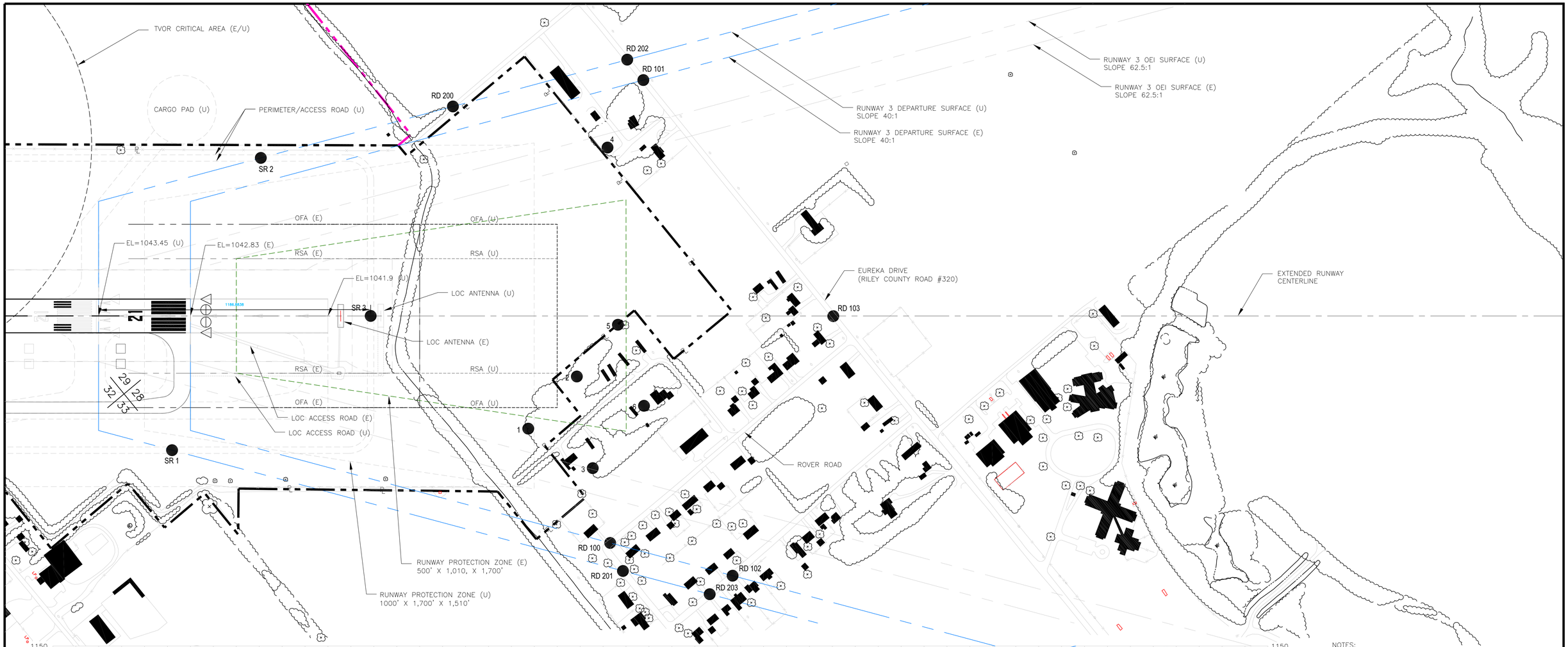
Manhattan Regional Airport

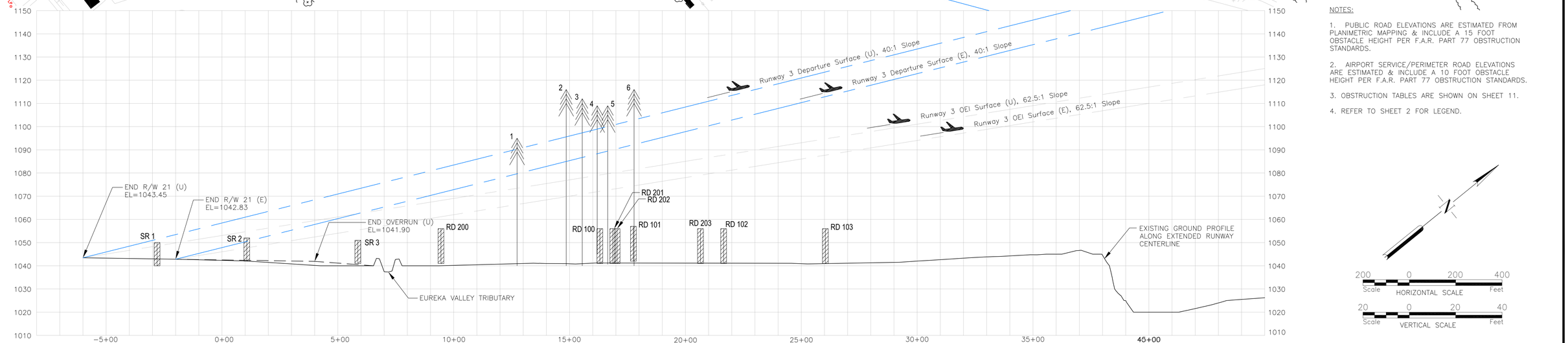
AIRPORT LAYOUT PLAN

INNER PORTION OF RUNWAY 21 DEPARTURE SURFACE DRAWING ULTIMATE 1,000' EXTENSION

DESIGNED: L. BORNTREGER
DRAWN: J. PETERS
CHECKED: B. TOMPKINS
APPROVED: B. TOMPKINS

DATE: FEBRUARY 2009





NOTES:

1. PUBLIC ROAD ELEVATIONS ARE ESTIMATED FROM PLANIMETRIC MAPPING & INCLUDE A 15 FOOT OBSTACLE HEIGHT PER F.A.R. PART 77 OBSTRUCTION STANDARDS.

2. AIRPORT SERVICE/PERIMETER ROAD ELEVATIONS ARE ESTIMATED & INCLUDE A 10 FOOT OBSTACLE HEIGHT PER F.A.R. PART 77 OBSTRUCTION STANDARDS.

3. OBSTRUCTION TABLES ARE SHOWN ON SHEET 11.

4. REFER TO SHEET 2 FOR LEGEND.

HNTB
7450 WEST 130TH STREET
SUITE 400
OVERLAND PARK, KS 66213

REVISIONS

NO.	DESCRIPTION	DATE	BY	APP'D

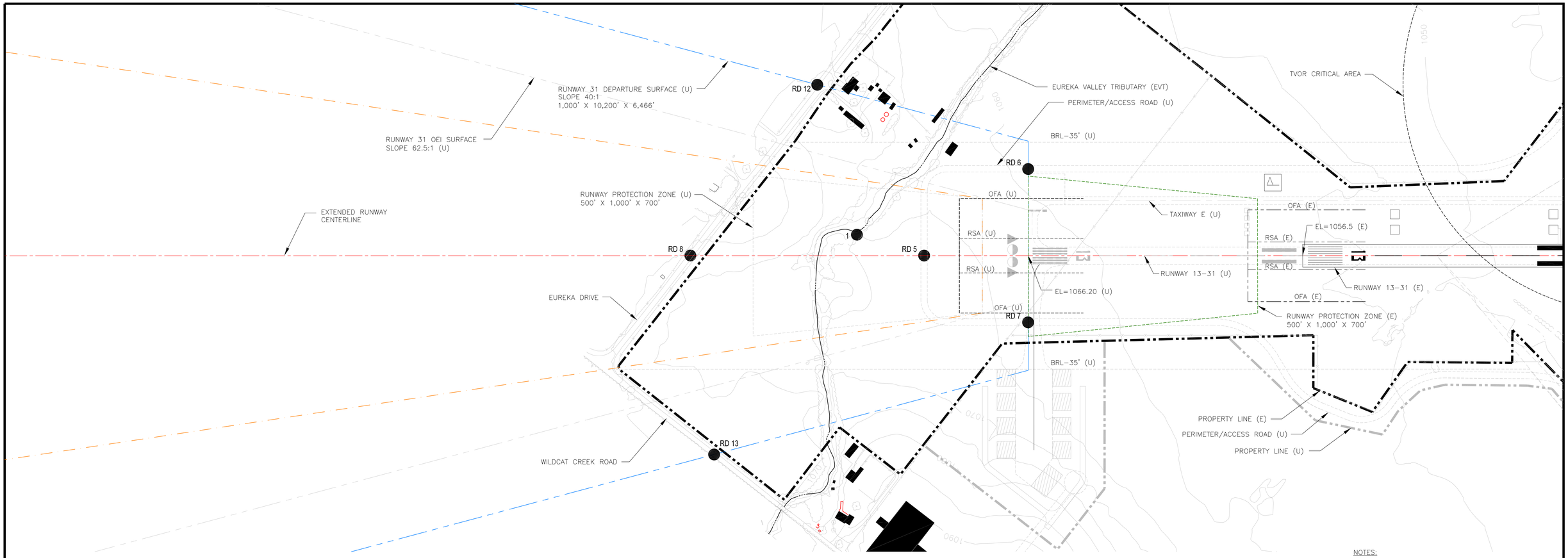
Manhattan Regional Airport

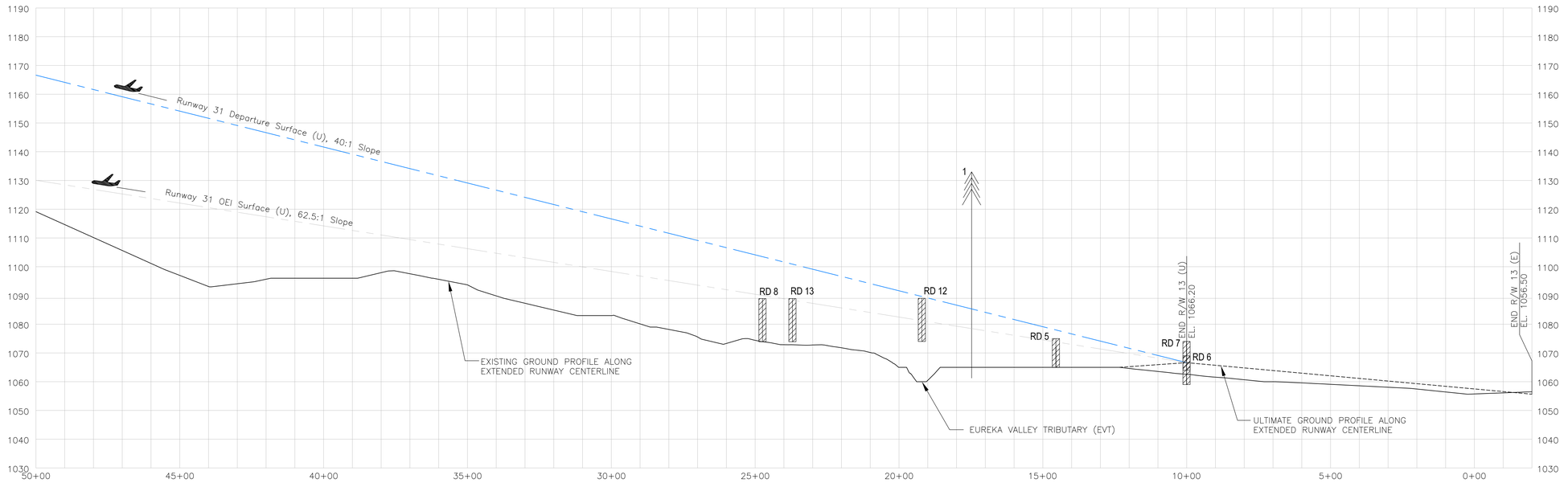
AIRPORT LAYOUT PLAN

INNER PORTION OF RUNWAY 3 DEPARTURE SURFACE DRAWING

DESIGNED: L. BORNTREGER
DRAWN: J. PETERS
CHECKED: B. TOMPKINS
APPROVED: B. TOMPKINS

DATE: FEBRUARY 2009





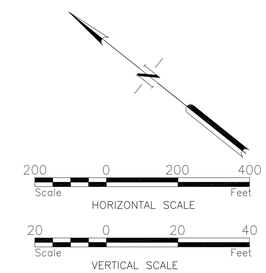
NOTES:

1. PUBLIC ROAD ELEVATIONS ARE ESTIMATED FROM PLANIMETRIC MAPPING AND INCLUDE A 15 FOOT OBSTACLE HEIGHT PER F.A.R. PART 77 OBSTRUCTION STANDARDS.

2. AIRPORT SERVICE/PERIMETER ROAD ELEVATIONS ARE ESTIMATED AND INCLUDE A 10 FOOT OBSTACLE HEIGHT PER F.A.R. PART 77 OBSTRUCTION STANDARDS.

3. OBSTRUCTION TABLES ARE SHOWN ON, SHEET 23.

4. REFER TO SHEET 2 FOR LEGEND.



HNTB
7450 WEST 130TH STREET
SUITE 400
OVERLAND PARK, KS 66213

REVISIONS

NO.	DESCRIPTION	DATE	BY	APP'D

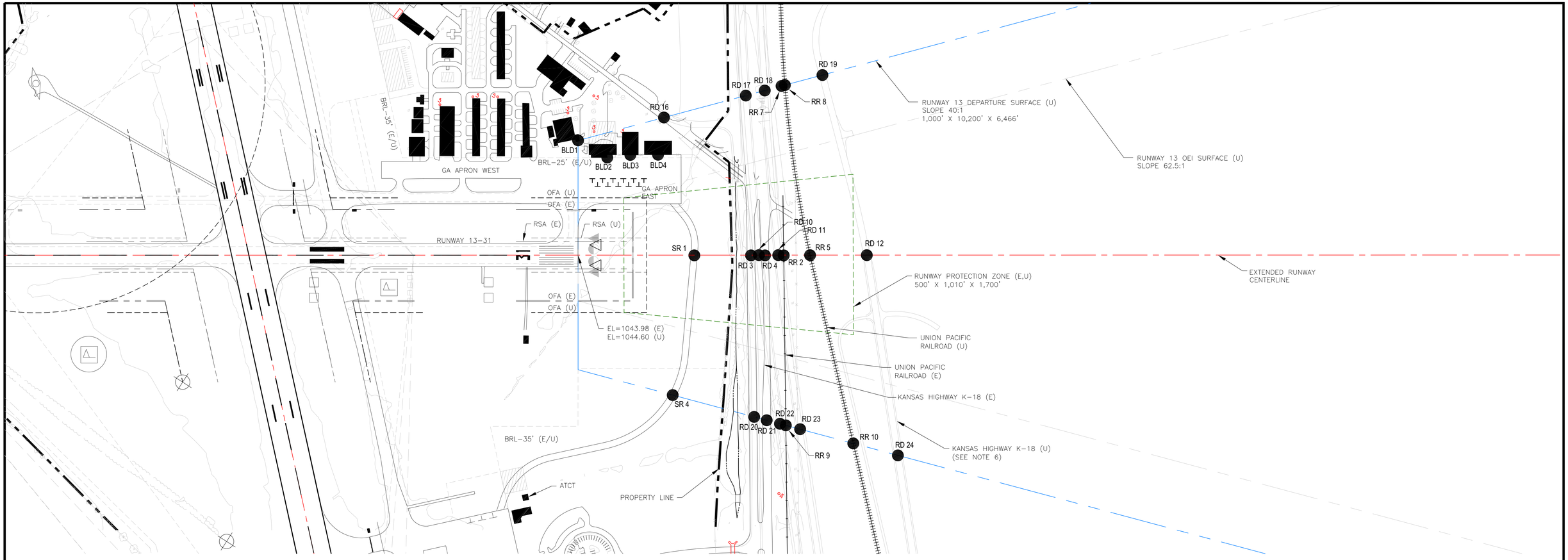
Manhattan Regional Airport

AIRPORT LAYOUT PLAN

INNER PORTION OF RUNWAY 31 DEPARTURE SURFACE DRAWING

DESIGNED: L. BORNTREGER
DRAWN: J. PETERS
CHECKED: B. TOMPKINS
APPROVED: B. TOMPKINS

DATE: FEBRUARY 2009



NOTES:

1. PUBLIC ROAD ELEVATIONS ARE ESTIMATED FROM PLANIMETRIC MAPPING AND INCLUDE A 15 FOOT OBSTACLE HEIGHT PER F.A.R. PART 77 OBSTRUCTION STANDARDS.

2. AIRPORT SERVICE/PERIMETER ROAD ELEVATIONS ARE ESTIMATED & INCLUDE A 10 FOOT OBSTACLE HEIGHT PER F.A.R. PART 77 OBSTRUCTION STANDARDS.

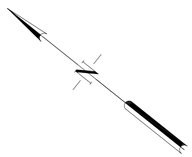
3. RAILROAD ELEVATIONS ARE ESTIMATED AND INCLUDE A 23 FOOT OBSTACLE HEIGHT PER F.A.R. PART 77 OBSTRUCTION STANDARDS.

4. RD4 AND RD18 ARE NOT SHOWN FOR CLARITY. THESE TWO POINTS ARE APPROXIMATELY THE SAME DISTANCE AND ELEVATION AS RD21 BUT AT A LOWER ELEVATION.

5. ULTIMATE RR8 NOT SHOWN FOR CLARITY. POINTS IS APPROXIMATELY THE SAME DISTANCE AND ELEVATION AS EXISTING RR7.

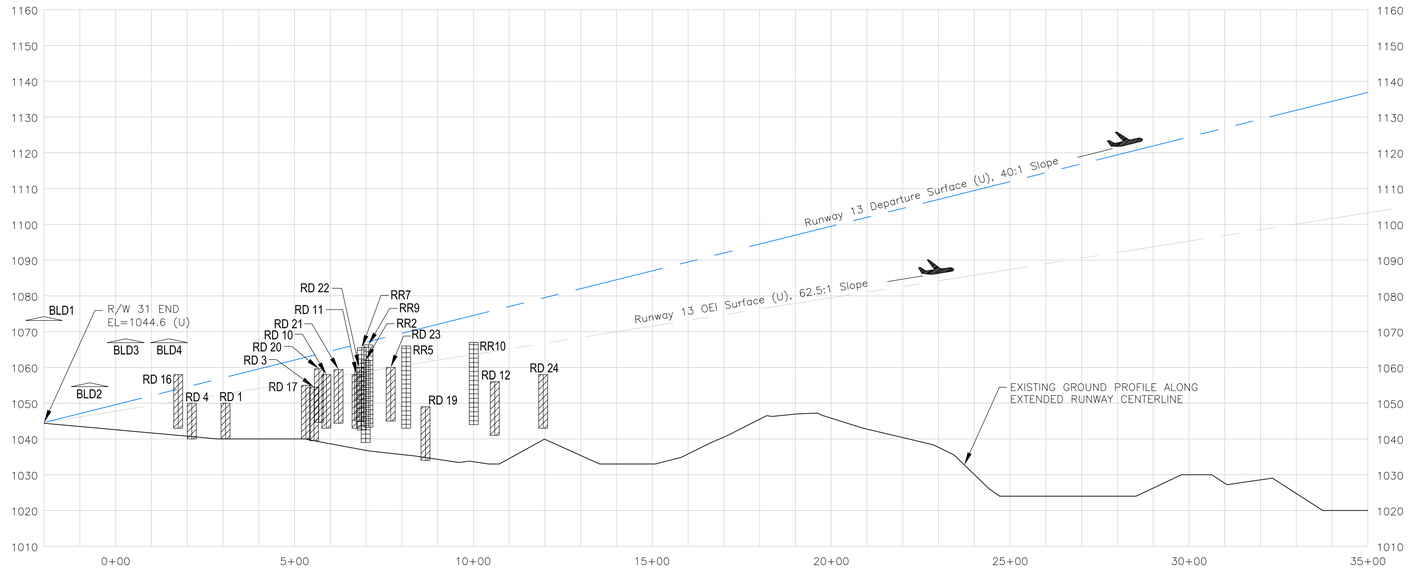
6. OBSTRUCTION TABLES ARE SHOWN ON, SHEET 23.

7. REFER TO SHEET 2 FOR LEGEND.



200 0 200 400
Scale Feet
HORIZONTAL SCALE

20 0 20 40
Scale Feet
VERTICAL SCALE



HNTB
7450 WEST 130TH STREET
SUITE 400
OVERLAND PARK, KS 66213

REVISIONS

NO.	DESCRIPTION	DATE	BY	APP'D

Manhattan Regional Airport

AIRPORT LAYOUT PLAN

INNER PORTION OF RUNWAY 13 DEPARTURE SURFACE DRAWING

DESIGNED: L. BORNTREGER
DRAWN: J. PETERS
CHECKED: B. TOMPKINS
APPROVED: B. TOMPKINS

DATE: FEBRUARY 2009

SHEET 22 of 23

Runway 21 Departure Surface (Ex.) Obstruction Table

Object No.	Description	Object Elevation	Departure Surface Elevation (1)	Object Penetration (2)	Proposed Object Disposition
1	TREE	1,120.0	1,122.7	-2.7	NO ACTION
2	TREE	1,123.0	1,137.1	-14.1	NO ACTION
3	TREE	1,160.0	1,148.2	11.8	REMOVE/LOWER
4	TREE	1,159.0	1,154.1	4.9	REMOVE/LOWER
5	TREE	1,167.0	1,155.6	11.4	REMOVE/LOWER
6	TREE	1,138.0	1,156.3	-18.3	NO ACTION
7	POLE	1,143.0	1,158.8	-15.8	NO ACTION
8	TREE	1,138.0	1,159.8	-21.8	NO ACTION
9	POLE	1,158.0	1,163.7	-5.7	NO ACTION
10	TREE	1,183.0	1,174.4	8.6	REMOVE/LOWER
11	TREE	1,188.0	1,177.2	10.8	REMOVE/LOWER
12	TREE	1,192.0	1,180.8	11.2	REMOVE/LOWER
13	POLE	1,170.0	1,182.4	-12.4	NO ACTION
14	POLE	1,189.0	1,187.0	2.0	REMOVE/LOWER
15	POLE	1,188.0	1,191.6	-3.6	NO ACTION
F-1	8.5' FENCE	1,072.1	1,121.4	-49.3	NO ACTION
D-F-2	8.5' FENCE	1,108.5	1,114.5	-6.0	NO ACTION
D-GND-1	GROUND	1,060.0	1,061.3	-1.3	NO ACTION
D-GND-2	GROUND	1,070.0	1,067.0	3.0	LOWER
D-GND-3	GROUND	1,080.0	1,071.4	8.6	LOWER
D-GND-4	GROUND	1,090.0	1,085.7	4.3	LOWER
D-GND-5	GROUND	1,100.0	1,089.3	10.7	LOWER
D-GND-6	GROUND	1,100.0	1,094.3	5.7	LOWER
D-GND-7	GROUND	1,105.0	1,101.5	3.5	LOWER
D-GND-8	GROUND	1,100.0	1,110.7	-10.7	NO ACTION
D-RD1	K-18	1,060.0	1,094.9	-34.9	NO ACTION
D-RD2	K-18	1,060.0	1,098.5	-38.5	NO ACTION
D-RD3	WILDCAT CRK RD	1,105.0	1,116.6	-11.6	NO ACTION
RD4	WILDCAT CRK RD	1,079.5	1,123.6	-44.1	NO ACTION
RD5	K-18	1,073.2	1,145.1	-71.9	NO ACTION
RD6	K-18	1,075.8	1,149.8	-74.0	NO ACTION
D-RR1	RAIL ROAD	1,068.0	1,102.7	-34.7	NO ACTION
RR2	RAIL ROAD	1,073.0	1,213.9	-140.9	NO ACTION

(1) Standard 40:1 Slope

(2) Negative values denote below surface

Runway 21 Departure Surface (Ult. 400' Extension) Obstruction Table

Object No.	Description	Object Elevation	Departure Surface Elevation (1)	Object Penetration (2)	Proposed Object Disposition
1	TREE	1,120.0	1,114.6	5.4	NO ACTION
2	TREE	1,123.0	1,129.0	-6.0	REMOVE/LOWER
3	TREE	1,160.0	1,140.1	19.9	NO ACTION
4	TREE	1,159.0	1,146.0	13.0	NO ACTION
5	TREE	1,167.0	1,147.5	19.5	NO ACTION
6	TREE	1,138.0	1,148.2	-10.2	REMOVE/LOWER
7	POLE	1,143.0	1,150.7	-7.7	REMOVE/LOWER
8	TREE	1,138.0	1,151.7	-13.7	REMOVE/LOWER
9	POLE	1,158.0	1,155.6	2.4	NO ACTION
10	TREE	1,183.0	1,166.3	16.7	NO ACTION
11	TREE	1,188.0	1,169.1	18.9	NO ACTION
12	TREE	1,192.0	1,172.7	19.3	NO ACTION
13	POLE	1,170.0	1,174.3	-4.3	REMOVE/LOWER
14	POLE	1,189.0	1,178.9	10.1	NO ACTION
15	POLE	1,188.0	1,183.5	4.5	NO ACTION
F-1	8.5' FENCE	1,072.1	1,113.3	-41.2	NO ACTION
D-F-50	8.5' FENCE	1,108.5	1,109.1	-0.6	NO ACTION
D-GND-1	GROUND	1,060.0	1,056.9	3.1	LOWER
D-GND-2	GROUND	1,070.0	1,065.9	4.1	LOWER
D-GND-3	GROUND	1,080.0	1,073.9	6.1	LOWER
D-GND-4	GROUND	1,090.0	1,081.2	8.8	LOWER
D-GND-5	GROUND	1,100.0	1,087.6	12.4	LOWER
D-GND-6	GROUND	1,110.0	1,093.3	16.7	LOWER
D-GND-7	GROUND	1,112.0	1,099.7	12.3	LOWER
D-GND-8	GROUND	1,110.0	1,103.5	6.5	LOWER
D-GND-9	GROUND	1,100.0	1,106.6	-6.6	LOWER
D-SR-1	SERVICE RD.	1,085.0	1,072.4	12.6	NO ACTION
D-SR-2	SERVICE RD.	1,054.0	1,082.1	-28.1	NO ACTION
SR-3	SERVICE RD.	1,073.2	1,112.1	-38.9	NO ACTION
D-RD50	K-18 (E)	1,060.0	1,092.7	-32.7	NO ACTION
D-RD51	K-18 (E)	1,060.0	1,096.2	-36.2	NO ACTION
D-RD52	K-18 (U)	1,069.0	1,102.5	-33.5	NO ACTION
D-RD53	K-18 (U)	1,069.0	1,105.6	-36.6	NO ACTION
D-RD54	WILDCAT RD (E)	1,100.0	1,111.0	-11.0	NO ACTION
D-RD55	WILDCAT RD (U)	1,100.0	1,117.7	-17.7	NO ACTION
RD56	K-18 (U)	1,099.0	1,156.1	-57.1	NO ACTION
RD57	K-18 (U)	1,099.0	1,157.6	-58.6	NO ACTION
RD4	WILDCAT CRK RD	1,079.5	1,199.6	-120.1	NO ACTION
RD5	K-18 (E)	1,073.2	1,199.6	+126.4	NO ACTION
RD6	K-18 (E)	1,075.8	1,199.6	+123.8	NO ACTION
D-RR50	RAIL ROAD	1,076.0	1,100.2	-24.2	NO ACTION
D-RR51	RAIL ROAD	1,078.0	1,120.9	-42.9	NO ACTION
RR2	RAIL ROAD	1,073.0	1,205.8	+132.8	NO ACTION

(1) Standard 40:1 Slope

(2) Negative values denote below surface

Runway 21 Departure Surface (Ult. 1,000' Extension) Obstruction Table

Object No.	Description	Object Elevation	Departure Surface Elevation (1)	Object Penetration (2)	Proposed Object Disposition
1	TREE	1,120.0	1,104.3	15.7	NO ACTION
2	TREE	1,123.0	1,118.7	4.3	REMOVE/LOWER
3	TREE	1,160.0	1,129.8	30.2	NO ACTION
4	TREE	1,159.0	1,135.7	23.3	NO ACTION
5	TREE	1,167.0	1,137.2	29.8	NO ACTION
6	TREE	1,138.0	1,137.9	0.1	REMOVE/LOWER
7	POLE	1,143.0	1,140.4	2.6	REMOVE/LOWER
8	TREE	1,138.0	1,141.4	-3.4	REMOVE/LOWER
9	POLE	1,158.0	1,145.3	12.7	NO ACTION
10	TREE	1,183.0	1,156.0	27.0	NO ACTION
11	TREE	1,188.0	1,158.8	29.2	NO ACTION
12	TREE	1,192.0	1,162.4	29.6	NO ACTION
13	POLE	1,170.0	1,164.0	6.0	REMOVE/LOWER
14	POLE	1,189.0	1,168.6	20.4	NO ACTION
15	POLE	1,188.0	1,173.2	14.8	NO ACTION
F-1	8.5' FENCE	1,072.1	1,103.0	-30.9	NO ACTION
D-F-100	8.5' FENCE	1,085.0	1,092.4	-7.4	NO ACTION
D-GND-1	GROUND	1,070.0	1,060.5	9.5	LOWER
D-GND-2	GROUND	1,080.0	1,064.1	15.9	LOWER
D-GND-3	GROUND	1,090.0	1,076.5	13.5	LOWER
D-GND-4	GROUND	1,090.0	1,089.3	0.7	LOWER
D-RD100	K-18 (E)	1,060.0	1,083.6	-23.6	LOWER
D-RD101	K-18 (E)	1,060.0	1,086.9	-26.9	LOWER
D-RD102	WILDCAT RD (E)	1,091.0	1,094.5	-3.5	LOWER
D-RD103	K-18 (U)	1,069.0	1,091.1	-22.1	LOWER
D-RD104	K-18 (U)	1,069.0	1,094.3	-25.3	NO ACTION
D-RD105	WILDCAT RD (U)	1,110.0	1,112.0	-2.0	NO ACTION
RD4	WILDCAT RD (E)	1,079.5	1,105.2	-25.7	NO ACTION
RD5	K-18 (E)	1,073.2	1,126.7	-53.5	NO ACTION
RD56	K-18 (U)	1,099.0	1,145.8	-46.8	NO ACTION
RD57	K-18 (U)	1,099.0	1,147.3	-48.3	NO ACTION
RD6	K-18 (E)	1,075.8	1,131.4	-55.6	NO ACTION
RR2	RAIL ROAD (E)	1,073.0	1,195.5	-122.5	NO ACTION
D-RR100	RAIL ROAD (E)	1,073.0	1,094.3	-21.3	NO ACTION
D-RR101	RAIL ROAD (U)	1,073.0	1,111.4	-38.4	NO ACTION
D-SR-1	SERVICE RD.	1,096.0	1,077.2	18.8	NO ACTION
D-SR-2	SERVICE RD.	1,055.0	1,076.0	-21.0	NO ACTION
SR-3	SERVICE RD.	1,073.2	1,101.8	-28.6	NO ACTION

(1) Standard 40:1 Slope

(2) Negative values denote below surface

Runway 3 Departure Surface (Ex.) Obstruction Table

Object No.	Description	Object Elevation	Departure Surface Elevation (1)	Object Penetration (2)	Proposed Object Disposition
1	TREE	1,095.0	1,079.7	15.3	REMOVE/LOWER
2	TREE	1,116.0	1,085.0	31.0	REMOVE/LOWER
3	TREE	1,112.0	1,086.7	25.3	REMOVE/LOWER
4	TREE	1,109.0	1,088.3	20.7	REMOVE/LOWER
5	TREE	1,109.0	1,089.4	19.6	REMOVE/LOWER
6	TREE	1,116.0	1,092.3	23.7	REMOVE/LOWER
RD100	ROVER ROAD	1,056.0	1,088.6	-32.6	NO ACTION
RD101	EUREKA DRIVE	1,057.0	1,092.2	-35.2	NO ACTION
RD102	ROVER ROAD	1,056.0	1,102.0	-46.0	NO ACTION
RD103	EUREKA DRIVE	1,056.0	1,112.9	-56.9	NO ACTION

(1) Standard 40:1 Slope

(2) Negative values denote below surface

Runway 3 Departure Surface (Ult.) Obstruction Table

Object No.	Description	Object Elevation	Departure Surface Elevation (1)	Object Penetration (2)	Proposed Object Disposition
1	TREE	1,095.0	1,043.5	1090.3	4.7
2	TREE	1,116.0	1,043.5	1095.6	20.4
3	TREE	1,112.0	1,043.5	1097.3	14.7
4	TREE	1,109.0	1,043.5	1098.9	10.1
5	TREE	1,109.0	1,043.5	1100.1	8.9
6	TREE	1,116.0	1,043.5	1102.9	13.1
RD103	EUREKA DRIVE	1,056.0	1,043.5	1123.6	-67.6
RD200	ACCESS ROAD	1,056.0	1,043.5	1082.1	-26.1
RD201	ROVER ROAD	1,056.0	1,043.5	1100.6	-44.6
RD202	EUREKA DRIVE	1,056.0	1,043.5	1101.1	-45.1
RD203	ROVER ROAD	1,056.0	1,043.5	1110.1	-54.1
SR1	SERVICE ROAD	1,050.0	1,043.5	1051.4	-1.4
SR2	SERVICE ROAD	1,052.0	1,043.5	1061.1	-9.1
SR3	SERVICE ROAD	1,051.0	1,043.5	1073.1	-22.1

(1) Standard 40:1 Slope

(2) Negative values denote below surface

Runway 13 Departure Surface (Ult.) Obstruction Table

Object No.	Description	Object Elevation	Departure Surface Elevation (1)	Object Penetration (2)	Proposed Object Disposition
SR1	SERVICE ROAD	1,050.0	1,057.3	-7.3	NO ACTION
SR4	SERVICE ROAD	1,050.0	1,054.9	-4.9	NO ACTION
RD3	K-18 (E)	1,054.5	1,063.5	-9.0	NO ACTION
RD4	K-18 (E)	1,053.4	1,065.0	-11.6	NO ACTION
RD10	K-18 (U)	1,058.0	1,064.3	-6.3	NO ACTION
RD11	K-18 (U)	1,058.0	1,066.4	-8.4	NO ACTION
RD12	K-18 (U)	1,056.0	1,076.1	-20.1	NO ACTION
RD16	S. AIRPORT RD.	1,058.0	1,054.0	4.0	NO ACTION
RD17	K-18 (E)	1,057.5	1,062.9	-5.4	NO ACTION
RD18	K-18 (E)	1,057.5	1,065.0	-7.5	NO ACTION
RD19	K-18 (U)	1,049.0	1,071.3	-22.3	NO ACTION
RD20	K-18 (E)	1,059.6	1,063.8	-4.2	NO ACTION
RD21	K-18 (E)	1,059.4	1,065.5	-6.1	NO ACTION
RD22	K-18 (U)	1,060.0	1,066.6	-6.6	NO ACTION
RD23	K-18 (U)	1,060.0	1,068.8	-8.8	NO ACTION
RD24	K-18 (U)	1,058.0	1,079.5	-21.5	NO ACTION
RR2	UPRR (E)	1,062.0	1,067.1	-5.1	NO ACTION
RR5	UPRR (U)	1,066.0	1,071.0	-5.0	NO ACTION
RR7	UPRR (E)	1,065.5	1,066.8	-1.3	NO ACTION
RR8	UPRR (U)	1,064.0	1,069.0	-5.0	NO ACTION
RR9	UPRR (E)	1,066.3	1,067.3	-1.0	NO ACTION
RR10	UPRR (U)	1,067.0	1,074.4	-7.4	NO ACTION
BLD1	HANGAR	1,074.2	1,044.6	29.6	NO ACTION
BLD2	HANGAR	1,055.7	1,047.8	7.9	NO ACTION
BLD3	HANGAR	1,068.0	1,050.3	17.7	NO ACTION
BLD4	HANGAR	1,068.0	1,053.3	14.7	NO ACTION

(1) Standard 40:1 Slope

(2) Negative values denote below surface

Runway 31 Departure Surface (Ult.) Obstruction Table

Object No.	Description	Object Elevation	Departure Surface Elevation (1)	Object Penetration (2)	Proposed Object Disposition
1	TREE	1,133.0	1,084.9	48.1	REMOVE/LOWER
RD5	SERVICE ROAD	1,075.0	1,077.6	-2.6	NO ACTION
RD8	EUREKA DR.	1,089.0	1,103.1	-14.1	NO ACTION
RD12	EUREKA DR.	1,089.0	1,089.2	-0.2	NO ACTION
RD13	WILDCAT CR RD.	1,089.0	1,100.5	-11.5	NO ACTION

(1) Standard 40:1 Slope

(2) Negative values denote below surface

NOTE:

1) WHEN AMOUNT OF OBJECT PENETRATION IS LESS THAN 35', A REDUCTION IN TODA IS NOT REQUIRED; HOWEVER, PENETRATION MAY AFFECT NEW DEPARTURE PROCEDURE ACCCORDING TO AC 150/5300-13, CHANGE 13, APPENDIX 2, PARAGRAPH 5.D.(1)(a).

HNTB
7450 WEST 130TH STREET
SUITE 400
OVERLAND PARK, KS 66213

REVISIONS

NO.	DESCRIPTION	DATE	BY	APP'D

Manhattan Regional Airport

AIRPORT LAYOUT PLAN

RUNWAY OBSTRUCTION DATA TABLES

DESIGNED: L. BORNTREGER
DRAWN: J. PETERS
CHECKED: B. TOMPKINS
APPROVED: B. TOMPKINS

DATE: FEBRUARY 2009