Terminal Area Master Plan

Fremont Municipal Airport

prepared for the

City of Fremont

FREMONT

NEBRASKA PATHFINDERS

Final Report

February 8, 2018

prepared by

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DAVIS DESIGN

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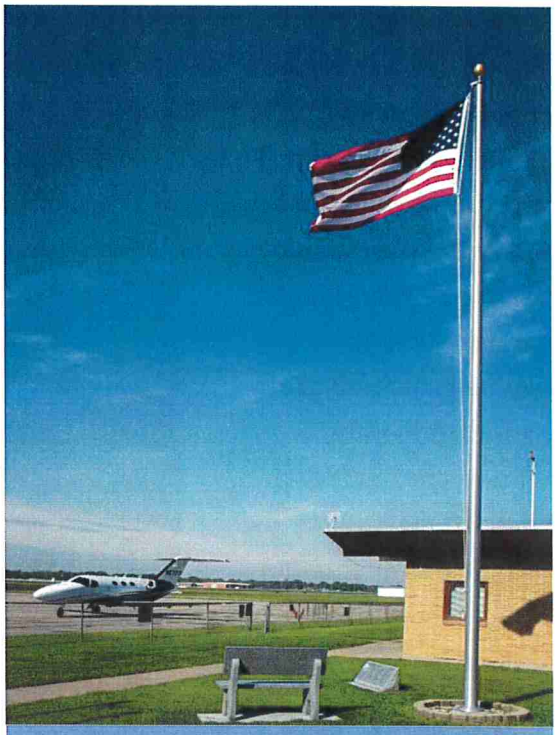
CHAPTER 1 INTRODUCTION

The Fremont Municipal Airport (FET) is a general aviation (GA) facility that provides regional access to the national airspace system (NAS) for business, recreational, and flight training operations. The City of Fremont is home to several manufacturing facilities and businesses who utilize the airport for business-related operations. However, the existing facility appears to be undersized to meet the daily aircraft operational demand. Accordingly, the City recognizes the need to develop a plan to accommodate existing and future aviation demand. A study was initiated in 2013 titled, "Terminal Area Plan Update" to identify terminal area improvement alternatives; however, this study was neither accepted nor approved by FAA or NDOT. See Appendix 1 for details.



Airport Terminal Area

The airport receives a significant number of itinerant operations by corporate aircraft, including many small to medium-sized business jets who remain on the aircraft apron during their stay in Fremont, sometimes overnight. The current aircraft parking apron is designed primarily for smaller single-engine aircraft while the daily presence of business jets, with wider wing spans, results in reduced wing tip clearances that are inconsistent with FAA design standards. As a result, the City of Fremont initiated a study to develop a solution to the physical limitations of the parking apron as well as identify improvement alternatives that are concurrent with FAA design standards.

PURPOSE

The purpose of this study is to determine the demand and capacity of the existing terminal facility to determine the extent of future improvements required to meet the

airport operational requirements. The previous study identified some of the operational issues at FET. However, additional analysis is needed to address questions and comments generated from the Nebraska Department of Transportation-Aeronautics Division (Aeronautics) and Federal Aviation Administration (FAA). The results of this outcome will assist the City with identifying future improvement alternatives that will guide the short- and long-term airport capital improvement program (ACIP).

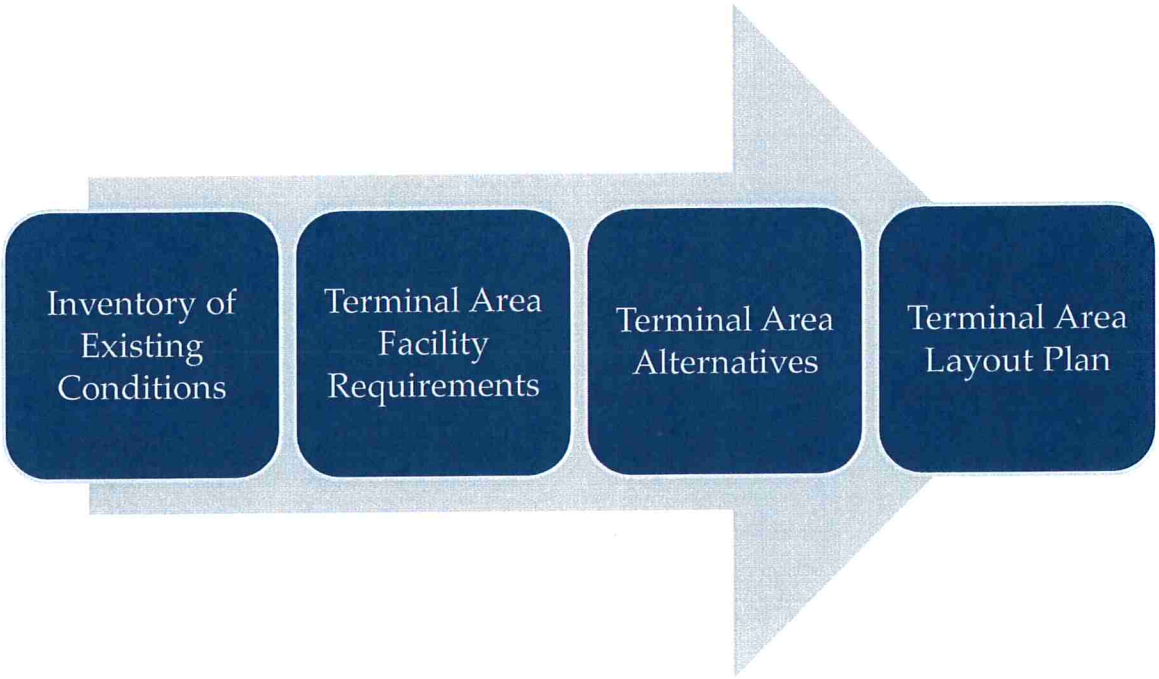
Terminal Plan Goals and Objectives

The vision of the City of Fremont is to optimize the existing airport footprint to satisfy the terminal area spatial requirements while maintaining airport safety and design standards. The Airport Cooperative Research Program (ACRP) 113 provides guidelines for developing the basic principles for the development of a general aviation plan: Safety, Efficiency, Economics, Expansion, Balance, and Consistency. These principles should guide the development of the improvement alternatives as well as identification of the preferred alternative. To determine whether the results of this evaluation will meet the specific needs and requirements of the airport and its users, a set of goals and objectives were identified that mirror many of the principles already discussed. These goals and objectives are specific to the users' needs, physical condition of the facility, regional setting, airport role, environmental conditions, and aviation demand. The goals and objectives are identified, as follows:

Aircraft Landing FET

TERMINAL PLAN GOALS AND OBJECTIVES	
Concurrent with FAA Design Standards (Safety)	The preferred improvement shall be concurrent with FAA design standards, as applicable. Any proposed deviation from FAA design standards will result in a "modification to standard" that requires approval from FAA Central Region.
Optimize Current Terminal Area Facilities (Efficiency / Economics)	The preferred improvement alternative should optimize the current terminal facilities to minimize additional construction costs associated. These facilities include existing hangars, parking apron, taxiway(s)/taxilane(s), and automobile parking.
Improve Line-of-Sight (Safety)	Improvements to the line-of-sight between the terminal building and both runway ends are desired. Having the capability to visually observe runway operations between both runway ends provides another level of safety in the event of an on-airport incident.
Cost-Effective (Economics / Balance / Expansion)	The preferred improvement alternative should include cost considerations to minimize the local financial burden associated with future expansion and development. Evaluation of this goal may be subjective, based on other feasible improvement alternatives.
Optimize Existing Utility Infrastructure (Balance / Consistency /Expansion)	Consideration of existing utility infrastructure capacity and location will be analyzed to maximize current conditions and minimize future improvement costs.
Maintain Access: Airside & Landside (Balance)	The preferred improvement alternative should maintain a balance regarding airside and landside access needs. The proposed 23rd Street Improvements will be considered during evaluation of landside access improvements. The preferred alternative should also balance access efficiencies between the runway and aircraft parking for aircraft operations.
Minimize Environmental Impact(s)	The preferred improvement alternative should avoid or minimize impacts to the natural environment. A summary will be prepared that identifies any environmental concerns associated with the Airport.

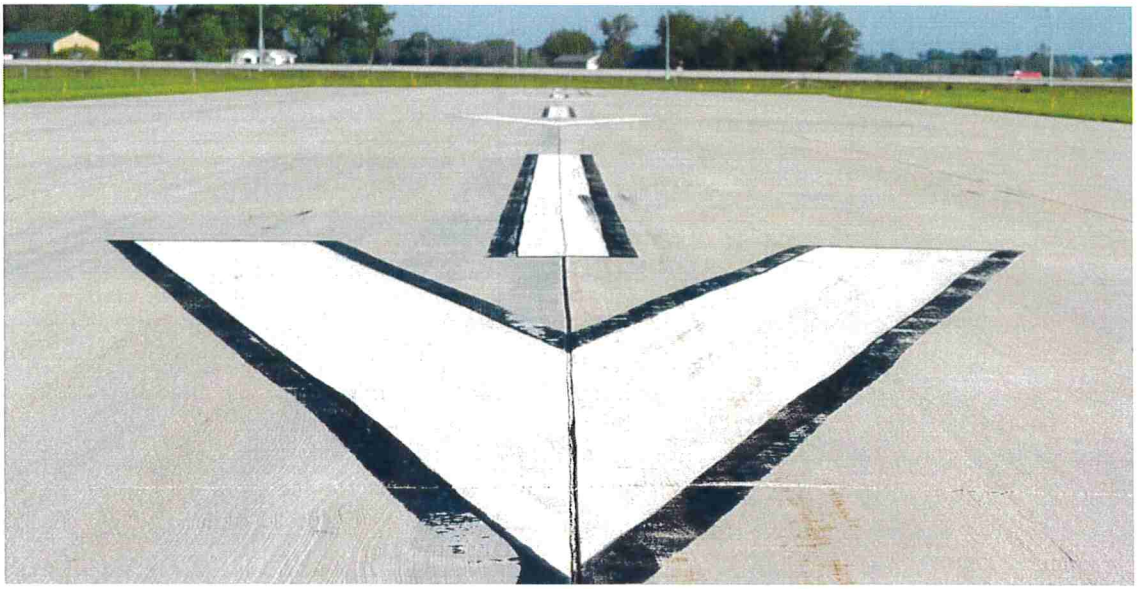
PLANNING PROCESS AND PARTICIPANTS



The planning process involves identifying existing and future airport user needs in the FET terminal area to develop a list of improvement alternatives that resolve any shortfalls or design needs. This process begins with identifying the existing conditions of the terminal area through an inventory of current facilities. The next step is examining the facility requirements to evaluate future airport needs based on existing shortfalls, followed by the development of improvement alternatives designed to address the future terminal needs. Upon identification of the preferred improvement alternative, the terminal area plan layout drawing will be completed illustrating the proposed future development.

FAA Advisory Circular (AC) 150/5070-6B, *Airport Master Plans*, provides the guidance for the preparation of this study, along with information provided from the Airport Cooperative Research Program (ACRP) 113, *Guidebook on General Aviation Facility Planning*. Previous reports and studies will be reviewed for relevant information pertaining to the development of the terminal master plan update. Additional guidance will be obtained from AC 150/5300-13A, *Airport Design*, and AC 150/5360-9, *Planning and Design of Airport Terminal Facilities at Nonhub Locations* and used as general guidance for all planning studies.

Study coordination will occur between the City of Fremont and NDA, who, in turn, will coordinate with the FAA Central Region. Public meetings will be scheduled to present study findings, obtain input, and will conclude with a presentation to the Fremont City Council for final approval of the preferred improvement alternative. Information and data from aircraft owners and business users will be included in the study. This information will assist in formulating the future needs at FET.



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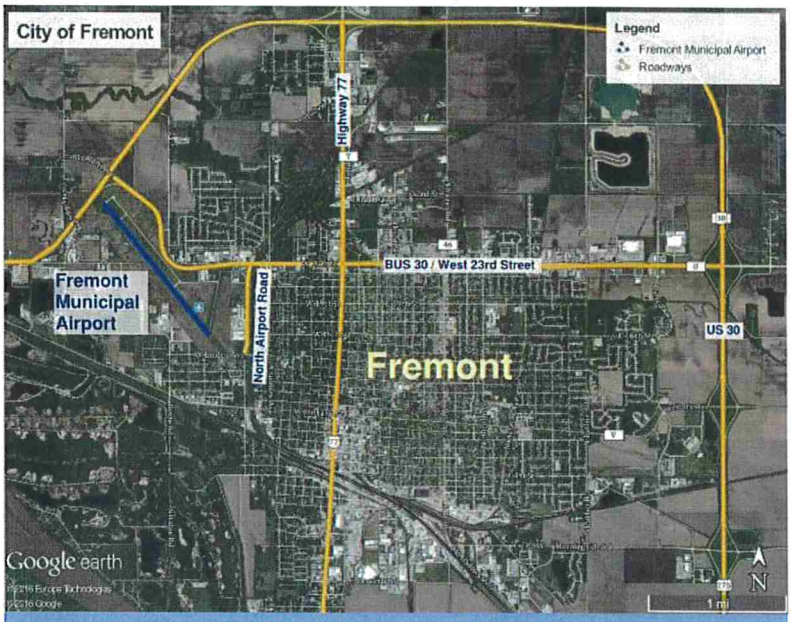
CHAPTER 2 INVENTORY OF EXISTING CONDITIONS

The Inventory of Existing Conditions provides a general assessment and condition of the terminal area as well as provides a snapshot of the current facility. This snapshot establishes a baseline to measure all future airport improvements. Current and historical data were gathered to provide an overview of the existing facility including its regional setting. An on-site examination was completed (May 10, 2017) to inventory the current facilities, infrastructure, and general layout of the terminal area and airport.

LOCATION AND SETTING

The City of Fremont is located approximately 30 miles northwest of Omaha in eastern Nebraska on U.S. Highway 275, and serves as the county seat for Dodge County. The city is part of the Omaha-Council Bluffs-Fremont, NE-IA Combined Statistical Area and is home to a large manufacturing base with major employers in the areas of agribusiness, food processing, fabricated metal processing and electronics manufacturing[1]. FET is located two miles northwest of the central business district (CBD) on approximately 353 acres, at the intersection of West 23rd Street (BUS 30) and North Airport Road.



Location Map

AIRPORT BACKGROUND

The Fremont Municipal Airport (FET) is a general aviation (GA) facility that provides regional access to the national airspace system (NAS) for business, recreational, and flight training operations. The National Plan of Integrated Airport

[1] Greater Fremont Development Council, Internet Lookup, 2017

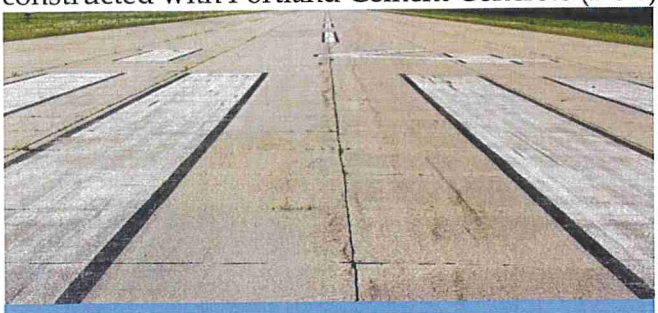
Systems (NPIAS) identifies FET as a Nonprimary Regional Airport and provides significant support to the regional economy. The City of Fremont (Sponsor) owns and operates FET as a public-use facility to meet the aviation and access needs of the region. As the airport sponsor, the City is eligible to receive federal assistance for airport improvements in return for accepting federal obligations under the FAA Airport Compliance Program (FACP). The FACP specifies how funding is distributed and utilized under the Airport Improvement Program (AIP), which will likely be used to finance the future terminal area improvements identified from this study.

Aeronautical Facilities

Aeronautical facilities at FET include the runway, taxiway(s), lighting, and visual and electronic NAVAIDs necessary to accommodate daily aviation activity. The classification and dimensions of these facilities are typically defined by FAA design standards, based on the number and types of operations that occur on the airfield. Due to the scope of this study, the runway and taxiways will be identified for reference purposes only.

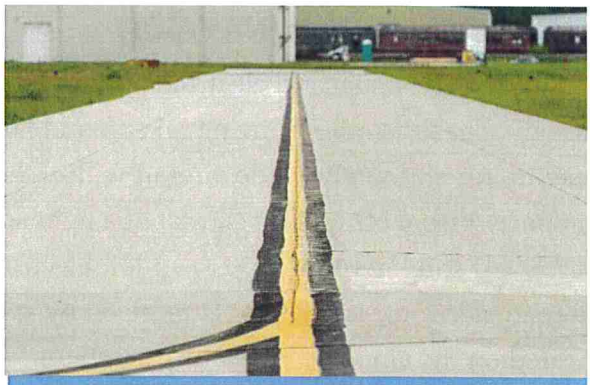
Runway 14-32

Runway 14-32 is 6,353 feet in length with 850-foot displaced thresholds on each end for obstacle clearance, and provides northwest-southeast take-off and landing operations for all aircraft operating at FET. Runway 14-32 is a non-precision approach runway constructed with Portland Cement Concrete (PCC) with pavement strength of 48,000 lbs. dual wheel gear (DWG). Runway 14-32 has a pavement width of 100 feet, which meets the C-II runway design code (RDC), which can accommodate medium to large business aircraft. Runway pavements are in excellent condition as reported by AERONAUTICS. The effective runway longitudinal gradient is less than 0.1 percent.



Runway 14-32

The runway is equipped with a Medium Intensity Runway Lighting (MIRL) system along each side with a two-light Precision Approach Path Indicator (PAPI) at both ends to provide visual guidance to the runway threshold. Runway 14 is also equipped with a Runway End Identifier Lighting System (REIL). The runway pavement has non-precision approach markings, including aiming points.



Taxiway B

Taxiway(s):

Taxiways provide access between the runway(s), aircraft parking, and hangar areas. The following taxiways were identified:

Taxiway A

Taxiway A is a partial-parallel taxiway providing access to Runway 14 end, taxiway B, connector taxiways A1, A2, and A3. It is constructed of PCC with a pavement width of 35 feet and medium intensity taxiway lights (MITLs).

Taxiway B

Taxiway B is a connector taxiway between Taxiway A, Taxiway D, and the T-hangars. It is constructed of PCC with a pavement width of 35 feet with MITLs.

Taxiway C

Taxiway C is a connector between the aircraft parking apron, Taxiway D and the T-hangars on the west side of the terminal area. It is constructed of PCC with a pavement width of 35 feet and MITLs.

Taxiway D

Taxiway D is the recently closed Runway 1-19 which provides access between Taxiway C, Taxiway B, and Runway 32 end. It is constructed of asphaltic-concrete (AC) with a pavement width of 50 feet and no lighting or markers.

Navigational Aids (NAVAIDs)

NAVAIDs are visual and electronic-based guidance systems designed to assist pilots during takeoff and landing operations, and safely guide aircraft within the terminal airspace. Visual NAVAIDs consist of a light source that is perceived and interpreted by the pilot. Electronic NAVAIDs emit an electronic signal that is received by special equipment located on the aircraft.


Airport Beacon

The following NAVAIDS are present at FET:

Airport Beacon

The airport beacon is a visual aid used during nighttime hours or during periods when visibility minimums are below Visual Flight Rules (VFR). The airport beacon is adjacent to the main apron, between the aircraft maintenance shop and hangar D on the northeast side of the airport.

Automated Weather Observation System (AWOS-III)

The AWOS-III provides field altimeter setting, wind direction, wind speed, temperature, dew point, density altitude, visibility, cloud/ceiling data, and barometric pressure. This weather reporting system broadcasts up-to-the minute weather information to pilots through a discrete radio frequency, and provides pilots with current weather conditions and influences the decision-making process used to conduct a safe approach to the runway. The AWOS is located west of the T-hangars and north of Taxiway A and has a 500-foot radius obstruction clearance.


AWOS

Segmented Circle and Lighted Wind Cone

A segmented circle and lighted wind cone are located near midfield, between Taxiway A and Runway 14-32. The lighted wind cone provides a visual indication of current winds and direction while the segmented circle provides information regarding local traffic patterns for landing and departing aircraft, which indicate standard (left-hand) traffic pattern for Runway 14 and non-standard (right-hand) traffic pattern for Runway 32.

General Aviation (GA) Facilities

GA facilities provide for the needs of pilots, aircraft owners, aviation-related or on-airport businesses, and general operations and are located in the terminal area. The terminal area facilities essential to the aviation activity at FET include the terminal building, taxilanes, hangars, parking apron/tie-downs, fueling system, and lighting. AC 150/5300-13A, Airport Design, and AC 150/5360-9, Planning and Design of Airport Terminal Building Facilities at Non-Hub Locations, defines the classification and utilization of these facilities, based on the number and types of operations that occur on the airfield. The following facilities were identified during the site visit:

Terminal Building

Terminal Building

The airport terminal building provides pilot and passenger services for based and itinerant customers. It was constructed in 1962 of masonry and block, and contains 1,750 square feet of space and appears to be in fair condition but lacks ADA-compliant access and amenities. The terminal building is located along the northern edge of the aircraft parking apron and provides office space, restrooms, flight planning area, training room and break area. The FBO uses the terminal building for administrative purposes. One of the primary goals of this study includes an evaluation of the existing facility to determine whether need exists for a new terminal building. A previous study, Architectural Report for Existing Terminal Building, details the condition of the terminal building and is included in Appendix 1.

Aircraft Parking Apron


Aircraft Parking Apron

At GA airports, the aircraft parking and tie-down apron is typically the largest facility and designed to accommodate both based and itinerant aircraft. It is preferred that this facility is centrally located in the non-movement areas with sufficient aircraft parking offering direct access to the terminal building and other primary services offered at the airport. Aircraft parking and tie-down aprons may contain one or more taxiways and/or taxilanes to facilitate aircraft movement. Apron location and layout should prohibit direct access to a runway to minimize potential runway incursions and increase pilot situational awareness.

The aircraft parking apron at FET is approximately 250' x 350' and constructed of asphaltic concrete pavement. The terminal building, fuel storage facility, and various aircraft hangars are located around the perimeter of the apron appear to constrain future apron expansion. While there are eight aircraft tie-down positions at various locations, the apron taxilane appears to be inconsistent with FAA design standards regarding object and wingtip clearances due to object clearance requirements. See Figure 2-1 for additional details.

Taxilanes


Apron Taxilane

Taxilanes are similar to taxiways, however their primary function is to provide low-speed access in the terminal and hangar areas. Taxilane width is determined by the operating characteristics of the most demanding aircraft using the taxilane on a regular

basis, known as the Aircraft Design Group (ADG).

The apron taxilane provides access to parking and aircraft hangars at FET. This apron taxilane is unmarked, however it appears to be located along the northern edge of the pavement, between Taxiway C and Hangar P1, at the east side of the terminal area. A 36-foot wide hangar taxilane also exists along the west edge of the pavement providing access to Hangars P3 and P4 south of the aircraft parking apron.

Taxilane Object Free Area (TLOFA)

A preliminary evaluation of the parking apron TLOFA wingtip clearance appears to be inconsistent with FAA design criteria. Based on Table 4-1, in AC 150/5300-13A, TLOFA should be based on the ADG II criteria[2], which is 115 feet wide and centered along the taxilane centerline. The minimum wingtip clearances for ADG II aircraft appear to conflict with six of the eight existing tie-down locations on the parking apron. Figure 2-1 illustrates the location and width of the TLOFA and conflicts between current tie-downs and aircraft access. (Note: the use of aircraft positioned around the apron is used to designate locations of aircraft tie-downs and parking, as observed during the initial site visit).

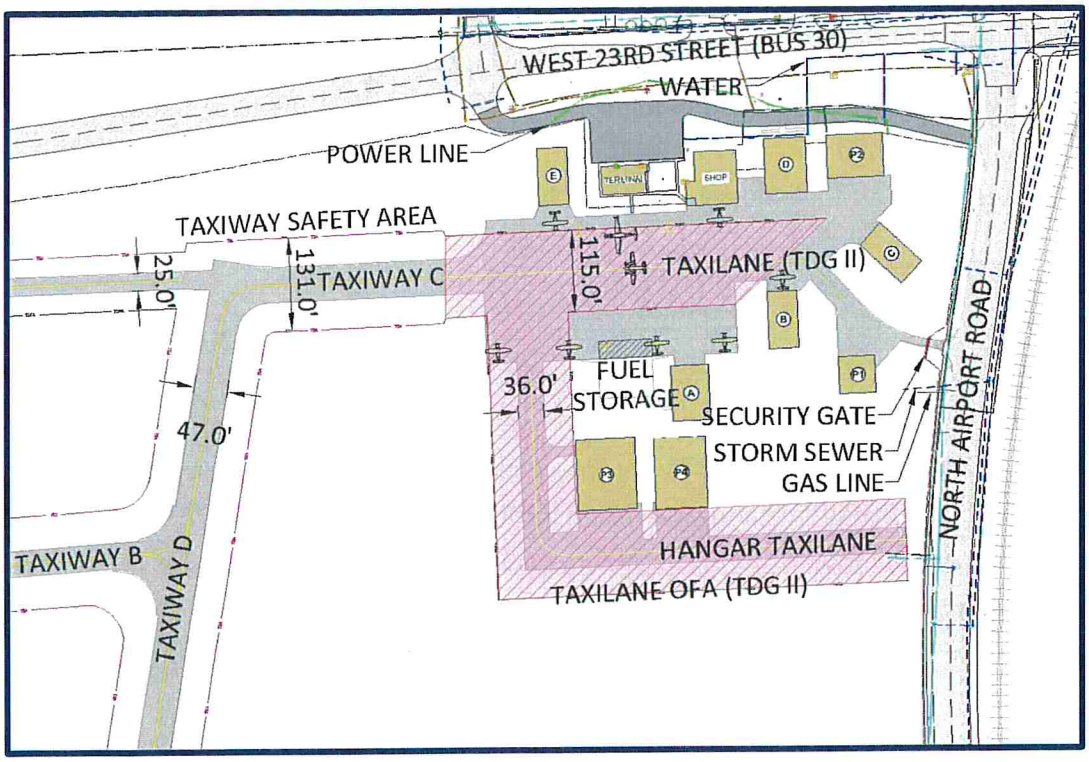
Furthermore, the current tie-down positions along the south side of the parking apron, between the fuel storage and Hangar A, appear to lack wingtip clearance and setback for fuel servicing.

Fuel Servicing Vehicles

Fuel servicing vehicles are used to fuel aircraft. The fuel servicing dispensers are located along the northern edge of the fuel storage area. Aircraft refuel trucks park in this area when not in use. National Fire Protection Association (NFPA) 407, paragraph 5.18, specifies that aircraft fuel servicing vehicles shall be located a minimum of 50-feet from any parked aircraft, building, or other maintenance facilities. See Figure 2-1 for additional details. Based on this evaluation, it appears the tie-downs adjacent to the fuel servicing and storage area are inconsistent with FAA design standards.

[2] See Table 2-1 for additional details.

Figure 2-1 Terminal Area Drawing



Source: City of Fremont, 2017

Hangars

Hangars provide shelter to aircraft for protection from the environment and inclement weather. A group of corporate style hangars are located around the perimeter of the aircraft parking apron while a second group of hangars, known as T-Hangars, are located west of the terminal area, along Taxiway B.

T-Hangars

T-Hangars are constructed in multiple units and provide a cost-effective solution to aircraft storage. These are simple designs intended to maximize developable space. T-Hangar vehicle access is from West 23rd Street, along the northern boundary of the airport.

Corporate Hangars

Corporate Hangars

These hangars are typically constructed for a single aircraft owner with some basic amenities such as restrooms and office space. There are nine corporate hangars located at FET. Their location along the perimeter of the aircraft parking apron allows for convenient access to the terminal building and taxiways.

Hangar Access

Access is limited to authorized airport personnel and hangar tenants, who are required to enter a discrete code for entry through the security gate. One gate is located along the east side of the terminal, on North Airport Road, while a second gate is located along West 23rd for access to the T-Hangar area.

Fuel Storage and Delivery

The airport fuel storage system consists of two 12,000-gallon storage tanks (Jet-A and 100LL) and dispensing units located along the south edge of the aircraft parking apron. The fuel storage tanks are above-ground, cylindrical, double-walled units placed inside an enclosed containment area. Fuel dispensing units are places along the north side of the containment area, adjacent to the aircraft parking apron. The storage tanks and dispensing units were reported to be in good condition.

Fuel deliveries are conducted by large over-the-road, tanker trucks, and occur monthly for Jet-A and bi-monthly for 100LL. Access for fuel deliveries is from North Airport Road, through the security gate, then across the aircraft parking apron. Each delivery is approximately 7,000 gallons.

Aircraft Fueling Operations

Aircraft refuel trucks are operated by the fixed based operator (FBO) personnel. Since self-service fueling facilities are unavailable, FBO personnel provide fuel service at the aircraft parking location. One truck is dedicated to Jet-A fuel with maximum capacity of 3,000 gallons, while a second truck holds 1,200 gallons of 100LL. Both fuel trucks are stored in a hangar next

Aircraft Fueling Operations

to the fuel storage area. Fuel trucks are refilled from pumps located along the northern edge of the aircraft parking apron.

Access, Circulation, and Parking

North Airport Road and West 23rd Street (US 30) provide public access to the airport. North Airport Road is a four-lane arterial running along the eastern boundary of the airport that originates at West 23rd Street on the north and runs south to Linden Avenue where it becomes a 2-lane residential road known as North Pierce Street.

Terminal Access

North Airport Road provides access to the commercial and industrial uses located along the west side of its route while railroad tracks line its eastern boundary. West 23rd Street, also known as Business Route 3 (BUS 30), is a major east-west thoroughfare that connects US 30 on each side of the City of Fremont. West 23rd street is a four-lane arterial between US 30 and US 77, about one-half mile east of the Airport, where it narrows to a two-lane road with center turn lanes.

Public access to terminal building parking is from West 23rd Street and North Airport Road. The terminal building parking lot is constructed of AC pavement and contains 22 marked parking stalls. This is the only paved public parking available at the airport. See Figure 2-2 for details.

Future Road Improvements

Proposed improvements to West 23rd Street involves the construction of an elevated viaduct to improve traffic flow along US 30. This proposed development appears to affect airport terminal access and parking. As a result, the proposed road improvements will likely require an evaluation of future access alternatives. See Figure 2-2 for details.

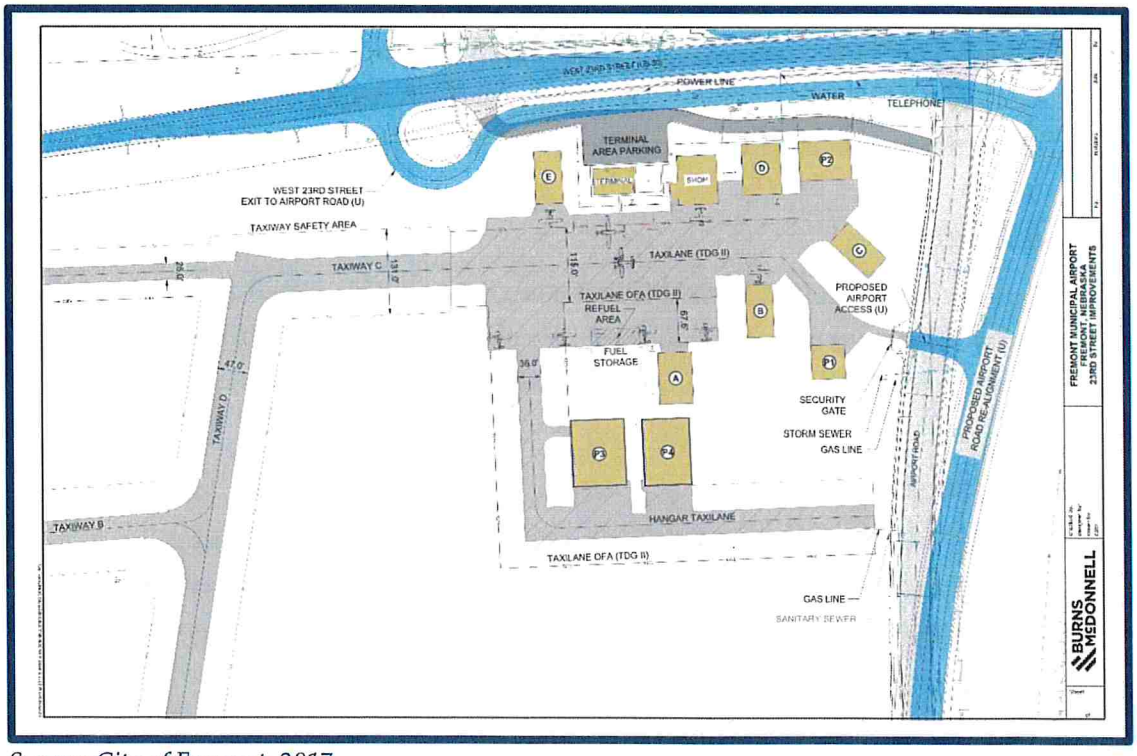
Land Use and Zoning

The airport is currently zoned as both Limited Industrial on the southern half and Agricultural/Urban Reserve District on the northern half of the property. Adjacent land use includes Residential (Single Family to Moderate), Agricultural/Urban Reserve District, and General Industrial District. The City of Fremont also incorporates Airport Zoning to protect the airspace from incompatible uses that could affect the airport.

Utilities

Utilities are important infrastructure considerations when discussing demand/capacity needs. Evaluation of existing utilities may have financial implications associated with future airport improvement considerations. Consideration should be given to existing above-ground power lines/poles, underground gas lines, potable water lines, sanitary sewer lines, and telephone/fiber optic cables when developing future improvement alternatives. Sanitary sewer and gas lines run along North Airport Road, and enter the terminal area from the east. Water, telephone, and power run parallel with West 23rd Street and enters the terminal area from the north. See Figure 2-2 for details.

Figure 2-2 West 23rd Street Improvements



Source: City of Fremont, 2017

AVIATION ACTIVITY


Itinerant Aircraft Operations

The most significant and measurable variable used to assess airport demand and capacity is aircraft operations. Current aircraft activity provides the essential data required to evaluate future facility needs. Additionally, this information is used to establish the most critical aircraft, or family of aircraft, currently operating at FET. Several sources of information may be used to obtain aircraft activity.

One source of aircraft activity is maintained by the FAA and known as the Terminal Area Forecast (TAF). The TAF is the official FAA forecast of aviation activity for U.S. airports and contains active airports in the NPIAS. The TAF revealed that FET experiences approximately 22,300 annual operations.[3] Of the annual operations, 12,200 are defined as local operations, while 10,100 are defined as itinerant.

A second source of information was obtained from FlightAware, which is a privately-owned business that provides live flight data based on actual flight plans. Data from FlightAware revealed aircraft activity associated with FET during the previous 12 months. This information is used to describe itinerant aircraft operations, below.

Based Aircraft

According to the FAA website, BasedAircraft.com, there are 56 aircraft at FET. However, a review of the FAA 2010 Inspection Record, revealed 58 total based aircraft including five multi-engine, two turbine engine (jet), and three helicopters.

Itinerant Aircraft

Itinerant aircraft are typically based elsewhere and travel to FET for business, or personal recreation or flight training. A based aircraft is also considered an itinerant operation if the aircraft travels beyond 25 miles from the airport prior to its return.

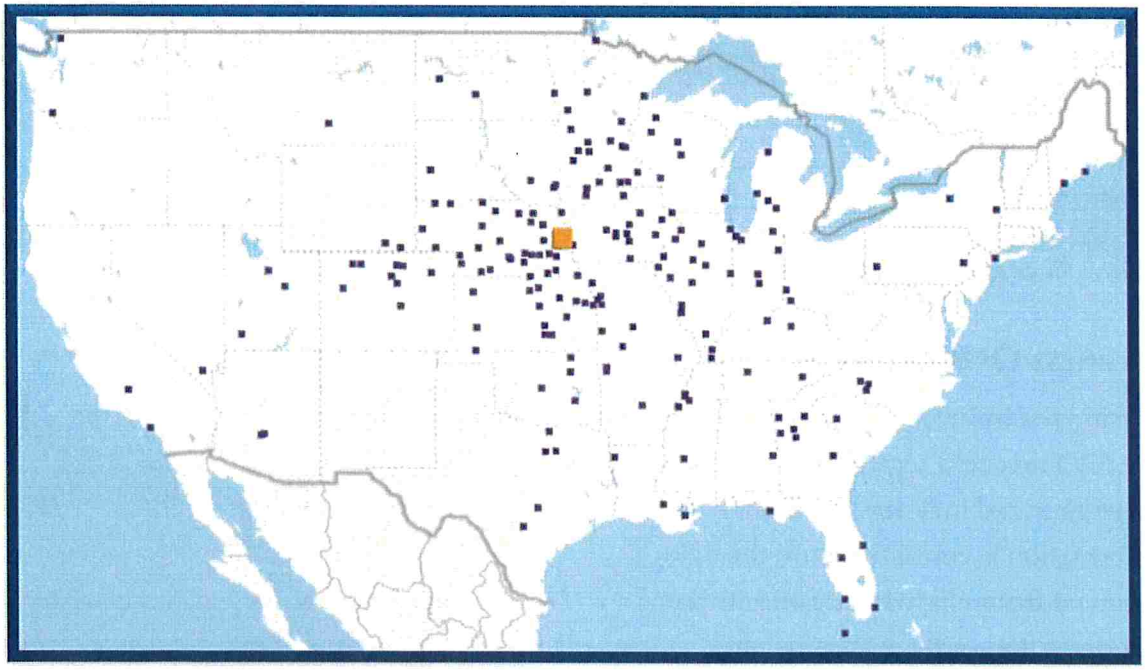
[3] An operation is a takeoff or landing. Therefore, a touch and go is counted as two operations.

Itinerant Aircraft Operations

Itinerant aircraft account for approximately 10,100, or 45 percent, of the total annual operations. This figure equates to more than 27 daily operations. Information obtained from FlightAware.com (May 2016 to May 2017) was used to identify the types of itinerant aircraft using FET, based on their flight plan, as filed with air traffic control.

Figure 2-3 provides a map of the itinerant operations obtained from FlightAware. Since this data is based on actual flight plans, it should be noted that not all aircraft operations require a flight plan. However, this information is valuable to provide insight and understanding of the range and types of itinerant aircraft using FET. Based on this information, itinerant operations at FET reach over 200 various locations throughout the US.

Figure 2-3 Itinerant Operations Map



Source: FlightAware.com, 2017

Aircraft information obtained from FlightAware provided the itinerant aircraft parking needs in the terminal area. The data was filtered by aircraft type and runway design code (RDC). The results revealed more than 50 percent (581) of the recorded itinerant operations were from Category B-II, or larger, aircraft. Therefore, based on the flight data records, it is reasonable to apply ADG II standards when evaluating existing terminal area operations. Table 2-1 provides additional details.

Table 2-1 Itinerant Aircraft Runway Design Code

Aircraft Group	Aircraft Approach Category			
	A	B	C	D
ADG I	385	140	2	0
ADG II	124	409	28	2

Source: FlightAware.com, May 2017

Recognizing the types of aircraft using the parking apron is important to understanding the operational needs, including layout, tie-down and taxilane design. The aircraft data obtained from FlightAware revealed that more than 50 percent (554) of itinerant operations were from turboprop aircraft while 21 percent (237) were from business jets. See Table 2-2 for additional details.

Table 2-2 Itinerant Aircraft by Type

Aircraft Type	Aircraft Design Group		
	I	II	Total
Piston	295	3	298
Turboprop	157	397	554
Turbine (Jet)	75	153	228

Source: FlightAware.com, May 2017

Business Operations

During the initial site visit, discussions with the FBO revealed regular activity from small to medium sized business jets at FET. This information is consistent with the data received from FlightAware and further validates the need for terminal area improvements focused on the larger business aircraft operating at FET. The FBO provided a

Itinerant Business Activities

list of businesses, local and non-local, that use the airport. The following businesses in Table 2-3 were identified as operating in Fremont.

Table 2-3 Businesses Using FET

Business	Home Base	Local Employment	Aircraft Make and Model	RDC	Annual Operations at FET
Buckle	Kearny, NE	NA	Citation X	C-II	24
Hormel	Austin, MN	1,500	Gulfstream	C-II	12
Hy-Vee	Des Moines,	500	Citation III	B-II	8
Butler	FET	NA	Pilatus PC-12	A-II	24
Oil Gear	FET	250	Citation CJ2	B-I	8
Costco	NA	NA	Citation III	B-II	48
Kreider	NA	NA	Citation CJ1	B-I	48
Wal-Mart	Bentonville,	500	Citation	B-II	6
Menards	NA	250	Citation II	B-II	8
Taylor	FET	NA	Beechcraft	B-II	80
Net Jets	NA	NA	Citation III	B-II	72
Monsanto	NA	NA	Citation III	B-II	NA
ADM	NA	100	Falcon 50	C-II	6
3M	NA	NA	Gulfstream IV	C-II	8
Delta	NA	NA	Citation II	B-II	24
Big Red	FET	NA	Citation 550	B-II	50
Fremont Beef	FET	500	Piaggio 166		96
Big Ox	Denmark, WI	NA	Beechcraft	B-I	72
	Totals:	**3,600**			**594**

Source: Discussion with FBO personnel, Greater Fremont Development Council, May 2017

User Feedback

Survey questionnaires and personal interviews were used to obtain feedback from based aircraft owners and itinerant business users regarding the terminal area and facilities at FET. The following comments from respondents were received:

- Aircraft parking apron (is) very tight when more than one aircraft is parked
- Terminal building is outdated and needs pilot facilities for privacy and crew rest
- Folks who run the airport are very accommodating
- Need aircraft towing capability
- Would like temporary storage (hangar) to protect aircraft from inclement weather while at Fremont

- Need RCO (remote communications outlet) to contact ATC on the ground for opening and closing flight plans
- Good approaches to the runway
- Improved Wi-Fi
- Television

ENVIRONMENTAL REVIEW

An environmental desktop review was conducted for FET to identify potential impact to resources near the proposed project area. The proposed project area includes the existing terminal area and areas likely needed to support future development. Environmental database information was obtained from available online resources including U.S. Fish and Wildlife Service (USFWS), Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM), Nebraska Department of Environmental Quality (NE DEQ), and the National Park Service (NPS). Historical and archeological information was received from the Nebraska State Historic Preservation Officer (NE SHPO). Table 2-4 identifies the resources, potential effects, and results of the review.

Table 2-4 Environmental Resources Information

Resource	Potential Effect	Source	Notes
Waters of the U.S, including wetlands	None	USFWS National Wetland Inventory	No waters of the U.S. are indicated on the NWI map. Field reconnaissance recommended for verification.
Threatened & Endangered Species	None	USFWS Endangered Species Program	While no critical habitat for threatened or endangered species is present, multiple species could be potentially affected by airport development. Field reconnaissance recommended for verification.
Migratory Birds	Possible	USFWS	Several migratory bird species may be potentially affected by airport development. Field reconnaissance recommended for verification.
Fish Hatcheries	None	USFWS	No fish hatcheries within Project Area
Floodplains	None	FEMA FIRM	No floodplains within Project Area

Resource	Potential Effect	Source	Notes
Historical Resources	Possible	NE SHPO	There are several previously recorded historic-age non-archaeological resources within the Project Area and additional resources could be indirectly affected by airport development. Survey and SHPO coordination recommended.
Archeological Resources	Possible	NE SHPO	The Project Area has never been surveyed for archaeological resources. The Project Area is on a landform that dates to the Holocene epoch; therefore, this area has the potential for prehistoric resources to be located on the surface and deeply buried. Additionally, map research suggests the possibility for historic-era resources. It recommended that a qualified archaeologist conduct a cultural resources survey prior to project commencement.
Federal Lands	None	--	No Federal lands within Project Area
Tribal Lands	None	--	No tribal lands within Project Area
Air Quality	None	NE DEQ	Fremont Airport is located in an area that is in attainment with the National Ambient Air Quality Standards
Impaired Waters	None	NE DEQ	No impaired waters currently receive discharge from the airport property. Recommend evaluation of final terminal development plan to determine effect to impaired waters.
Traffic Noise	None	--	Proposed airport development activities are not expected to affect traffic noise

Resource	Potential Effect	Source	Notes
Section 4(f) Resources	Possible	NE DEQ, SHPO	No existing or planned parks, recreation areas, wildlife refuges, or historic properties would be affected by the project; however, a survey to identify potentially significant historic properties that would qualify for 4(f) consideration should be conducted prior to Project commencement.
Section 6(f) Resources	None	NPS	No Airport property was purchased with Land and Water Conservation Funds

Source: Burns & McDonnell, May 2017

In summary, additional environmental investigation should coincide with future airport design projects, as necessary.

SUMMARY OF EXISTING CONDITIONS

The following is a summary of existing conditions as observed during a site visit on May 10, 2017. The assessment of existing conditions at FET is considered a "snapshot" of the airport which becomes the baseline to measure any changes to the facility, including future airport improvements. Since the study focus is on the existing terminal area, the following results are based on only those items related to the terminal building and aircraft parking apron.

The terminal building is located on a constrained site at the northeast corner of the airport. The physical structure appears to be in fair condition however it lacks ADA compliant amenities and access. Pilot and passenger facilities appear adequate, although airport users have indicated upgrades to amenities are needed. Nevertheless, AC 150/5360-9, suggests the terminal building location should permit easy identification from the runway, adjacent to an apron that meets the needs of based and transient aircraft, and provides space to accommodate future growth.

Furthermore, the existing aircraft parking apron, taxilane, and associated OFA are also inconsistent with FAA airport design criteria and guidance. The primary purpose of the aircraft parking apron is to provide direct access to the terminal building for pilots and

passengers using the airport. Existing infrastructure, including hangars and fuel supply facility, are located on the perimeter of the apron that prevent expansion opportunities. Removal or relocation of these facilities to permit expansion of the aircraft parking apron to meet existing demand appear to be cost-prohibitive.

Moreover, the location of the terminal area appears to result in significant inefficiencies and land use incompatibility. When practical, the terminal area should be located close to the primary runway and parallel taxiway. The current location of the terminal parking apron on the northeast corner of the airport results in excessive taxi times for aircraft as well as unnecessary fuel usage. The vacant space between the runway and terminal area create an imbalance between compatible land uses and functional relationships.

Terminal Area

Based on these criteria, combined with the fact that the aircraft parking apron and apron taxilane are inconsistent with FAA airport design criteria, the current terminal building location and functionality appear to be inadequate to serve the needs of FET. As a result, these deficiencies reveal the urgent need to focus on the development of a new terminal building and aircraft parking apron in a suitable location that is functional and meets FAA design criteria. The results of this evaluation are highlighted Table 2-5.

Table 2-5 Summary of Existing Conditions

Facility	Meets Standards			Comments
	Yes	No	N/A	
Aeronautical Facilities				
Runways		✓		Not evaluated
Taxiways		✓		Not evaluated
General Aviation Facilities				
Terminal Building		✓		Location and functional relationship
Aircraft Apron		✓		Demand exceeds capacity, design standards
Tie-Downs		✓		TLOFA, wingtip clearances, and fuel servicing areas conflict with existing tie-down locations.
Taxilane(s)		✓		Apron taxilane design standards
TLOFA		✓		Inconsistent with ADG II criteria
Hangars			✓	Condition and capacity were not evaluated
Hangar Access			✓	Discrete code required for access
Fuel Storage			✓	Fuel storage was not evaluated
Fuel Servicing		✓		Clearances and set-backs
Airport Access	✓			West 23rd Street improvements will likely impact airport access
Airport Circulation	✓			See Airport Access Comments
Airport Parking	✓			See Airport Access Comments
Utilities			✓	Evaluation not part of study
Aviation Activity		✓		Aviation activity indicates current apron demand exceeds capacity

Source: Burns & McDonnell, May 2017

CHAPTER 3 FACILITY REQUIREMENTS

INTRODUCTION

The purpose of the Facility Requirements section is to assess the ability of the current facility to meet existing and future demand. Due to the constantly evolving aviation industry, this analysis addresses any changes in the size, quantity, and type of facilities needed to meet future demand. The results of this analysis will formulate the framework for the improvement alternatives that best meet the terminal area needs. The requirements for facilities reflect the unique circumstances of each airport, such as:

1. Capacity shortfalls resulting from demand outpacing airport improvements or available funding;
2. Recent changes to FAA airport design standards, or other regulatory agencies, to correct existing non-standard conditions and eliminate existing modifications to standards;
3. A shift in the airport sponsor's strategic vision for the airport;
4. Outdated condition, arrangement, or functionality of existing facilities;
5. Consideration of overall airport sustainability practices, which may include recycling and waste minimization, and increasing energy efficiency.

PARKING APRON DEMAND

The first step to determine the terminal area needs is calculating how many apron tie-downs are needed to meet itinerant aviation demand. This formula utilizes data gathered during the airport site visit and FlightAware.com. Based on existing information, FET experiences 22,300 annual operations with 45 percent, or 10,100, defined as itinerant operations. ACRP 113 provides guidance to determine the number of parking positions for itinerant aircraft and is illustrated in Table 3-1. The information gathered regarding itinerant aircraft operations was inserted into the formula that resulted in the need for seven tie-down positions to accommodate existing demand.

Table 3-1 Parking Apron Demand

Operations	2016
Annual Itinerant Operations	10,100
Landings	(÷) 2
Total Annual Landings	5,050
Daily County	(÷) 365
Total Daily Operations	14
Percent Parked on Apron	(×) 50%
Total Tie-Down Spaces	7

Source: ACRP 113

Itinerant Fleet Mix

The aircraft fleet mix analysis establishes the future facility needs, based on the frequency of operations and performance characteristics of each aircraft group. Information obtained from FlightAware.com identified the ADG and TDG, based on the frequency of operations at FET. The data collected was compiled to determine the itinerant aircraft fleet mix and presented in Table 3-2.

Table 3-2 Itinerant Fleet Mix

	Aircraft Approach Category (AAC)			
	A	B	C	Total:
ADG I	35%	13%	<1%	48%
ADG II	11%	38%	3%	52%
Total:	46%	51%	3%	

Source: FlightAware.com

The analysis of itinerant fleet mix (Table 3-2) reveals approximately 38 percent of itinerant operations are performed by Category B-II aircraft while Group II, as a whole, accounted for over half of all itinerant operations (51.6 percent). This analysis also revealed a significant number of operations by larger aircraft, specifically turbine powered aircraft, which accounts for nearly 73 percent of all reported itinerant activity. See Table 3-3 for additional details.

Table 3-3 Fleet Mix by Type

Aircraft Type	Airplane Design Group (ADG)		
	I	II	Total:
Piston	27.1%	0.3%	27.4%
Turbine	21.3%	51.3%	72.6%
Total:	48.4%	51.6%	

Source: FlightAware.com

DESIGN AIRCRAFT

Planning for new airport improvements requires the selection of one or more "design aircraft." In most cases, the design aircraft is a composite, or family of aircraft, that performs at least 500 annual operations. The design aircraft for the purposes of the terminal area geometric design is a composite aircraft representing a collection of aircraft classified by three parameters: Aircraft Approach Category (AAC), Airplane Design Group (ADG), and Taxiway Design Group (TDG). However, the design parameter applicable to the terminal area design is based on the ADG of the design aircraft.

The results of the site investigation revealed that itinerant aircraft were the primary users of the terminal apron and tie-downs. Therefore, the itinerant fleet mix ADG will be used to define the existing and ultimate geometric design. Table 3-2 revealed the most demanding itinerant aircraft was from the ADG-II family of aircraft, while Table 3-3 shows that over 72 percent of itinerant operations were by Turbine-powered aircraft.

A further evaluation of itinerant operations reveals the Cessna Encore performs over 260 annual operations. As a result, this aircraft is recommended to represent the B-II family of aircraft as guidance for the initial (short-term) terminal design. However, consideration should be given to the Challenger 300, which is a C-II aircraft that performs at least eight annual operations. Although this number is relatively low compared to other Group II aircraft, this specific aircraft is operated by a local manufacturer who has indicated the preference to increase operations at FET if adequate terminal area facilities and parking were available.

It should be noted that the most recent airport layout plan narrative report (JEO, 2003) established the ultimate airport reference code (ARC) as C-II at FET. This classification was based on the number of annual operations by the Category C-II family of aircraft.

For terminal area design purposes, the Cessna Encore represents the existing critical aircraft while the Challenger 300 represents the future critical aircraft. See Table 3-4 for design aircraft characteristics.

Table 3-4 Design Aircraft Characteristics

Design Criteria	Critical Aircraft	
	Cessna Encore	Challenger 300
Runway Design Code	B-II	C-II
Existing Annual Operations	268	8
Maximum Ramp Weight	16,630 lbs.	39,000 lbs.
Wing Span	54.1′	63.8′
Length	48.9′	68.8′
Tail Height	15.2′	20.0′

Source: AC 150/5300-13A, Airport Design

Pavement Strength

The terminal area and taxiway pavements should be designed to support the loads imposed by aircraft using these areas. As a result, pavement strength is a function of the most demanding weight load, which is typically associated with the critical aircraft. Table 3-4 identifies the critical aircraft operating weights for the Category B-II aircraft at 16,630 lbs. as well as the C-II aircraft at 39,000 lbs.

Taxiway/Taxilane Design Requirements

The taxiway and taxilane design requirements focus on recommended layouts to enhance safety while developing an efficient taxiway system that minimizes excess pavement. Pavement width and design requirements are established by the TDG while taxiway and taxiway clearances are based on the ADG. See Table 3-4 for details.

Taxiway/Taxilane Width

Taxiway width is determined by the TDG designation of the critical aircraft. TDG II criteria was previously established for taxiway design guidance, which resulted in a taxiway width of 35 feet. Based on existing operations by Category II aircraft, a taxiway width of 35 feet is recommended for the taxiways and taxilanes. Secondary taxiways and taxilanes will be designed for the specific TDG aircraft utilizing these areas, as appropriate.

Taxiway Safety Area (TSA) Width

The TSA is centered on the taxiway and extends beyond the pavement edges while the width is determined by the ADG, which is based on the wingspan of the critical aircraft. See Table 3-5 for additional details.

Taxiway and Taxilane Object Free Area (TOFA/TLOFA) Width

The TOFA/TLOFA is centered on the taxiway and extends beyond each side of the paved surface. The TOFA/TLOFA clearing standards prohibit objects located in this area unless required for air or ground navigation purposes. The specific design requirements for each ADG expected to use the Airport are listed in Table 3-5.

Table 3-5 Taxiway/Taxilane Requirements

Airplane Design Group (ADG)	I	II
Taxiway Protection		
Taxiway/Taxilane Width	25′	35′
Taxiway Safety Area (TSA)	49′	79′
Taxiway OFA (TOFA)	89′	131′
Taxilane OFA (TLOFA)	79′	115′
Taxiway Separation		
Taxiway Centerline to Fixed or Movable Object	300′	300′
Taxilane Centerline to Fixed or Movable Object	150′	150′

Source: AC 150/5300-13A, Airport Design, Table 4-1

Aircraft Parking Apron

At GA airports, the aircraft parking apron is typically the largest facility and designed to accommodate both based and itinerant aircraft, however based aircraft do not utilize the apron tie-downs. Therefore, the proposed aircraft parking apron design will focus on serving itinerant aircraft operations. ACRP 113 recommends the itinerant parking apron includes the following characteristics:

- Low density
- Expandable
- Full circulation around parking positions
- Sized for Design Group II, or larger
- At least two access points
- Ample area lighting
- Ample signage

- Pull-through parking positions
- Graded for adjacent hangars
- Visibility from the runway and parallel taxiway
- Ample parking for several large aircraft
- Adjacent to the terminal building
- Vehicle access
- Easy egress to the non-secure side of the fence
- Good drainage

It is preferred this facility be centrally located in the non-movement areas, and situated near the primary runway with direct access to the terminal building and other primary services offered at the airport. Aircraft parking aprons may contain one or more taxiways and/or taxilanes to facilitate aircraft movement through the terminal area. Furthermore, apron location and design should prohibit direct access onto a runway (hotspot) to minimize potential runway incursions and maximize situational awareness.

Apron Sizing and Layout

Apron layout depends on aircraft and ground vehicle circulation needs, and aircraft clearance requirements. Apron dimensions are determined by the layout and wingtip clearances for the aircraft fleet mix currently using the facility. Parked aircraft must remain clear of the TSA and TOFA/TLOFA. Ideally, it is good practice to separate different sized aircraft, especially jet aircraft, to prevent damage from jet blast. Using the fleet mix identified in Table 3-2 and Table 3-3 as guidance, an aircraft parking layout is recommended that accommodates a variety of itinerant aircraft types, including turbine powered, while minimizing the effects of jet blast on other aircraft located on the apron. This type of apron has a design known as "pull through" parking positions with taxilanes either side to provide the most efficient use of space to meet the immediate needs at FET. See Figure 3-1 for details.

Parking Apron Depth

ACRP 113 provides illustrations of various apron layouts and designs recommended to accommodate the types of itinerant aircraft parking at FET. Figure 3-1 is an adaptation of the original apron dimension calculations presented in ACRP 113.

The depth of the parking apron, as illustrated in Figure 3-1, is recommended to be large enough to accommodate the larger Group II aircraft, which is 75 feet. Information presented in Table 3-5 indicates the TLOFA for Group II aircraft is 115 feet, while the

Taxiway (Taxilane) Width, established in Table 3-4, is 35 feet. These dimensions were used to calculate the apron depth, as follows:

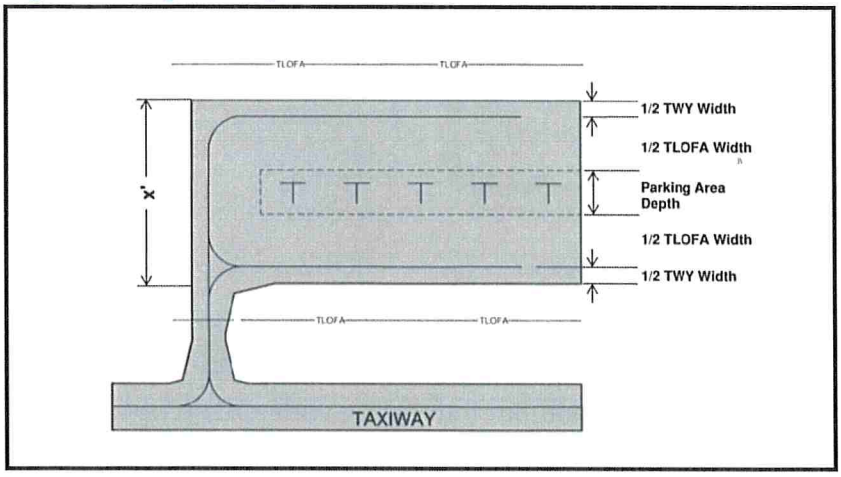
Table 3-6 Parking Apron Depth Calculations

Parking Apron Depth	Cessna Encore		Challenger 300	
Taxiway/Taxilane Width	35′ x (½)	17.5′	35′ x (½)	17.5′
TLOFA	115′ x (½)	57.5′	115′ x (½)	57.5′
Parking Area Depth	66′ x 1	66.0′	75′ x 1	75.0′
TLOFA	115′ x (½)	57.5′	115′ x (½)	57.5′
Taxiway/Taxilane Width	35′ x (½)	17.5′	35′ x (½)	17.5′
Total Depth		216.0′		225.0′

Source: ACRP 113

The results of this calculation resulted in a pavement depth of 216 feet for the Cessna Encore and 225 feet to meet the Challenger 300 spatial requirements.

Figure 3-1 Apron Layout



Source: ACRP 113, Table 5

Parking Apron Width

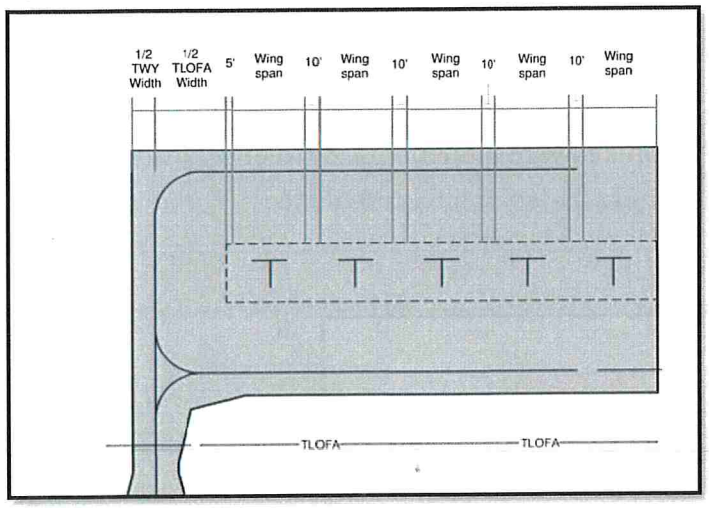
The width the of parking apron is calculated by multiplying the number of parking positions by aircraft wingspan, then adding the wingtip clearances (10′), TLOFA, and the taxiway width. See Figure 3-2 for reference.

Table 3-7 Parking Apron Width

Parking Apron Width	Cessna Encore		Challenger 300	
Wingspan	54.1′ x 7	378.7′	63.8′ x 7	446.6′
Taxiway/Taxilane Width	35′ x (½)	17.5′	35′ x (½)	17.5′
TLOFA	115′ x (½)	57.5′	115′ x (½)	57.5′
Wingtip Clearance	40′ x 7	60.0′	40′ x 7	60.0′
Total Width		513.7′		581.6′

Source: ACRP 115, Table 5

Figure 3-2 Apron Width Dimensions



Source: ACRP 113, Table 5

Apron Lighting and Marking

Apron lighting is recommended for safety and security. This type of lighting should illuminate as much of the apron as possible without interfering with aircraft operations. Consideration should be made for pole mounted light units along the perimeter of the apron, with consideration for airspace and the taxiway/taxilane OFA.

TERMINAL FACILITIES

Terminal facilities at GA airports provide important services for based and transient passengers and pilots. As the primary facility at the airport, the terminal building provides visitors the first impression of your community from arriving pilots and passengers. As a result, there may be value to developing a facility that symbolizes the ideals and values of your region.

Terminal facilities are typically open to the public on a 24-hour basis, and include restrooms, flight planning services, crew rest area, passenger lounge, vending area, and administrative offices. Some airports also provide space for FBOs to operate on an annual lease basis.

Existing apron expansion opportunities appear non-existent due to existing structures around the apron perimeter such as hangars and fuel storage facility. As a result, the terminal building location is ineffective and impractical since its intended purpose is to serve aircraft pilots and passengers who rely on direct access from the aircraft parking apron.

This study is focused on identifying a location for a new terminal facility; however, facility size and layout will be determined as part of the terminal construction project that will occur during subsequent projects.

Terminal Area Security

Transportation Security Administration (TSA) published Security Guidelines for General Aviation Airports in May 2004, to provide GA airport owners guidelines and recommendations regarding security measures. Before September 11, 2001, GA airports had not been subject to federal rules regarding airport security. Since then, all GA airport sponsors are encouraged to assess their facilities and develop security measures, when possible. Examples include fencing and access controls, daily airfield inspections, landside and airfield signage, and public awareness programs for educating the aviation community as well as the general public on the safe and secure use of the facility.

Perimeter Fencing

FET has security fence along the entire perimeter of the terminal area. The fence appeared to be in good condition, but requires periodic inspection and maintenance. It is recommended the fencing be maintained for airfield security purposes.

Access Gates

Two electronic access gates are installed in the terminal area which help maintain security by allowing access to authorized personnel. These gates appear to be in good condition and should be maintained to continue providing secure access control.

Airport Signage

The use of signage provides a deterrent by warning of facility boundaries as well as notifying of the consequences for violation. Signs should be located along both sides of the fence line to warn potential violators of the policy regarding the consequences for violating security measures.

Access, Circulation, and Parking

Public access, circulation, and parking should be included with future terminal area improvements. Based on the proposed West 23rd Street Improvements, airport access should be addressed with each proposed development alternative. Additionally, auto parking will be needed to accommodate airport terminal users and visitors. A detailed auto parking plan will be included with the design of the terminal building.

Sustainability Best Practices

Sustainability best practices play an important role in the planning, design, construction and operation of airport facilities. Whether mandated on the federal, state or local level, sustainable initiatives strive to:

- Reduce environmental impact through lower energy consumption, decreased operating costs, water conservation and natural resource preservation;
- Increase customer and occupant satisfaction and productivity through improved health and well-being;
- Enhance economic growth.

General recommendations are provided that focus on categories of energy and climate, ground transportation, site conditions, water efficiency, materials and resources, and indoor environment.

Energy and Climate

In 2015, about 40% of total U.S. energy consumption was consumed in residential and commercial buildings. Future terminal building improvements should implement energy efficiency programs, including the upgrade of lighting to LED lights and solar-powered electric perimeter fencing and gates. The following list provides examples of additional opportunities to reduce energy consumption in airport facilities:

- Perform a baseline energy audit and use a computer simulation model to assess energy performance and identify cost-effective energy conservation measures
- Replace outdated and inefficient heating systems
- Implement facility-wide lighting retrofit programs
- Use Energy Star equipment and appliances
- Install occupancy sensors to control lighting in spaces that are occupied on a non-regular basis (e.g. restrooms, storage areas, etc.).
- Install automatic lighting controls that respond to natural daylight
- Install high performance glazing and window systems
- Improve building insulation
- Install ground- or roof-mounted solar photovoltaic systems
- Implement commissioning and O&M programs to take full advantage of efficient building operation, improved facility control, improved indoor air quality and occupant productivity, extended equipment life and reduced maintenance costs
- Develop energy standards for construction and renovation of privately-owned facilities

Ground Transportation

The Airport currently provides a courtesy car for pilot use within the city of Fremont. When replacement is required or funds available, replace conventionally-fueled vehicles with alternatively-fueled or electric vehicles and provide electric charging station for public use and education. Evaluate procurement of alternative-fueled or electric-powered fleet and maintenance vehicles.

Site Conditions

Stormwater Design: Focus on low impact design strategies to reduce runoff volumes and improve water quality. Design future projects to ensure no net increase in rate and quantity of stormwater runoff by offsetting the amount of impervious surface with water quality swales and rain gardens to control stormwater rates. Alternatives for non-aviation traffic areas include the use of permeable pavements to reduce stormwater runoff. Gravel roads are used for this purpose, however due to the potential for foreign object damage (FOD) created by gravel, this option is not recommended on the airport. Remove and recycle existing pavement that is not required to reduce non-pervious surfaces.

Landscape and Exterior Design: Current landscaping celebrates regional influences. Continue developing sustainable landscaping guidelines that require native and low-maintenance plantings and paving materials.

Water Efficiency

Water conservation is a key link between balancing current and future needs, where less than two percent of the Earth's water supply is fresh water and less than 1% is available as drinking water. US buildings account for nearly 14 percent of our potable water consumption. Minimize the use of potable water for irrigation by establishing a landscape design focused on native and drought-tolerant plant materials. Additional strategies to reduce water use within airport facilities include the following:

- Develop a baseline of water consumption and track water usage data to identify overall cost savings
- Install low flow urinals, faucets and showerheads
- Install motion sensors on sink faucets
- Educate staff, employees, visitors and customers on water conservation strategies

Materials and Resources

Waste Reduction: Collect co-mingled recyclables (glass, plastic, aluminum, paper and cardboard) and transfer materials to the nearby recycling center.
The Airport would benefit from a formalized Solid Waste Management Plan with contracted pick-up for the following materials:

- *Municipal solid waste* including aluminum and other metals, glass bottles, plastic bottles and containers, packaging, paper products and cardboard and other recyclables such as batteries, fluorescent bulbs and electronic waste
- *Construction and demolition waste* including concrete, metals, wood, asphalt, roofing materials, drywall, carpet and other finish material
- *Composting* of landscape and food waste

Future Construction and Renovation: Construction waste is the largest burden on our country's landfills, but diligent salvage, reuse and recycling practices during demolition and construction can significantly reduce this waste stream. Regional building materials

that assess cradle-to-cradle design celebrate the local vernacular, benefit the regional economy and reduce transportation impacts. Materials manufactured with post-consumer recycled content, rapidly renewable and bio-based materials as well as certified wood products from sustainably-managed forests and suppliers, further reduce unnecessary waste of our limited natural resources.

Indoor Environmental Quality

Good indoor air quality reduces health risks and promotes occupant well-being and productivity. Thermal comfort can be improved though efficient HVAC systems, glare control and individual control of ambient conditions though operable windows and/or zoned thermostats. Additional opportunities to improve the interior environment include:

- Maintain a smoke free environment in public buildings
- Locate exterior designated smoking areas at least 50 feet from entries and operable windows
- Install permanent carbon dioxide monitoring systems that provide feedback on space ventilation performance
- Provide adequate outdoor air through building ventilation systems
- Use MERV 13 filtration media
- Increase air movement in facilities with ceiling fans
- Install floor mats at the building entrance to reduce introduction of exterior contaminants
- Use zero- or low-volatile organic compound (VOC) adhesives, sealants, paints and coatings
- Select carpet, flooring, composite wood products and other interior finish materials complying with third party green building standards

Summary of Facility Requirements

Table 3-8 provides a summary of facility requirements developed for the future terminal area parking apron and terminal building. Two Design Aircraft were selected for the alternatives analysis: Cessna Encore and Challenger 300. While the majority of operations are performed by Category B-II aircraft, similar to the Cessna Encore, the need exists to also consider larger Category C-II aircraft, represented by the Challenger 300. Specific design elements are provided below.

Table 3-8 Facility Requirements Summary

Design Elements		Cessna Encore	Challenger 300
Aircraft Parking Positions		7	7
Taxiway/Taxilane		35′	35′
Taxiway Safety Area (TSA)		79′	79′
Taxiway OFA (TOFA)		131′	131′
Taxilane OFA (TLOFA)		115′	115′
Aircraft Parking Apron	Depth	216′	225′
	Width	518.7′	586.6′
Pavement Strength		16,630 lbs.	39,000 lbs.

Source: Burns & McDonnell, 2017

CHAPTER 4 TERMINAL AREA ALTERNATIVES

INTRODUCTION

The terminal area alternatives analysis provides development options that satisfy the specific needs identified in Chapter 3 Facility Requirements. Each development alternative includes a description of the proposed alternative, evaluation, and summary. This analysis is intended to provide an organized approach to identifying and evaluating alternative development options that will assist the City of Fremont with the development of the terminal layout plan and airport capital improvement program (ACIP). The key elements of this process are:

1. Identification of development alternatives that address terminal facility requirement needs;
2. Evaluation of the alternatives to provide a thorough understanding of the opportunities, constraints, and consequences of each; and,
3. Selection of a recommended alternative that meets the goals of this study.

DEVELOPMENT GOALS

The goal of this terminal area plan is to identify an alternative that is consistent with FAA design criteria as well as future development of infrastructure and facilities. Therefore, the following design elements are used to guide the selection of the preferred alternative:

Taxiway Design

AC 150/5300-13A, para 401, provides guidance for taxiway location and design. Regarding existing taxiway geometry, improvements are encouraged where "hot spots" or confusing layouts occur. These situations create potential runway incursions due to poor situational awareness as a result of the taxiway design. As a result, the following design guidelines are considered:

- Taxiway intersection angles should be 90 degrees;
- Keep taxiway systems simple to increase pilot situational awareness;
- Avoid unnecessary wide expanses of pavement;
- Limit runway crossings;

- Increase visibility using right angle intersections between taxiways and runways; and,
- Avoid indirect access to the runway from parking aprons.

Apron Design

AC 150/5300-13A, Chapter 5 provides guidance for the design of aircraft parking aprons. It recommends apron locations near or adjacent to the terminal building to accommodate loading and unloading of passengers and or cargo. Apron layout and orientation minimizes runway incursions and expedites aircraft operations. Apron layout should prevent direct access to the runway and permit good situational awareness for pilots. Proper placement of aprons contributes to improved accessibility, efficient aircraft movement and enhanced situational awareness conditions. Efficient apron design should provide ease of aircraft maneuvering, limit taxiway distance to and from the runways, and separate different sized aircraft (i.e. corporate jets from light propeller aircraft).

AC 150/5300-13A, para 504.a, states that aprons and associated taxilanes should be designed for the critical aircraft and/or the combination of aircraft that will use the facility. Itinerant or transient aprons should be designed for easy access by the aircraft under power. Furthermore, aprons designed to handle jet aircraft should consider the effects of jet blast and allowing sufficient area for safe maneuvering.

Airport Cooperative Research Program (ACRP) 113 provides additional guidance regarding aircraft parking apron location. It states that the apron should:

- Provide safe and easy ingress and egress for aircraft from taxiways and taxilanes;
- Maximize available space;
- Provide space for other GA facilities like hangars or a terminal building;
- Provide sufficient parking area outside the required OFAs and setback areas;
- Maintain consistency with future expansion;
- Provide vehicle access; and,
- Ensure that pilots and passengers do not have to cross a taxiway to reach their aircraft.

Terminal Building

ACRP 113 also provides guidance for the location of a general aviation terminal building. These buildings typically provide a passenger waiting area, restrooms, telephones, pilot lounge, and flight planning area. The location of the terminal building should:

- Provide maximum visibility from the runway and or parallel taxiway for arriving aircraft;
- Provide good visibility of the airfield from the terminal;
- Provide safe and efficient access from primary roadways;
- Be close to an apron adequate for based and transient aircraft;
- Have room for adequate automobile parking;
- Not interfere with the possible expansion or construction of other airfield facilities;
- Allow for future expansion of the building and associated parking; and,
- Allow easy access to utilities.

Overall, the terminal building should be the focal point of the airport. As a result, it should be easy to locate and navigate to from both the airside and landside. It is preferred that the view is not blocked by other buildings and aligned with the parallel taxiway or runway as much as possible.

Evaluation Criteria

The following criteria are used to assist with the selection of the preferred development alternative. These criteria are based on ACRP 113 guidelines, and consistent with FAA design criteria and the study goals identified earlier. The following categories are used to evaluate each development alternative:

Safety — Meets recommended FAA design standards, while minimizing opportunities for runway incursions and promoting situational awareness by emphasizing a linear alignment with the parallel taxiway or runway. Taxiway system should be simple using 90 degree angles at intersections, when possible, while minimizing excessive pavement including unnecessary wide expanses of pavement. The preferred location should provide a clear line-of-sight to the runway(s) and taxiway(s) while attempting to avoid conflicts with navigational aids.

Efficiency	Optimizes existing space, including infrastructure and facilities, promotes efficient airside and landside access, and encourages compatibility with adjacent land uses.
Economics	Benefit is worth the cost including future cost savings, project is eligible to receive funding, minimizes unnecessary costs, and offers reasonable opportunities for generating revenue or reducing operating costs.
Expansion	Accommodates expansion of both airside and landside facilities and infrastructure while allowing expansion of adjacent facilities.
Balance	Balances user needs with overall airfield needs when possible however, the preferred plan should focus on enhancement of airfield capacity and capability based on FAA design standards.
Consistency	Consistent with airport vision or community goals while meeting FAA design standards and grant assurances. Preferred alternative should maintain consistency with future expansion goals and promote safe and easy access between airside and landside facilities.

PROJECT CONSTRAINTS

The following project constraints are identified from the initial site investigation, discussion with federal and state agencies, and data collection efforts regarding future terminal development alternatives at FET:

FAA Funding: FET is eligible to receive non-primary entitlement (NPE) funds up to $150,000 each year, not to exceed a cumulative amount of $600,000. NDA funds are available for eligible and justified projects and administrated by the Nebraska Department of Transportation. FAA also distributes discretionary funds typically reserved for large capital improvement projects; however, initial discussion with the FAA Central Region revealed that any proposed terminal area improvements associated with this study are likely limited to NPE funds.

Existing Aircraft Parking Apron: As identified in Chapter 2, the existing aircraft parking apron is inconsistent with FAA design criteria (TLOFA/Fuel Servicing Set-backs). Expansion opportunities are non-existent due to existing structures around the

apron perimeter such as hangars and fuel storage facility. As a result, the existing terminal building location is ineffective and impractical since its intended purpose is to serve aircraft pilots and passengers who rely on direct access from the aircraft parking apron.

West 23rd Street: A plan to improve West 23rd Street is being considered by the City of Fremont. The proposed development involves the construction of an overpass over the railroad tracks and expanding the Right-of-Way to include a reconfiguration for access to Airport Road, running along the east side of the airport.

Taxiway D: This connector taxiway is the remaining pavement from the decommissioned Runway 1-19 and provides access between Runway 32 and the existing terminal area. This pavement is currently in poor condition and appears to require rehabilitation to prevent further deterioration. Its alignment and orientation intersects the Runway 32 threshold at a 50-degree angle, which is inconsistent with FAA design standards recommending a 90-degree intersection designed to increase situational awareness and reduce potential runway incursions. Since a portion of this pavement is inconsistent with FAA design standards, AIP funds may not be available for rehabilitation or maintenance.

AWOS: The weather reporting station is located west of the T-hangars, and adjacent to the property line. The AWOS wind sensor has specific object clearance guidelines for wind speed and direction readings. More specifically, objects within 500 feet of the wind sensor should be no higher than 15 feet below the wind sensor elevation (typ. 30' to 33' AGL).

FAR Part 77 Airspace Surfaces: Three-dimensional, imaginary surfaces are linked to the runway location and elevation. These surfaces are used to protect local airspace from object penetrations, natural or manmade, that could compromise the safety of flight. Clearance of these surfaces will be maintained, based on the BRL.

Runway/Taxiway Safety Areas: Both, the runway and taxiways contain safety areas that provide object clearances or set-backs intended to prevent damage to aircraft and people on the ground. These safety areas will be identified, as necessary.

Existing Structures: The FET terminal aircraft parking apron is surrounded by hangars and the fueling facility. Removal or relocation of existing structures is beyond the scope of this project and will not be considered as a development alternative.

Terminal Area Development Alternatives

The goal of the terminal area development alternatives is identifying an appropriate location for a new terminal building and aircraft parking apron. Additional support facilities such as hangars, maintenance, buildings, and utilities will be determined upon the sponsor approval of the preferred development alternative. It should be noted that the terminal building layout and features will be determined during the design phase of the project. In the past, development has been stalled because of focusing on building size, features, etc. For this alternatives analysis, a location for a new facility will be identified for evaluation purposes only. Cost estimates were prepared for the aircraft parking apron and connecting taxiway for up to seven aircraft parking positions. The cost to design and construct the terminal building will be determined during the design phase when its spatial needs and layout are established.

Alternative 1 – No Build

The No Build alternative is proposed as an option to maintain current conditions in the terminal area.

Alternative Evaluation:

- Safety – This alternative fails to solve FAA apron design standards regarding minimum wingtip and taxilane OFA clearances distances without potential damage to parked aircraft and/or personnel.
- Efficiency – This alternative optimizes existing terminal area infrastructure however it does not appear to promote efficient access between airside and landside facilities.
- Economics – This development option appears to be the least costly in terms of terminal area improvement costs however it does not appear to address existing aircraft parking apron and terminal area needs.
- Expansion – The No Build option does not appear to facilitate expansion of the terminal area.
- Balance – This alternative does not appear to satisfy airfield design or facility requirements.

- Consistency – This development option does not appear to address community goals to accommodate existing and future itinerant aircraft parking demand.

Alternative 1 Summary:

In summary, this development option fails to address the primary goal of accommodating itinerant aircraft parking while addressing future airport needs. As a result, this alternative is not recommended. No cost estimates were developed for this alternative.

Alternative 2 – East Side Development

This option evaluates a two-phased approach to terminal development along the east side of the airport. The first phase includes the construction of an aircraft parking apron for five aircraft, connecting taxiway (11,536 SY) and terminal building with access from Airport Road. Phase 2 involves apron expansion for two additional aircraft (3,701 SY). See Figure 4-1 for details.

Design Notes:

This alternative involves construction of a new aircraft parking apron and connector taxiway to Taxiway D. This location provides direct access from Airport Road to the terminal building and automobile parking.

Alternative Evaluation:

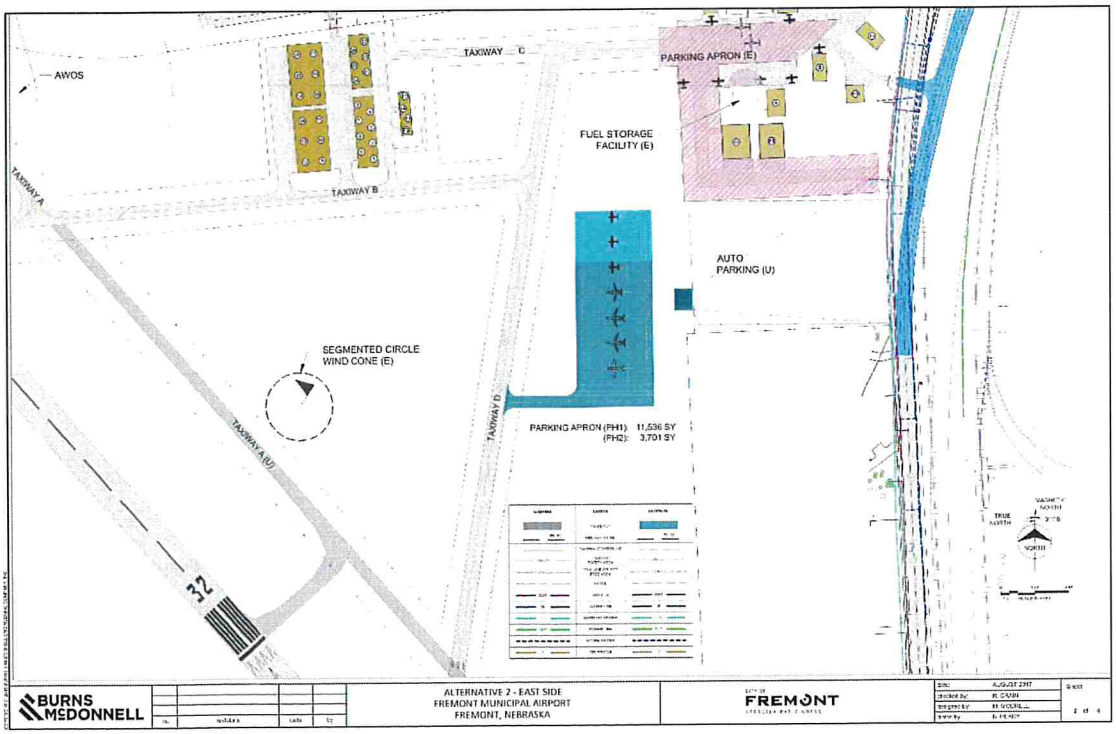
- Safety – This alternative appears to maximize available space, avoiding direct access from the parking apron to the runway, and providing safe and easy ingress and egress. However, space for future hangar development along the aircraft parking apron appears limited at this site.
- Efficiency – Alternative B is located near the current terminal facility which provides an opportunity to be near existing facilities while ground access is available from Airport Road.
- Economics – These alternative attempts to reduce development costs through the utilization of Taxiway D pavement for runway access. However, discussion with FAA revealed that because Taxiway D is inconsistent with airport design criteria, this pavement is likely ineligible to receive any type of FAA funds for maintenance or improvements.
- Expansion – This location appears to provide limited terminal area expansion opportunities due to existing infrastructure and property boundaries.

- Balance – The terminal building and parking apron is located near the eastern edge of the airport. As a result, this location appears out of balance with existing runway and taxiway elements due to excessive aircraft taxi distance between the runway and parking.
- Consistency – This site appears to be inconsistent with the City goal to develop a cost-effective solution while balancing airside/landside access and optimizing existing infrastructure.

Alternative 2 Summary:

This location appears to be inconsistent with study goals to optimize current infrastructure since Taxiway D between the terminal area and Runway 32 threshold is in poor condition and is unlikely to receive FAA funds for maintenance. Furthermore, this site does not provide efficient aircraft traffic flow between parking and the runway apron. See Figure 4-1 for details. Cost estimate for this alternative is $1.745 Million for design and construction of the aircraft parking apron and connecting taxiway.

Figure 4-1 Alternative 2 - East Side



Source: Burns & McDonnell, 2017

Alternative 3 – Mid-Field Terminal Development

This option evaluates two options for a terminal building and parking apron development that is more centrally-located near the mid-field connector taxiway. This site is intended to improve direct access between the runway and proposed terminal area parking. Although these alternatives divide existing terminal area services, such as aircraft fueling, from the proposed terminal area, the long-term benefits emphasize the development of an efficient and safe terminal area. Furthermore, FBO personnel provide fuel service for based and itinerant aircraft using fuel trucks. As a result, the location of the fuel facility is expected to have a minimum affect if terminal aircraft parking is relocated closer to the runway.

Alternative 3A – Mid-Field Taxiway A

This alternative evaluates a two-phased approach for construction of an aircraft parking apron to accommodate five aircraft, connecting taxiway (9,878 SY), and terminal building that aligns with the proposed extension Taxiway A to the Runway 32 threshold. Access to the terminal area involves closure of Taxiway D for access from Airport Road. Phase 2 proposes a future apron expansion for two additional aircraft (3,829 SY). See Figure 4-2 for details.

Design Notes:

This alternative estimates a total 13,707 square yards of aircraft parking apron and taxilane along the extended Taxiway A, near the mid-field connector taxiway. This design reflects the ideal location and orientation parallel to the primary runway with clear line-of-sight. The parking apron is designed to accommodate jet aircraft with "pull through" parking along with the construction of an access taxiway that will become part of the full-parallel taxiway. This alternative appears to provide safe and efficient access between the runway and parking apron, and optimizes future taxiway development following completion of the parallel taxiway. This option includes landside access from Airport Road since the long-term preferred development appears to favor the removal of Taxiway D and extension of Taxiway A to the Runway 32 threshold.

Alternative Evaluation:

- Safety: This location and orientation appears to be consistent with FAA design recommendations regarding proximity and access to the runway and taxiways. This location appears to provide efficient aircraft traffic flow, oriented parallel

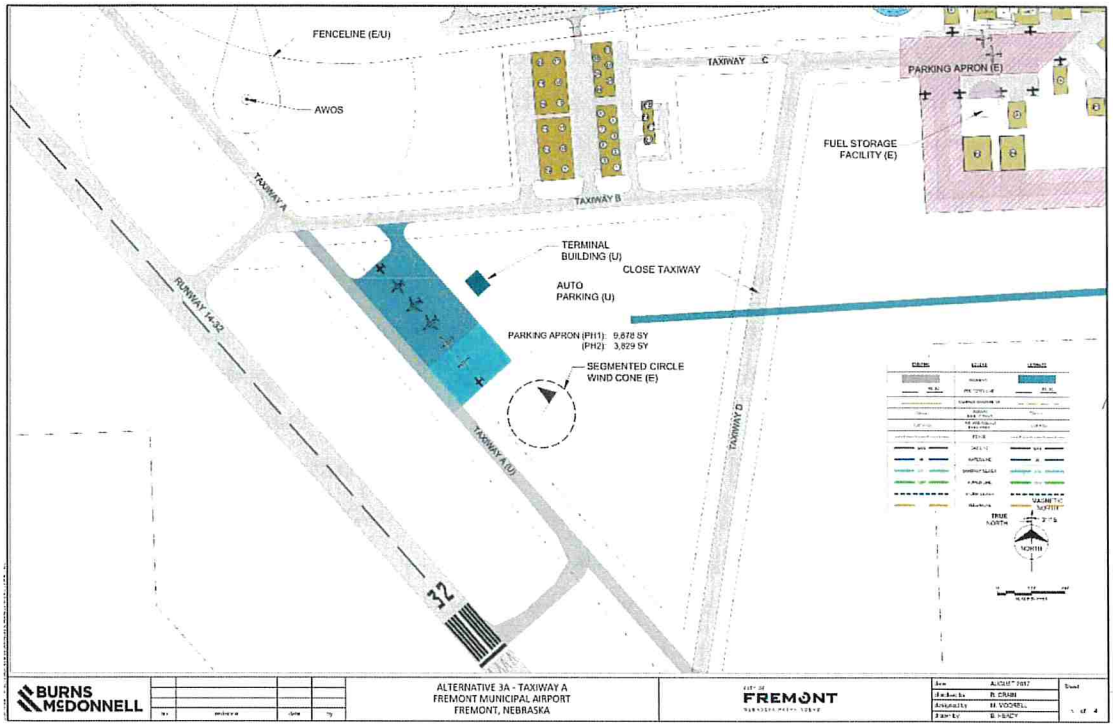
to the runway, and increases line-of-sight requirements to promote situational awareness for pilots. It appears there are no conflicts with NAVAIDs or the AWOS.

- Efficiency: The layout promotes efficient traffic flow between the runway and parking apron, and provides good access from both the airside and landside. Connection between the current terminal area and runway are maintained with Taxiway B, while land uses appear to remain consistent with adjacent uses.
- Economics: This location appears to be eligible for FAA funds, which will assist with project construction costs and future maintenance. This layout and orientation appear to provide the most cost-efficient design regarding aircraft operating costs and future pavement maintenance by reducing the distance traveled by itinerant aircraft.
- Expansion: This layout and location promote extension of Taxiway A that coincides with a full-parallel taxiway system. This site also appears to provide adequate space for future apron expansion and access as well as development of corporate style hangars and maintenance facilities.
- Balance: This location and layout appears to balance runway and taxiway capability and needs while maximizing future airport infrastructure. This site appears to be an optimal location to serve itinerant aircraft as well as satisfy existing parking and tie-down needs. One drawback is that this site separates the existing and future terminal area.
- Consistency: This location appears to be consistent with the City vision regarding FAA design standards, optimization of current facilities, improvement to line-of-sight, provides a cost-effective development, and maintains airside and landside access.

Alternative 3A Summary:

This alternative offers an opportunity to optimize the ultimate full-parallel taxiway as a cost-effective approach to terminal area development as well as provide a natural fit for future expansion. Although, the existing and future terminal areas are separated, the proposed terminal area location will address short-term needs while focusing on long-term goals of developing an efficient and functional terminal area closer to the runway and parallel taxiway. See Figure 4-2 for details. Cost estimate for this alternative is $2.02 Million for design and construction of the aircraft parking apron and connecting taxiway.

Figure 4-2 Alternative 3A - Taxiway A



Source: Burns & McDonnell, 2017

Alternative 3B – Mid-Field Taxiway B

This location evaluates a two-phased approach for construction of an aircraft parking apron, connecting taxiway to accommodate five aircraft (9,188 SY), and terminal building parallel to Taxiway B, along the north side of the airport. Phase 2 involves the expansion of the aircraft parking apron (3,239 SY) to accommodate two additional aircraft. See Figure 4-3 for details.

Design Notes:

This alternative estimates a total 12,427 square yards of aircraft parking apron and taxilane along Taxiway B, near the mid-field connector taxiway. This design places the terminal building on the north side of Taxiway B which requires crossing an active taxiway to access the parking apron. The parking apron is designed to accommodate jet aircraft with "pull through" parking along with the construction of an access taxiway that will become part of the full-parallel taxiway. Ground access is proposed from West 23rd Street with automobile parking available at the terminal building. The following categories are evaluated:

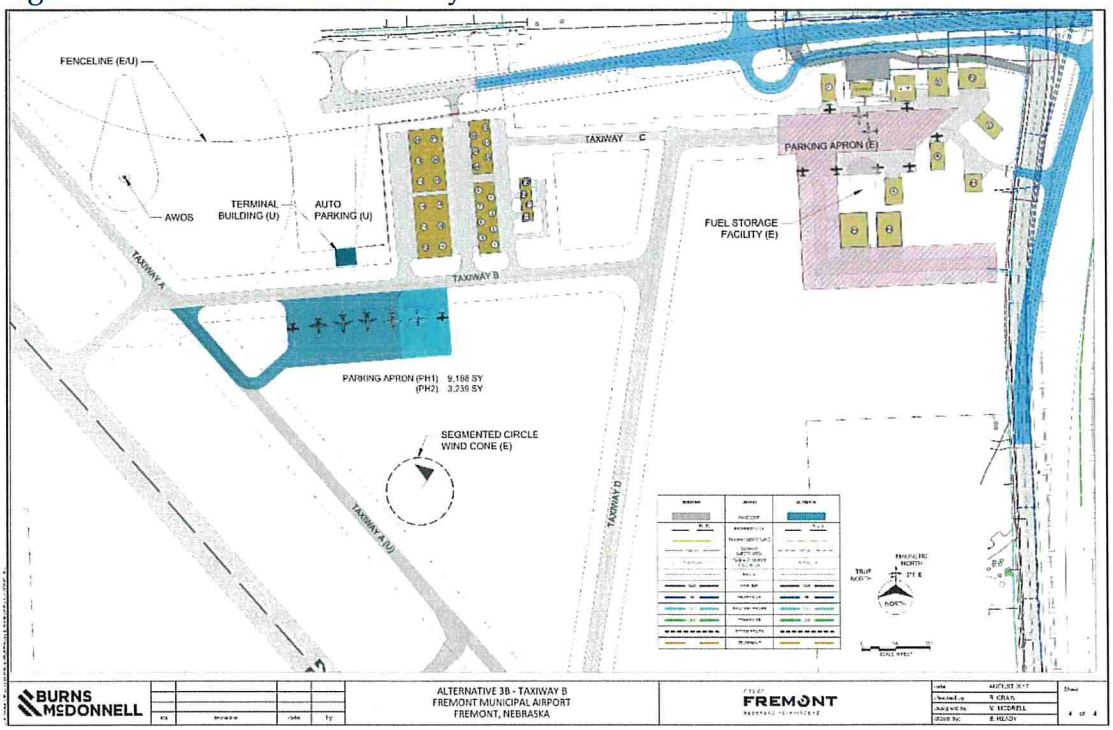
Alternative Evaluation:

- Safety: This alternative appears to be inconsistent with FAA design standards, including crossing active taxiways to access parked aircraft. Furthermore, this design does not appear to improve airport situational awareness using 90 degree angles and a location that aligns with Runway 14-32. This design does not appear to conflict with NAVAIDs and improves clear line-of-sight to each runway end.
- Efficiency: This proposed layout is intended to optimize current pavements as well as provide efficient aircraft traffic flow between the runway, taxiway, and aircraft parking. Additionally, airside and landside access appears to meet the design goals for the terminal building but not for further hangar expansion and landside access adjacent to the parking apron. Furthermore, this layout does not appear to provide a parallel orientation in relation to the runway or improve pilot situational awareness.
- Economics: FAA funds are likely available pending review and approval. This site is proposed to offer a relatively cost-effective development solution through maximization of existing pavements to expand the terminal apron.
- Expansion: This layout appears to adversely impact future expansion opportunities for corporate hangar development due to the AWOS clearance requirements to the west and existing T-hangars to the east.
- Balance: This layout and location appears to meet existing airfield requirements but limits expansion opportunities to meet future operational needs.
- Consistency: This layout and location appears to meet some of the goals of the city and airport based on current needs, however future expansion opportunities appear to be limited near the apron and terminal building.

Alternative 3B Summary:

In summary, this alternative provides a short-term solution to meet aircraft parking apron needs, however this location does not appear to meet the long-term study goals due to limited terminal area expansion opportunities. Additionally, this site is not recommended due to pilots and passengers crossing an active taxiway which could lead to unsafe conditions. See Figure 4-3 for details. Cost estimate for this alternative is $1.525 Million for design and construction of the aircraft parking apron and connecting taxiway.

Figure 4-3 Alternative 3B - Taxiway B



Source: Burns & McDonnell, 2017

ALTERNATIVES EVALUATION MATRIX

An evaluation matrix was created to illustrate the recommended development options, based on previously specified criteria. Each alternative was evaluated and scored according to its ability to meet FAA design standards and planning guidance regarding terminal area facilities. See Table 4-1 for reference. According to this evaluation, Alternative 3A – Midfield Taxiway A appears the most favorable development alternative that meets the goals and objectives of the City of Fremont and the planning and design guidance. As a result, Alternative 3A is recommended as the preferred development alternative.

Table 4-1 Alternatives Evaluation Matrix

	Safety	Efficiency	Economics	Expansion	Balance	Consistency	Recommended Action
ALT 1 – No Build	●	●	●	●	●	●	
ALT 2 – East Side	●	●	●	●	●	●	
ALT 3A – Mid-Field Taxiway A	●	●	●	●	●	●	●
ALT 3B – Mid-Field Taxiway B	●	●	●	●	●	●	

Source: Burns & McDonnell, 2017

A general cost comparison for each alternative is available in Table 4-2 for reference. These costs were developed for each aircraft parking apron and taxiway connector location. With all things being equal, it appears that ALT 3B is the least expensive development option, followed by ALT 2, then ALT 3A. Cost estimates were not developed for ALT 1 since development costs are not anticipated for the no-build option.

Table 4-2 Alternatives Cost Estimates

	AIP Eligible	Local Cost (10%)	Total Cost
ALT 1	N/A	N/A	N/A
ALT 2	$1,571,328.00	$174,592.00	$1,745,920.00
ALT 3A	$1,819,080.00	$202,120.00	$2,021,200.00
ALT 3B	$1,372,680.00	$152,520.00	$1,525,200.00

Source: Burns & McDonnell, 2017

City of Fremont Preferred Alternative

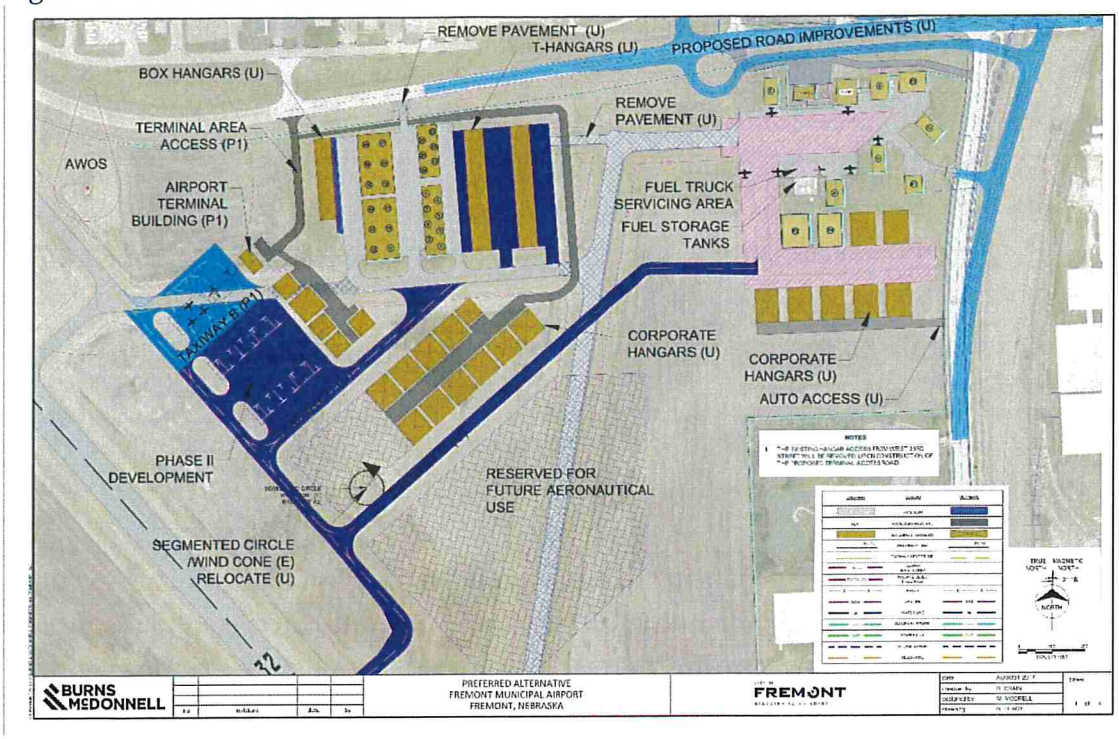
The City of Fremont and the Airport Board evaluated each alternative during a presentation on August 18, 2017. During this meeting, the benefits of each alternative were discussed in terms of safety, efficiency, economics, expansion, balance, and consistency. Overall, the Airport Board preferred the general location of ALT 3B with the following modifications:

- Rotate the apron south towards the runway to create additional development space and align with the parallel taxiway
- Locate the terminal building to the north of the aircraft parking apron, if NDOT will permit the relocation of the AWOS
- Maintain hangar expansion east of the apron
- Provide terminal access from West 23rd Street where is aligns with 2nd Street
- Connect Taxiway B to the existing taxilane located south of the current parking apron, for future access to the runway
- Show future hangar development south of the existing apron, similar to existing hangars
- Re-align Taxiway B to maintain access to Taxiway A, and future full-parallel taxiway

During follow-on conversations with NDOT-Aeronautics Division, the re-location of the AWOS was not recommended until further study could be completed to identify a suitable alternative site. As a result, the proposed terminal building was re-located from the north side of the parking apron to the east side. This location appears to allow future hangar development on the east side without impacting the AWOS clearance area, airport access or taxilane routes. See Figure 4-4 for details regarding proposed short-term and long-term terminal development options.

The preferred alternative illustrates an apron layout designed to provide flexible parking options for itinerant aircraft expected to continue operating at FET. This layout also illustrates parking for up to four ARC B-II, ten ARC A-I aircraft, or a combination of each for short-term needs, while providing expansion capabilities for additional parking during the long-term planning period. See Figure 4-5 for details regarding initial development.

Figure 4-4 Preferred Alternative



Source: Burns & McDonnell, 2017

Terminal Building

The proposed terminal building is located outside the 500-foot AWOS clear area, along the northern edge of the proposed aircraft parking apron. This location appears to permit direct access for itinerant pilots and passengers, who are expected to be the primary users of these facilities.

Aircraft Parking Apron

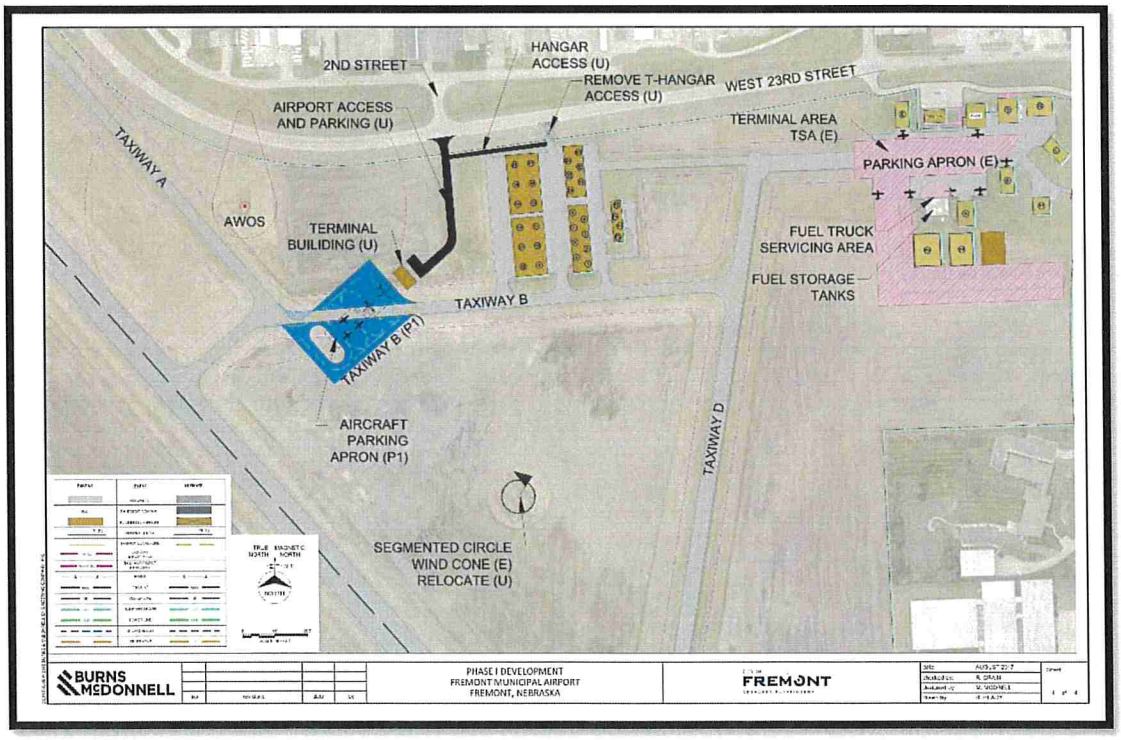
The proposed location and alignment of the aircraft parking apron is designed to maximize existing pavement, to the extent possible, while maintaining consistency with FAA design recommendations. Therefore, the proposed apron is positioned at the intersection of Taxiway A and Taxiway B. This layout results in the re-alignment of Taxiway B along the eastern and southern perimeter of the proposed parking apron to maintain runway access. This configuration also requires a small extension of Taxiway A to the east where it intersects with Taxiway B.

Access Road

The proposed terminal access road will permit direct access from West 23rd Street to the proposed terminal parking and adjacent facilities. West 23rd Street is classified as a Business (30) Route; as a result, due to safety concerns, any changes to access points along this corridor is subject to review and concurrence by the NDOT Access Control Team. Currently, there are two separate access points along West 23rd Street. The first access point is located at the existing terminal area, near Airport Road, on the east side of the airport. The second access point is located along West 23rd, near the T-hangars.

The initial terminal access was proposed in a location approximately 200 feet west of 2nd Street. However, a review by the NDOT Access Control Team indicated that approval would be granted for additional access to West 23rd Street if it were aligned with 2nd Street. In addition, upon construction of the new access, the T-hangar access to West 23rd Street would be removed.

Figure 4-5 Short-Term Development



Source: Burns & McDonnell, 2017

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FREMONT
NEBRASKA PATHFINDERS

APPENDIX 1: *Terminal Area Plan Update, October 2015*

DAVIS DESIGN

BURNS McDONNELL

FREMONT
NEBRASKA PATHFINDERS

DAVIS DESIGN

BURNS McDONNELL

CITY OF
FREMONT
NEBRASKA PATHFINDERS

TERMINAL AREA PLAN UPDATE

OCTOBER 2015

Executive Summary

The City of Fremont contracted with Airport Development Group, Inc. (ADG) in November 2013 to engage in a two-part planning project that would result in an updated Airport and Terminal Area Layout Plan (ALP) with three suggested alternatives and cost estimates to relocate the terminal facility and reorganize the airfield to more easily accommodate the growing mix of larger business jets.

In late 2013, a conference call with representatives of the City of Fremont, ADG, NDA and FAA was held to discuss available resources and challenges to a reconfiguration of the airfield. The current Capital Improvement Plan (CIP) identifies approximately $2 million toward this reconfiguration.

The City last completed formal airport planning in 2003. The City, FAA, and NDA determined that a terminal area plan update would be beneficial given current activity, on-airport land use concerns and economic conditions. The City of Fremont consulted with FAA and NDA and the planning consultant to consider current potential issues and craft a work plan which addresses resolution.

On March 18, 2014, the ADG project team made a presentation of five alternative layout designs and their estimated costs to the City Council in a special hearing along with an architectural report on the existing terminal's physical stability and cost effectiveness to rehabilitate vs. build a new facility.

The present terminal building is operating beyond its designed life span, is not in compliance with the Americans with Disabilities Acts (ADA), and is energy inefficient. The configuration of the present building layout does not lend itself to privacy, adequate meeting space, flight instruction. Modifications to West 23rd Street will necessitate removal of a good portion of terminal auto parking.

After discussion and some suggestions to the alternatives presented during this March meeting, the ADG project team was given direction to present four alternatives. Common to all alternatives is: closure of Runway 1/19, formal design standards compliant accommodation of larger and faster aircraft on Runway 14-32, Relocation of Highway 30 to clear Runway 14 airspace and reconfiguration of West 23rd Street in the vicinity of the terminal area. Highlights of the alternatives are:

Alternative No. 1 - Future development located on the site of the existing terminal with closure of Runway 1/19, expansion of aircraft parking aprons, and new hangars.

Alternative No. 2 - Future development with terminal access located along Airport Road with closure of Runway 1/19, expansion of aircraft parking aprons, and new hangars.

Alternative No. 3 - Future development with terminal access located farther west along West 23rd Street, with closure of Runway 1/19, expansion of aircraft parking aprons, and new hangars.

Alternative No. 4 - Future development with terminal access adjacent to current terminal area with closure of Runway 1/19, expansion of aircraft parking aprons, and new hangars.

Recommendation–

As the project team concluded its work on a comprehensive planning 'vision' for the Fremont Municipal Airport, it is critical that decisions, and consensus, are reached that best utilize the accrued FAA funds of $600,000 along with other potentially available funds from the FAA, NDA and the City of Fremont to enhance a growing economic engine for the city. On balance, **Alternative No. 4** provided ease of access, adequately consolidates aircraft parking area, meets the spirit and intent of FAA comments hereto and best suits needs.

TERMINAL AREA PLAN UPDATE
FREMONT MUNICIPAL AIRPORT (FET)

OCTOBER 2015

Prepared for the:
CITY COUNCIL OF THE CITY OF FREMONT

SCOTT GETZSCHMAN
Mayor

JENNIFER BIXBY
President

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CECILIA HARRY
BILL DUGAN
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and the:
FEDERAL AVIATION ADMINISTRATION, CENTRAL REGIONAL AIRPORTS DIVISION

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1.0 INTRODUCTION

The City of Fremont as owner, operator and sponsor of the Fremont Municipal Airport (FET) has initiated this update of its airport planning to assess FET's existing and future role and to provide direction and guidance related to short- and long-term on-airport development.

This study will find a course of action over a period of 20 years and beyond for on-airport development. This course of action will be advanced pursuant to City Council prerogative and provide compliance with current Federal Aviation Administration (FAA) airport design standards.

This project and its process will be shepherded through Mr. Dave Goedeken, P.E., Public Works Director, coordinated through Fremont's various aviation and non-aviation constituencies as they may wish to participate, and approved by City Council.

The planning, and this resulting document, is intended to be both a forward-looking and flexible document. Resolutions and solutions are proposed well in advance of the likely need; and the plan is flexible enough to change with the need. Federal and state agencies are then similarly able to program funding and be responsive to financing needs, should that be appropriate.

FAA, the City and the State of Nebraska Department of Aeronautics (NDA) have not yet formulated a funding need; some funding is available for terminal area facility improvements. The current FET Capital Improvement Plan (CIP) identifies approximately $2 million to that end.

Four alternative layouts are within fielded for City Council consideration followed by an updated Airport Layout Plan (ALP) drawing and Terminal Area Plan (TAP) drawing for FET.

The remainder of this introductory section describes plan purpose, issues, and project participants.

1.1 PURPOSE

The purpose of the planning effort is to use developed methods to objectively evaluate and assess on-airport facilities from an aviation use, land use, and development perspective. The potential need for infrastructure and additional facilities will be considered while looking to the future to determine how the airport may more fully participate in the local and regional economy. Further, this planning will assist City leadership to guide local airport infrastructure investment decisions.

The product of this effort will provide the City with a concept to meet aviation needs in the short, intermediate, and long-range planning periods. It is anticipated that benefits derived from the plan will positively affect FET, its users, City and County residents and the surrounding area.

1.2 ISSUES

The City last completed formal airport planning in 2003. The City, FAA and the Nebraska Department of Aeronautics (NDA) determined that a terminal area plan update would be beneficial given current activity, on-airport land use concerns and economic conditions. The City of Fremont consulted with FAA and NDA and the planning consultant to consider current potential issues and craft a work plan which addresses issues. Some of those issues are described as follows and will be given particular attention in the planning process.

Issue Number One:
Existing Terminal Building Disposition

The existing general aviation terminal building has likely reached the end of its useful life without

rehabilitation. Inadequacies identification along with potential new sites will be considered. Specifically, focus will be made to a new facility, perhaps in a different location.

Issue Number Two:
Accommodate Potential Landside Demand

Landside in this context relates to portions of FET's ramp/aprons, the terminal building function/location, aircraft fueling and other services provided to the flying public, automobile access and parking, and other important features which serve to support airside operations. Accommodation hereto will be considered in an alternatives context.

A number of larger aircraft may now, or in the future, use the airport in a sufficient quantity to suggest that some portion of the landside should be designed to accommodate airport design standards for those larger aircraft, including pavement strengths, clearance widths and other on-the-ground features. Again, accommodation hereto will be considered in an alternatives context.

1.3 PLANNING PROCESS AND PARTICIPANTS

A planning process is primary and accompanies this narrative. This planning process and participation through the process from those with interests in the overall aviation community is important to creation of this narrative and its depictions.

The planning process begins with preparation of the necessary data and mapping to be used in the study to prepare this narrative, along with its updated ALP and TAP drawings for FET.

The narrative and the ALP and TAP drawings will be prepared in accordance with FAA guidelines, policies and procedures and applicable federal and state laws and standards. Previous reports and associated work will be reviewed, as necessary for baseline information.

The project process will be engaged in coordination with the City Council, federal, state and local planning agencies, the representatives of which will be consulted for input and invited to attend progress meetings. The end result will provide a planning document that recommends a responsive course of action and a financially-unconstrained plan, complete with current planning-level cost estimates for improvements.

Various airport constituencies, including the general public will be solicited through the public participation process. This process includes two public meetings and a presentation to the City Council. The first meeting introduces the planning and previews the alternatives planning. The second meeting will detail the alternatives and work to build consensus on an acceptable configuration.

FAA and NDA will advise on project progress and documents at key project points. The planning consultant, Airport Development Group, Inc., will prepare project documentation, help to guide project progress, and solicit guidance.

2.0 INVENTORY INTRODUCTION

This planning effort is intended to instruct and supplement NDA airport planning and programming efforts, as necessary. This plan is a more detailed look at the FET's landside, while national and state planning step back and generally consider the larger role FET plays in the overall system of airports.

FET is part of the US national transportation system and the FAA's National Plan of Integrated Airport Systems (NPIAS). Of the nation's nearly 5,200 public-use airports, the NPIAS comprises nearly 3,400 airports which are considered

significant by FAA to the national airspace system. As a participating facility in the program, the City as sponsor is eligible to receive federal funds for airport improvements.

FET is eligible to receive funding through NDA, and other state agencies. The Nebraska Airport System Plan Update (2002) identifies FET as a National General Aviation Airport in the Nebraska system of airports. State system planning for airports generally includes a more detailed analysis not only of commercial service, but general aviation airports like FET.

2.1 LOCATION AND SETTING

FET is located in extreme southeastern Dodge County in eastern Nebraska near 41° 26′ 59.6″ North, 96° 31′ 12.7″ West. FET is entirely within the City of Fremont boundaries, due west of the residential and business areas of the City. FET is approximately 30 miles due northwest from Omaha, Nebraska, via U.S. Highway 6 to U.S. Highway 275 to U.S. Highway 30. Airport properties currently approximate 353 fee acres and 75 acres under avigation easement. The airport beacon is adjacent to the main apron. The Airport Surface Observing System (ASOS) and segmented circle with wind indicator units are found near midfield.

Runway 14-32 is approximately 6,353 feet long and 100 feet wide. It is constructed of concrete with an estimated 28,000 pounds single-wheel gear (SWG) and 48,000 pounds duel-wheel gear (DWG) design pavement strength. 850-foot displacements are found on either end and declared distances are identified. The effective runway longitudinal gradient is less than 0.1 percent and runway longitudinal line of sight is met. Runway pavements are in excellent condition as reported by NDA. The runway is equipped with a Medium Intensity Runway edge-Lighting (MIRL) system. Both runway ends are equipped with a two-light Precision Approach Path Indicator (PAPI) VGSI (Visual GlideSlope Indicator) lighting systems and Runway 14 is equipped with a Runway End Identifier Lighting System (REIL). Each runway end is marked with elements appropriate for non precision aircraft operation including aiming points.

Runway 1-19 is approximately 2,316 feet long and 50 feet wide. It is constructed of asphalt with an estimated 12,500 pounds single-wheel gear (SWG) design pavement strength. Runway threshold displacements are found on either end and declared distances are identified. The effective runway longitudinal gradient is less than 0.1 percent and runway longitudinal line of sight is met. Runway pavements are in poor condition as reported by NDA. Each runway end is marked with elements appropriate for visual aircraft operation excluding aiming points.

Aircraft traffic pattern turns are prescribed: Left Traffic for Runway 14, Right Traffic for Runway 32, Left Traffic for Runway 1 and Right Traffic for Runway 19. Both runway alignments, individually, do meet FAA's recommended 95 percent coverage of winds in all-weather conditions (Runway 14-32 marginally so at 94.90%). Wind data gathered from the ASOS on the field was used to create the three wind roses for FET. The wind rose is found on Exhibit E following this page.

Three instrument approach procedures are written to accommodate aircraft operation in inclement weather. Table 1 on the next page tabulates data and notes best minima for straight-in and circling operation. Note that departure minima are specified for Runway 14 and 19 and departure procedures and minima are specified for Runway 14.

Runway 14-32 is equipped with partial parallel Taxiway A. All taxiway pavements are 35 feet wide, equipped with a Medium Intensity Taxiway edge-Lighting (MITL) system, with holdlines and

airfield signage no closer than 250 feet from runway centerline on connecting taxiways. Taxiway B connects the A/A3 intersection with Runway 1-19, is 35 feet wide and equipped with MITL. Taxiway C connects near the Runway 19 end to the main apron and is 50 feet wide. Taxiway B and C have holdlines and signage no closer than 125 feet from runway centerline.

The main apron approximates 7,777 square yards of recently rehabilitated asphalt with marked tiedown positions along the apron edge. Note that not this entire yardage is available for public aircraft operations as some fronts hangars, and taxiway marking is non-standard. This apron is functionally-constrained as to accommodate (in accordance with FAA design standards) only smaller aircraft (Group I). A 2,400 (±60'x±40') square foot terminal building fronts the northern apron edge. This building accommodates the FBO and the transient and local pilot with offices, lounge, and pilot area. Approximately 850 square yards of paved auto parking (22 stalls) is found adjacent to and north of the building. 100LL and Jet-A aviation fuels are for retail sale via two 10,000 gallon tanks to on-airport fueling vehicles.

These tanks are found adjacent to the across the apron, south from the terminal building. Eight hangars constitute the remainder of the aeronautical facilities of the main terminal area and are accessed by way of West 23rd St.

The west-side terminal area (connected via Taxiway B) accommodates two executive and three T-hangars. These hangars also access via West 23rd St.

A combination of chain-link and three-strand barbed fencing surrounds the airport with gates along Airport Road, West 23rd St and the main terminal area.

2.2 AVIATION ACTIVITY

NDA inspects FET on a periodic basis to assess facilities and activity. Data from the annual airport inspection for the year ended December 12, 2013 indicates that FET accommodates 3,600 air taxi (16%) and 6,350 itinerant general aviation (28%) along with 12,200 local (55%) and 150 military (<1%) aircraft operations, totaling 22,300 total aircraft operations, 10,100 of which (45%) are itinerant in nature. The inspection notes 40 single-engine (83%), 7 multi-engine (14%) and 1 (<1%) helicopter for the based aircraft count.

FAA maintains a based aircraft and aircraft operations record and forecasting effort for NPIAS airports termed the Terminal Area Forecast (TAF). Aircraft operations identified within the TAF for FET are the same as above since the year 2008 and remain the same 20 years hence.

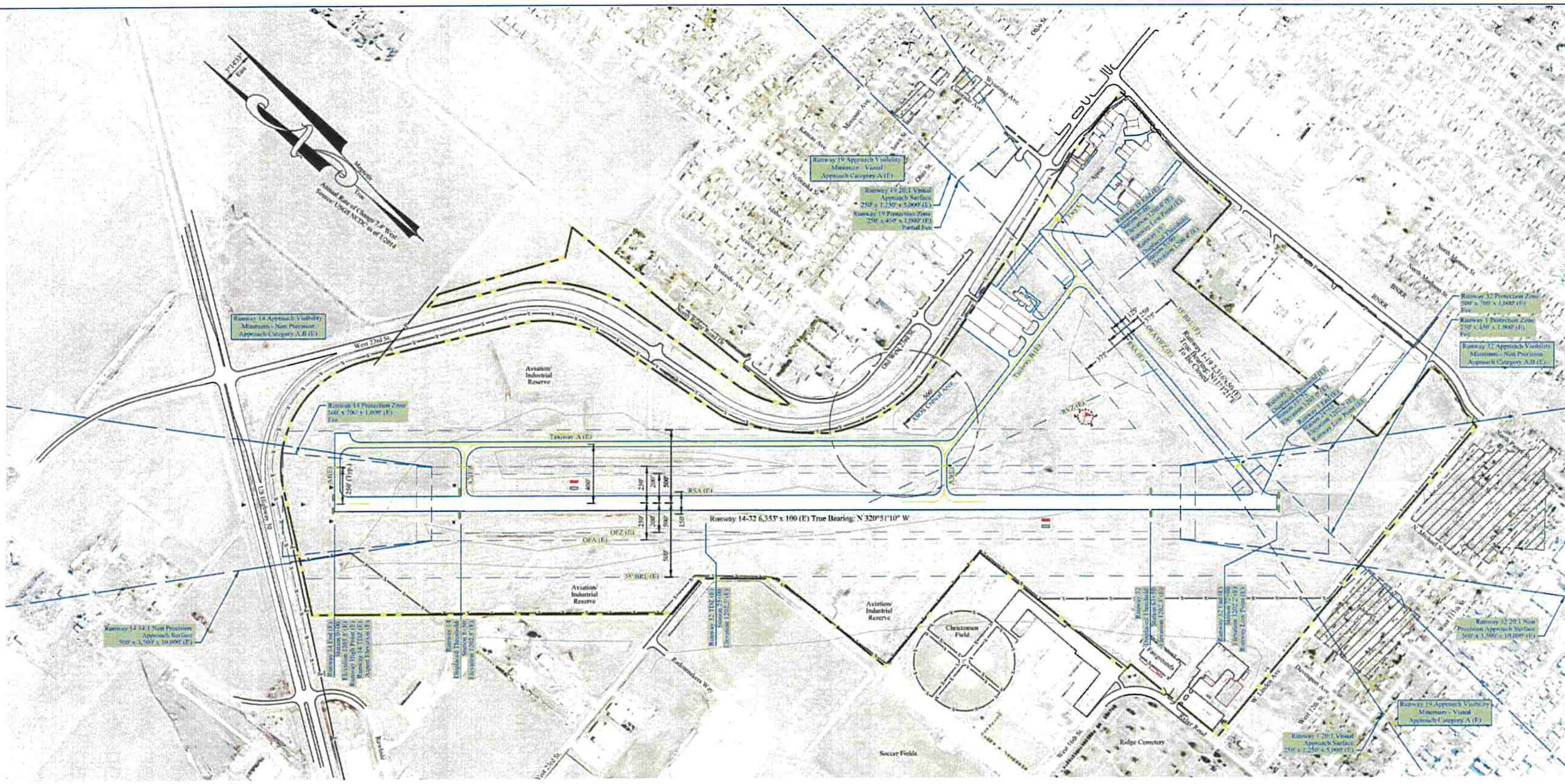
Current information, as of August 15, 2014 via the Fixed Base Operator, Fremont Aviation updates the based aircraft quantity: 3 Twin-Turbo prop, 1 Jet and 2 helicopter.

Table 1
FET Instrument Approach Procedures (IAPs)

IAP Name	A-Minima	B-Minima	C-Minima	D-Minima
RNAV (GPS) RWY 14 (Circling)	600-1	600-1	900-2½	Not Authorized
RNAV (GPS) RWY 14 (Straight-in LPV)	300-1	300-1	300-1	Not Authorized
RNAV (GPS) RWY 32 (Circling)	600-1	600-1	900-2½	Not Authorized
RNAV (GPS) RWY 32 (Straight-in)	300-1	300-1	300-1	Not Authorized
VOR/DME-RWY 14 (Circling)	700-1	700-1	900-2½	Not Authorized
VOR/DME-RWY 14 (Straight-in)	700-1	700-1	700-1¾	Not Authorized

Legend

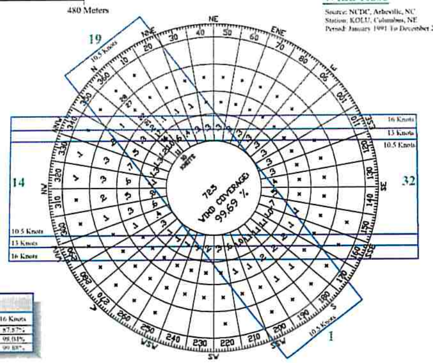
- (E) Existing
- Existing Property Line
- Building Restriction Line (35' BRL)
- Runway Protection Zone (RPZ)
- Approach Surface
- Object Free Area (OFA)
- Runway Safety Area (RSA)
- Obstacle Free Zone (OFZ)
- Runway Visibility Zone (RVZ)
- Existing Fence
- Existing Pavement
- Existing Paved Roads
- Existing Buildings
- Avigation Easement
- Drainage Line
- Contour Line
- Threshold/Edge Lights (MIRL)
- Runway End Identifier Lights (REIL)
- Section Corner
- Precision Approach Path Indicators (PAPI-2/4)
- Runway Hold Position Sign
- Segmented Circle With Lighted Wind Cone
- Rotating Beacon



Graphic Scale

All-Weather Wind Rose

Source: NCDC, Asheville, NC
Station: KOLU, Columbus, NE
Period: January 1991 To December 2001



Wind Coverage

Runway	10.5 Knots	13 Knots	16 Knots
14-32	91.34%	96.75%	97.57%
1-19	90.93%	94.90%	98.01%
14-32 & 1-19 Combined	98.34%	99.47%	99.88%

Runway End Coordinates

Runway	Existing	Future
14	North Latitude 41°27'27.32" West Longitude 96°31'50.35"	
14 Displaced	North Latitude 41°27'20.80" West Longitude 96°31'43.30"	
32	North Latitude 41°26'38.72" West Longitude 96°30'58.33"	
32 Displaced	North Latitude 41°26'45.18" West Longitude 96°31'04.75"	
1	North Latitude 41°27'02.39" West Longitude 96°30'52.01"	
1 Displaced	North Latitude 41°26'02.39" West Longitude 96°30'51.56"	
19	North Latitude 41°27'02.39" West Longitude 96°30'52.01"	
19 Displaced	North Latitude 41°26'38.72" West Longitude 96°30'58.33"	

The preparation of these drawings was financed, in part, through a planning grant from the Federal Aviation Administration (FAA), as provided under Section 505 of the Airport and Airway Improvement Act of 1982, and as amended by the Airport and Airway Safety and Capacity Expansion Act of 1987, as amended. The contents do not necessarily reflect the official views of the FAA. Acceptance of these drawings does not in any way constitute a commitment on the part of the United States to participate in any development depicted herein, nor does it indicate that the proposed development is environmentally acceptable in accordance with appropriate public laws.

Runway Data

	Runway 14-32				Runway 1-19	
	14 Existing	32 Existing	14 Future	32 Future	1 Existing	19 Existing
Runway Length and Width	6,353 x 100, Concrete				2,316 x 50, Asphalt	
Runway Pavement Strength (SWG/DWG/DTWG/DDTWG in 1,000 lbs.)	28 SWG, 48 DWG				N/A	
Runway Lighting	MIRL				None	
Runway Marking (V, NP, PI)	Non Precision	Non Precision			Visual	Visual
Crosswind Component and Percent Coverage	13 Knots/96.75%				10.5 Knots/98.94%	
Blast Pad Width Length	N/A	N/A			N/A	N/A
Runway Development Reference Code (RDC RRC)	A-II, 1 Mile				A-I, Visual	
Critical Design Aircraft	Cessna Citation 525				Cessna 150	
Approach Speed, Wingspan, Weight, Haul	115 kts., 49.8', 13,870 lbs., <500 mi				55 kts., 32.7', 1,600 lbs., <500 mi	
Associated Taxiway Design Group (TDG), Width, Lighting	2, 35', MITL				1, None, None	
Approach Surface (Table 3-2)	20:1; Row 6	20:1; Row 6			20:1; Row 2	20:1; Row 2
Departure Surface	N/A	N/A			N/A	N/A
FAR Part 77 Approach Surface	34:1 NP, 500'x 3,500' x 10,000'	34:1 NP, 500'x 3,500' x 10,000'			20:1 V, 250'x 1,250' x 5,000'	20:1 V, 250'x 1,250' x 5,000'
Landing/Navigational Aids	GPS,PAPI,REIL	GPS, PAPI			None	None
Runway End Elevation	1,203.5'	1,202.2'			1,202.2'	1,200.6'
Highest/Lowest Runway Elevation	1,203.5' / 1,202.2'				1,200.6' / 1,202.2'	
Runway Touchdown Zone Elevation (TDZ)	1,203.5'	1,202.9'			1,202.2'	1,202.2'
Runway Intersection Elevation	N/A				N/A	
Effective Longitudinal Runway Gradient	<0.1%				<0.1%	
Maximum Longitudinal Runway Gradient	<0.1%				<0.1%	
Line of Sight Standards Met (Longitudinal/RVZ)	Yes/Yes				Yes/Yes	
Runway Safety Area (RSA) Beyond End/Prior To	300'/300'	300'/300'			240'/240'	240'/240'
Runway Safety Area (RSA) Width	150'				120'	
Runway Object Free Area (ROFA) Beyond End Prior To	300'/300'	300'/300'			240'/240'	240'/240'
Runway Object Area (ROFA) Width	500'				250'	
Obstacle Free Zone (ROFZ) Length Beyond End Width	200'/400'				200'/250'	
Precision Obstacle Free Zone (POFZ) Length/Width	N/A	N/A			N/A	N/A
Runway Protection Zone (RPZ) AAC, Visibility, Dimensions Accommodated, Dimensions and Nature of Ownership	A-B, 1 mi., 500' 750'x1,000' Fee	A-B, 1 mi., 500' 750'x1,000' Fee			A, Vis., 250' 450'x1,000' Fee	A, Vis., 250' 450'x1,000' Fee/Ease&ROW
Runway Centerline Separations, Taxiway, Hold and Parking	240', 200', 250'				150', 125', 125'	
Displaced Threshold Elevation	1,202.8'	1,202.3'			1,200.4'	1,203.0'
Takeoff Runway Available (TORA)	5,500'	5,500'			1,974'	1,844'
Takeoff Distance Available (TODA)	5,500'	5,500'			1,974'	1,844'
Accelerate Stop Distance Available (ASDA)	5,500'	5,500'			2,444'	2,284'
Landing Distance Available (LDA)	4,650'	4,650'			1,844'	1,844'

Airport Data

	Existing	Future
Airport Elevation	1,204'	
Airport Reference Point (ARP)	North Latitude 41°26'56.9" West Longitude 96°31'12.7"	
Airport Electronic Aids	GPS RNAV, VOR DME	
Mean Maximum Temperature of Hottest Month	88.6° Fahrenheit (July)	
Most Demanding Runway Design Code	A/B-II, 1 Mile	
NPIAS/State Role	General Aviation	
Most Demanding Critical Design Aircraft	Cessna Citation 525	

Sponsor Approval

City Of Fremont, Nebraska ____________________ Date

Notes

1. Base Mapping from 2010 ALP obtained from the City of Fremont, January 2014 supplemented by 1-meter ortho-referenced *Pictometry* imagery obtained January 2014. Ground contours via the 2010 ALP. Supplemental airspace survey not conducted.
2. No Obstacle Free Zone Penetrations or Threshold Siting Surface Penetrations exist. No Modification to Design Standards approved and no Non Standard Conditions identified.
3. All Coordinates 1983 North American State Plane Projection, all elevations North American Vertical Datum, Epoch Year 1988.
4. Existing airport-related city property approximates 353 acres, and easement acreage approximates 75 acres
5. See Terminal Area Plan for more detailed building information.
6. Planned (But Not Shown) improvements include:
   - 6.1. Closure of Runway 1-19 to serve as taxiway
   - 6.2. Full-parallel taxiway for Runway 14-32
   - 6.3. Improved IAP visibility (from 1-mile to 3/4-mile) for Runway 14 while simultaneously removing the Runway 14 displacement and updating declared distances
   - 6.4. Adoption of C&D Design Standards for Runway 14-32
   - 6.5. Planned Terminal Area hangars, apron, access and other landside features

No.	Revision	Ckd	Date

Fremont Municipal Airport

City of Fremont, Nebraska

ADG Airport Development Group
1776 South Jackson Street | Suite 203
Denver, Colorado 80210-3822
303 782 0882 / 303 782 0842 fax
www.ADGairports.com

NDA Project Number:

Project No.:	FET1437M
Designed By:	SPM
Drawn By:	MTP
Approved By:	SPM
Date:	February 2014

Existing Airport Layout

Exhibit: **E** of VII Exhibits

2.3 AIRFIELD DESIGN STANDARDS

FAA specifies a coding scheme for airport design that relates airfield design criteria to the operational and physical characteristics of aircraft using an airport in a meaningful quantity, along with IAP visibility. This scheme, and standards compliance thereto, relates to individual runways and runway ends at certificated and/or obligated airports. FET is an obligated airport as the City has accepted federal grant-in-aid funds from FAA. The scheme relates to runways, along with their associated IAPs and taxiways/aprons.

The first portion of the overall scheme relates to a given runway, and runway end, and has three criterion. Table 2 shows the criterion collectively, the Runway Design Code (RDC).

The first, represented by a letter, is the Aircraft Approach Category (AAC). It relates to aircraft approach speed, an aircraft operational characteristic (1.3 x Vso/Vref {the speed of an aircraft in the landing configuration}). The second designator, Airplane Design Group (ADG), is represented by a roman numeral. It is related to aircraft wingspan and aircraft tail height; physic characteristics.

A given runway end may accommodate an IAP with various FAA-approved visibilities. These visibilities are segregated and expressed in terms of Runway Visual Range (RVR). RVR is a real-time meteorological measurement noted feet and related to ¼ mile visibility increments. RVR measurements are made at the runway location. Figure 1 on the following page shows representative aircraft grouped only by Airplane Design Group (ADG).

These criterion, the AAC speed, ADG wingspan and tail height, along with IAP capability, combine to identify each runway's RDC and classify design standards, primarily related to runway and runway protection. A RDC is associated with a particular runway end. A field with multiple

Table 2
Runway Design Code (RDC) Criterion

Aircraft Approach Category (AAC)	Aircraft Speed Range (Knots)
A	Less than 91
B	More than 91, but less than 121
C	More than 121, but less than 141
D	More than 141, but less than 166
E	More than 166

Airplane Design Group (ADG)	Aircraft Wingspan Range	Aircraft Tail Height Range
I	Up to but not including 49′	Up to but not including 20′
II	49′ up to but not including 79′	20′, up to but not including 30′
III	79′ up to but not including 118′	30′, up to but not including 45′
IV	118′ up to but not including 171′	45′, up to but not including 60′
V	171′ up to but not including 214′	57′, up to but not including 60′
VI	214′ up to but not including 262′	66′, up to but not including 80′

IAP Capability in Terms of Visibility (Statute Mile)	
RVR 4000	Lower than one mile but greater than ¾ mile
RVR 2400	Lower than ¾ Mile but not lower than ½ mile
RVR 1600	Lower than ½ Mile but not lower than ¼ mile
RVR 1200	Lower than ¼ Mile

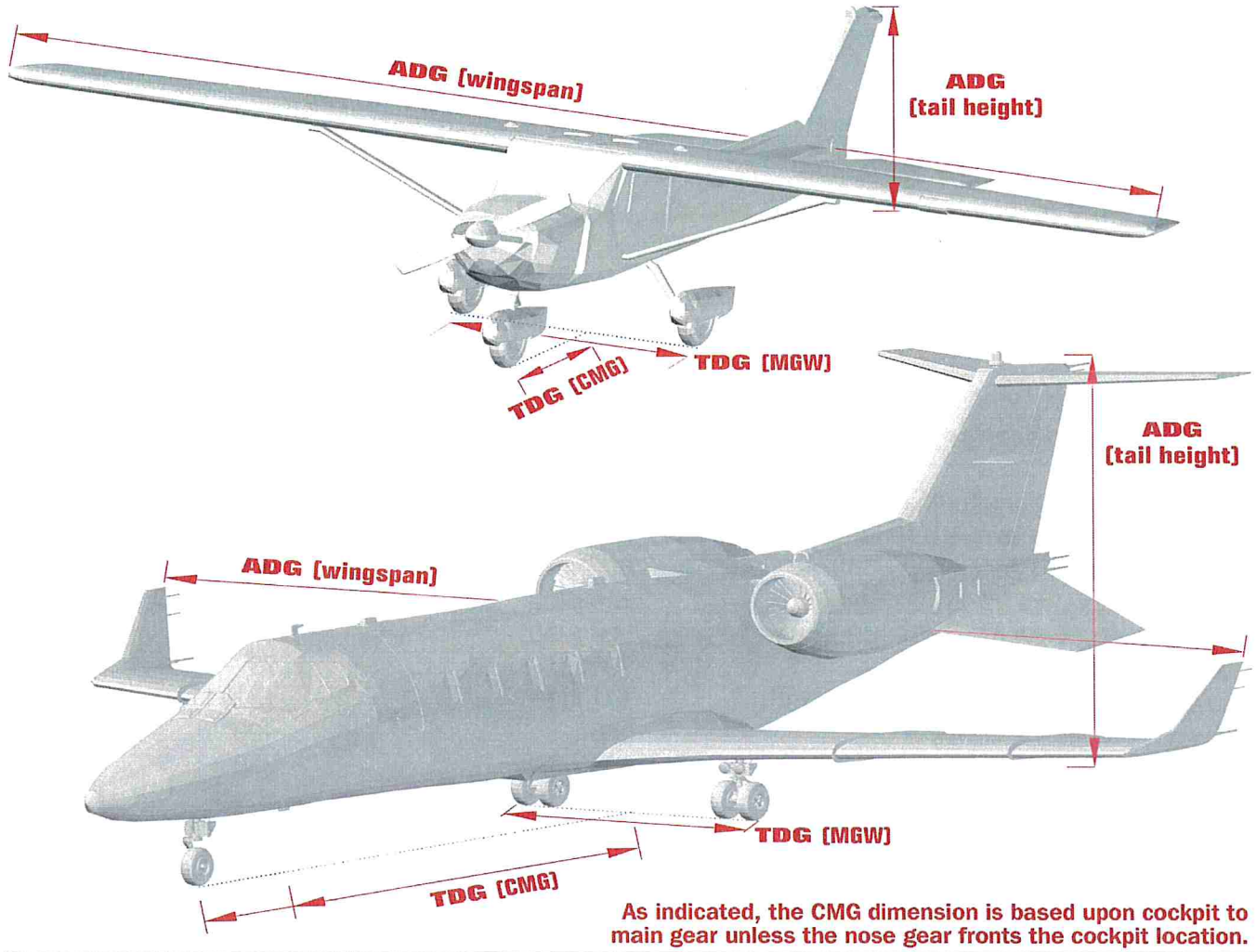
runways may have multiple RDCs.

Beyond RDC, Taxiway Design Group (TDG) is an additional criteria; it is based upon the dimensions of aircraft undercarriage, specifically the distance between the outer edge of the main gear, termed the Main Gear Width (MGW) with the distance between the Cockpit to Main Gear, termed CMG. Note that if the nose wheel fronts the cockpit, the CMG distance increases. Various MGW and CMG ranges combine to make TDG's 1 through 7, with 7 accommodating the largest ranges, and aircraft. The visualization on the following page, as Figure 1-4, shows the physical aircraft characteristics associated with ADG and TDG. In many instances ADG and TDG for individual airplanes will be within the same grouping; for example, ADG-I with TDG-1, ADG-II with TDG-2, and AGD-III with TDG-3. Notable exceptions generally include aircraft with a relatively long fuselage.

Finally, aircraft weight is an additional criterion to be able to determine suitable application of all airport planning and design at FET.

Aircraft which weigh less than 12,500 pounds (maximum certificated gross), regardless of wheel configuration, are termed utility or small aircraft.

Figure 1
Select Airport Design Criterion



Those which weight more are termed non-utility or large aircraft. Note that the runway, taxiway and the main apron pavement strengths are currently 12,500 pounds SWG.

The most demanding aircraft or group of aircraft with alike physical and operational characteristics that use the airport regularly; generally conducting at least 500 annual takeoffs or landings, is termed the design aircraft.

The current criterion for Runway 14-32 are:

A&B-II, Large Aircraft; >RVR4000; and, the current criterion for Taxiway A, its connectors and aprons is TDG-2, Large Aircraft. The current design aircraft is the Cessna Citation CJ4 (C525C); a B-II, TDG-2, large aircraft.

The current criterion for Runway 1-19 (planned to be closed) are:

A&B-I, Small Aircraft; >RVR4000; and, the current criterion for its associated taxiways, connectors and aprons is TDG-1a, Small Aircraft. The current design aircraft is the Cessna 150 (C150); an A-I, TDG-1a, Small Aircraft.

Design standards encompass various areas, zones, surface gradients and separations standards; select standards are described and tabulated within Table 3 based upo the current design aircraft:

- ✓ A Runway Protection Zone (RPZ) is a trapezoidal area off each runway end, established to enhance protection of people and property by clearing incompatible land uses.
- ✓ The Runway Safety Area (RSA) and Taxiway Safety Area (TSA) are established to ensure that the ground surface adjacent to runways and taxiways is suitably prepared to reduce the risk of damage in the event of an aircraft deviation from paved surfaces. Safety area specifications are dimensional, grade-specific and material-specific.
- ✓ The Runway Object Free Area (ROFA) and Taxiway Object Free Area (TOFA) are established to ensure the safety of aircraft operations by having an area free of objects, except those frangibly-mounted objects, necessary for air navigation or ground maneuvering purposes.
- ✓ The Obstacle Free Zone (OFZ) is a volume of airspace up to 150 feet above airport

Table 3
Select FET Airport Design Standards for Runway 14-32

Standard/Specification	Standard	Existing
Runway Width	75 Feet	100 Feet
Effective Runway Longitudinal Grade	Within ±2% Maximum	Within ±2% Maximum
Runway Pavement Strength (Pounds)	Recommended 12,500 SWG	>12,500 SWG
Runway Protection Zones	500'x700'x1,000'	500'x700'x1,000'
Runway Safety Area Width/Beyond End	150'/300'	150'/300'
Runway Object Free Area Width/Beyond End	500'/300'	500'/300'
Taxiway Safety Area Width	79'	79'
Taxiway/Taxilane Object Free Area Width	131'/115'	131'/115'
Runway to Parallel Taxiway A	240'	400'
Runway to Aircraft Holdline on Taxiway A	200'	250'
Runway to Aircraft Parking	>250'	>250'
Obstacle Free Zone Width/Beyond End	400'/200'	400'/200'
Approach Surfaces (20:1)	800'x3,800'x10,000'	800'x3,800'x10,000
Part 77 Primary Surface Width/Beyond End	500'/200'	500'/200'
Part 77 Approach Surfaces Dimension/Slope	500'x3,500x5,000'; 34:1	500'x3,500x5,000'; 34:1

elevation, centered on runway centerline, primarily established to preclude taxiing and parked aircraft. The runway holdline is sometimes located to coincide with limits of the OFZ.

- ✓ The purpose of the Approach and Departure Clearance Surfaces is to provide obstacle clearance for visual and instrument approach procedures. These surfaces are generally three-dimensional trapezoids with 20:1 or 34:1 surfaces extending upward and outward away from each end of runway.

Title 14 of the Code of Federal Regulations, Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace* specifies various imaginary surfaces considered to protect the airspace around FET from objects of natural growth or man-made features, termed obstructions. These surfaces are the primary, approach, transitional, horizontal and conical as described in Section 77.25 and as follows:

- ✓ The primary surface is longitudinally centered on the runway. The elevation of any point on the primary surface is the same as the elevation of the nearest point on centerline. The width of the primary surface is based on the type of approach available or planned for each runway.
- ✓ The approach surface is a surface longitudinally centered on the extended runway centerline and extending outward and upward from each end of the primary surface. An approach surface is applied to each end of each runway based on the type of approach available or planned for that runway end.
- ✓ The transitional surfaces extend outward and upward at right angles to the runway centerline and runway centerline extended at a slope of 7:1 (±8.13 degrees) from the sides of the primary surface and from the sides of the approach surfaces.
- ✓ The horizontal surface is a level horizontal plane 150 feet above the established airport elevation, the perimeter of which is constructed by swinging arcs of either 5,000 or 10,000 feet from the center of each end of the primary surface of each runway and connecting the adjacent arcs with lines of tangency.
- ✓ The conical surface extends outward and upward from the periphery of the horizontal surface at a slope of 20:1 (±2.86 degrees) for a horizontal distance of 4,000 feet.

3.0 FORECASTS INTRODUCTION

The forecasts of aviation demand are the basis for determining current and future airport facility requirements. These requirements are then used to plan airport development such as runways and taxiways, apron area, hangar space and selection of the appropriate airfield design standards. The forecasts establish the nature and magnitude of aeronautical activity and the associated need for airport development for the 20-year planning period.

History has repeatedly demonstrated that airport utilization will vary significantly, depending upon the level of service provided for the public and regional economic conditions. Due to the highly elastic nature of the aviation industry, most aviation forecasts tend to follow trends rather than fluctuations in any given year.

3.1 FORECASTS OF AVIATION DEMAND

No formal forecasting is to be conducted for this planning; only percentage estimates are derived. Existing and historical data was simply reviewed and a *constrained*, subjective judgment was made and tabulated as is found in Table 4. Note that percentage increase estimates are found next to the forecast value within the table.

The most current master plan and system plan are perhaps out of date for purposes herein. Several other sources may be reviewed to determine an appropriate level of forecasting, including the onsite interview conducted in late January 2014 to estimate operations by aircraft type.

Forecast information, for purposes herein, is valuable not for formal FAA purposes, but for planning an adequate amount of apron, for example. More specifically with respect to apron, FAA has created modeling software based upon *Airport Design* which provides an eligible (but not necessarily funded) quantity of apron for future planning purposes based upon the number of itinerant operations.

3.1.1 Aircraft Operations

The following is of subject for the forecast for aircraft operations as found in Table 4:

1. Planning Years:
   - ✓ 2014, 2019, 2024, 2033
2. Airport Reference Code/Class:
   - ✓ A&B-I Small
   - ✓ A&B-II Small
   - ✓ A&B-II Business
   - ✓ C&D-II Corporate
   - ✓ C&D-II Large Corporate

With respect to the above Airport Reference Code/Class, note that:

- *A&B-I Small* forecasts all aircraft types weighing less than 12,500 pounds, with approach speeds up to 121 knots, and wingspans up to 49 feet, inclusive.

  Example aircraft include:
  - ✓ Cessna 152,172, 210, 206, 414, 441
  - ✓ Piper Cub, Arrow, Comanche, Saratoga
  - ✓ Beechcraft Bonanza, Duke
  - ✓ Cirrus, Mooney, Diamond, Glasair
  - ✓ Helicopters, Ultralights

- *A&B-II Small* forecasts all aircraft types weighing less than 12,500 pounds, with approach speeds up to 121 knots and wingspans up to 79 feet, inclusive.

  Example aircraft include:
  - ✓ Cessna 441, Mustang
  - ✓ Beechcraft King Air 90/100, Premier
  - ✓ Embraer Phenom, Eclipse 500

- *A&B-II Business* forecasts all aircraft types weighting greater than 12,500 pounds, with approach speeds up to 121 knots and wingspans up to 79 feet, inclusive.

  Example aircraft include:
  - ✓ Cessna Citation 550, 650, Sovereign
  - ✓ Dassault Falcon 20,50,200
  - ✓ Hawker 400, 850XP,

- *C&D-II Corporate* forecasts all aircraft types weighting up to 60,000 pounds, with approach speeds up to 166 knots and wingspans up to 79 feet, inclusive.

  Example aircraft include:
  - ✓ Cessna Citation X
  - ✓ Bombardier Challenger 300, 605
  - ✓ Lear 35, 45, 60, 85 (Weight Excepted)
  - ✓ Dassault Falcon 900, 2000

- C&D-II Large Corporate forecasts all aircraft 60,000 pounds or greater, with approach speeds up to 166 knots and wingspans up to 79 feet, inclusive.

  Example aircraft include:
  - ✓ Bombardier Global Express, Challenger
  - ✓ Gulfstream II, III, 550, 650
  - ✓ Falcon 7X
  - ✓ Hawker Horizon

3.1.2 Based Aircraft

The following is of subject for the forecast of based aircraft as found in Table 4:

1. Planning Years:
   - ✓ 2014, 2019, 2024, 2033
2. Aircraft Type:
   - ✓ Single-Engine Piston
   - ✓ Multi-Engine Piston
   - ✓ Twin-Turbo Prop
   - ✓ Jet
   - ✓ Helicopter/Other

3.1.3 Operations Mix

The following is of subject for the forecast of aircraft operations mix as found in Table 4:

1. Planning Years:
   - ✓ 2014, 2019, 2024, 2033
2. Operations Type:
   - ✓ Local Operations (those operations performed by aircraft that remain in the local traffic pattern, execute simulated instrument approaches or low passes at the airport, and the operations to or from the airport and a designated practice area within a 20–mile radius of the tower)
   - ✓ General Aviation Itinerant (those non-local operations under FAR Part 91)
   - ✓ Air Taxi Itinerant (those non-local operations under FAR Part 135)
   - ✓ Itinerant Military

3.1.4 Peaking Operations

The following is of subject for both the forecast of peak aircraft operations as found in Table 4:

1. Planning Years:
   - ✓ 2014, 2019, 2024, 2033
2. Operations Type:
   - ✓ Total Operations (from 3.1.1)
   - ✓ Peak Month (total operations divided by 10%)
   - ✓ Peak Day (peak month operations divided by 30)
   - ✓ Peak Hour (peak day operations divided by 15%)

Table 4
Forecasts of Aviation Demand

Aircraft Operations	**2014**	**2019**	**2024**	**2033**
A&B-I Small	18,120	18,664 *(3%)*	19,207 *(6%)*	19,932 *(10%)*
A&B-II Small	2,500	2,575 *(3%)*	2,650 *(6%)*	2750 *(10%)*
A&B-II Business	1,200	1,248 *(4%)*	1,248 *(4%)*	1344 *(12%)*
C&D-II Corporate	330	347 *(5%)*	347 *(5%)*	376 *(14%)*
C&D-II Large Corporate	150	155 *(5%)*	159 *(5%)*	171 *(14%)*
Total Operations	**22,300**	**22,988**	**23,611**	**24,573**
Based Aircraft	**2014**	**2019**	**2024**	**2033**
Single-Engine Piston	40	41	43	45
Multi-Engine Piston	7	7	7	8
Twin-Turbo Prop	3	3	3	4
Jet	1	1	2	4
Helicopter/Other	2	2	3	3
Total Based Aircraft	**53**	**54**	**58**	**64**
Operations Mix	**2014**	**2019**	**2024**	**2033**
Local Operations	12,265 *(55%)*	12,643 *(55%)*	12,750 *(54%)*	13,024 *(53%)*
Itinerant; GA (Part 91)	6,244 *(28%)*	6,437 *(28%)*	6,729 *(28.5%)*	7,126 *(29%)*
Itinerant; Air Taxi (Part 135)	3,568 *(16%)*	3,678 *(16%)*	3,896 *(16.5%)*	4,177 *(17%)*
Itinerant; Military	223 *(1%)*	230 *(1%)*	236 *(1%)*	246 *(1%)*
Total Operations	**22,300**	**22,988**	**23,611**	**24,573**
Peaking Operations	**2014**	**2019**	**2024**	**2033**
Total Operations	22,300	22,988	23,611	24,573
Peak Month	2,230 *(*.1)*	2,299 *(*.1)*	2,361 *(*.1)*	2,457 *(*.1)*
Peak Day	74 *(/30)*	77 *(/30)*	79 *(/30)*	82 *(/30)*
Peak Hour	11 *(*.15)*	11 *(*.15)*	12 *(*.15)*	12 *(*.15)*

4.0 LANDSIDE FACILITY REQUIREMENTS AND ALTERNATIVES

Given that future aviation activity levels are determined, the ability of existing facilities to satisfy this demand is to be evaluated. Landside deficiencies identified determine airport needs throughout the 20-year planning period. This chapter examines impacts to the airport due to the forecasts of aviation demand. Shortcomings in the ability to serve forecasted demand are highlighted, and recommendations are made regarding physical improvements needed to correct identified shortcomings.

Then, a series of three phased-development alternatives are prepared and visualized to address aggregate demand over the 5, 10 and 20 -year periods.

Specific aims for landside development in this regard include:

1. Plan aviation land uses and propose aviation-related facilities which will meet anticipated demand, and which will also allow for continued demand accommodation in case aviation and regional economic activity is more robust than anticipated.
2. Plan aviation-related land uses and propose facility locations which will allow the FET to be as financially self-sufficient as possible.
3. Minimize runway and taxiway crossings from one side of the runway to another, and provide for an efficient airfield design.

Examples of aviation-related land uses include:

1. General Aviation Terminal/Ramp
2. Corporate Aviation Terminal/Ramp
3. Air Cargo
4. Aircraft Maintenance and Support
5. Aircraft Rescue and Structural Firefighting
6. On-Field Agricultural/Agricultural Lease
7. Aviation-Related Light Industrial
    a. Parts Manufacturing and Assembly
    b. Flight Simulator
    c. Defense Contractor
    d. Aerial Photography/Photogrammetry
    e. Aerial Spray
8. Fixed Base Operation (FBO)
    f. Aircraft Charter, Storage, Sales
    g. Aircraft Repair and Wash
    h. Pilot Supplies
    i. Pilot Lounge, Flight Planning
    j. Flight Training
    k. Food Services/Catering
    l. Office/Overnight Accommodations
    m. Restrooms
9. Aircraft Storage
    n. T-Hangar
    o. Executive Hangar
    p. Mixed-Use Hangar
    q. T-Shade
10. US Government
    r. Military
    s. Air Traffic Control
    t. Navigational Aids
    u. Homeland Security
    v. Public Safety and Emergency Facilities
    w. Weather Collection and Dissemination
    x. Satellite Communications

Again, landside facilities are those portions of the airfield which are not directly related to the landing and take-off of aircraft but support it.

Importantly, several current predispositions are foundational for a landside and terminal area planning at FET. Current City prerogative and the historical airport planning define current City priorities. These follow and are partially the basis for Table 5's *future* column standards.

1. Runway 1-19 is to be closed in the near future. City prerogative to close is found primarily because this landing area in not eligible for FAA grant-in-aid funding. This ineligibility is due to the fact that Runway 14-32 alone accommodates a sufficient (or functionally sufficient) percentage of winds at 94.90%.

2. A new configuration for West 23rd Street is planned. The primary consequence of this modification is that the road alignment claims much of the existing terminal building's auto parking area.
3. Given that FET is expected to continue to accommodate larger, faster and heavier aircraft, a transition from a Business (B-II) Class facility to a more Corporate (C-II) Class facility should be planned.
4. US Highway 30 is planned for relocation away from the Runway 14 end in the future. Although the time frame for this relocation is no yet known, road relocation planning has been formalized and funding moves ever-closer to consummation. This highway is the defining obstruction which requires the current Runway 14 displacement. Were the highway moved, the displacement could be reclaimed and visibility perhaps improved to ¾-mile for the current RNAV and the VOR IAP to Runway 14. Land acquisition is prerequisite in this regard.
5. The current terminal building is a relatively aged facility and rehabilitation will be necessary to extend its useful life, should that be specified by the City. More detail in this regard is provided in Appendix D. This appendix contains an architectural reporting of building insufficiencies.

4.1 RECOMMENDED LANDSIDE FACILITIES

Various landside recommendations are derived based upon the informal forecasts of aviation demand. These relate to apron and circulation area, terminal building and aircraft hangar area requirements, and automobile access area.

4.1.1 Apron

The existing terminal apron provides an area of approximately 7,777 square yards, not all of which is available for circulation and parking. This aircraft parking area currently accommodates several aircraft parking areas with tie-downs, and

Table 5
Existing (A/B-II, Large Aircraft, Greater Than ¾ Mile) and
Future (C/D-II, Large Aircraft, ¾ Mile) Airfield Design Standards for Runway 14-32

Standard/Specification	Existing	Future
Runway/Taxiway Width	75'/35'	100'/35'
Runway Longitudinal Grade[1]	Within ±2% Maximum	Within ±1.5% Maximum
Runway Pavement Strength (Pounds)	48,000 DWG	48,000 DWG or greater
Runway 14 Protection Zone	500'x700' x1,000'	1,000'x1,510'x1,700'
Runway 32 Protection Zone	500'x700' x1,000'	1,000'x1,010'x1,700'
Runway Safety Area Width/Beyond End	150'/300'	500'/1,000'
Runway Object Free Area Width/Beyond End	500'/300'	800'/1,000'
Taxiway Safety Area Width	79'	79'
Taxiway/Taxilane Object Free Area Width	131'/115'	131'/115'
Runway 14-32 to Parallel Taxiway	240'	300'
Runway 14-32 to Aircraft Holdline	200'	250'
Runway 14-32 to Aircraft Parking	200'	500'
Obstacle Free Zone Width/Beyond End	400'/200'	400'/200'
Runway 14 Approach Clearance (20:1)	800'x3,800'x10,000'	800'x3,800'x10,000'
Runway 14 Departure Clearance (40:1)	1,000'x6,466'x10,200'	1,000'x6,266'x10,200'
Runway 32 Approach Clearance (20:1)	800'x3,800'x10,000'	800'x3,800'x10,000'
Runway 32 Departure Clearance (40:1)	1,000'x6,466' x 10,200	1,000'x6,266'x10,200'
FAR Part 77 Primary Surface Width/Beyond End	500'/200'	1,000'/200'
FAR Part 77 Approach Surface, Runway 14	500'x3,500x10,000'; 34:1	1,000'x4,000x10,000';34:1
FAR Part 77 Approach Surface, Runway 32	500'x3,500x10,000'; 34:1	1,000'x3,500x10,000';34:1

Table 6
Apron Area Recommendations

Based Aircraft Apron Area	**2014**	**2019**	**2024**	**2033**
Single-Engine (Not Hangared)	1	1	1	1
Apron Recommendation (Square Yards)	600	600	600	600
Multi-Engine (Not Hangared)	1	1	1	1
Apron Recommendation (Square Yards)	800	800	800	800
Itinerant Aircraft Apron Area	**2014**	**2019**	**2024**	**2033**
Apron Recommendation (Sq. Yards)	21,755	22,426	23,034	23,972
Total Recommended Apron Area	**23,155**	**23,826**	**24,434**	**25,372**
Apron Area Deficiency (Square Yards)	*16,778*	*17,449*	*18,057*	*18,995*

is primarily used on an unassigned basis because of area constraints. Planning for both based and itinerant apron is made.

53 aircraft currently base at FET and based aircraft apron area is, and will continue to be required. All current aircraft owners hangar their aircraft due to personal choice and weather, but reserving one or two spots on the apron for an aircraft pending new hangar construction, for example, is recommended.

A standard 600 square yards of area per single-engine aircraft and 800 for multi-engine aircraft is used for based aircraft apron area. Note that these area calculations do not include necessary taxiway/taxilane to parking positions.

Apron requirements for itinerant aircraft activity are estimated a bit differently. As previously noted, FAA has created modeling software entitled *Apron Size Calculations for Transient Aircraft* based upon *Airport Design* which provides an eligible (but not necessarily funded) apron area for future planning purposes predicated upon the number of itinerant aircraft operations.

Table 6 above shows recommendations for both based and itinerant aircraft apron area, while noting deficiencies. As can be seen from the analysis and based upon the forecasts of aviation demand, additional aircraft apron is necessary now and in the longer-term.

4.1.2 Buildings and Auto Parking

A general aviation terminal and administration building should typically provide office space, a waiting room for pilots and passengers, a small area for food and drink vending, a public telephone, and public restrooms.

Terminal floor space requirements are a function of the anticipated number of peak hour operations and airport users. Peak hour users are computed as 1.5 passengers per each local aircraft arrival and 2.5 passengers per itinerant arrival. This is an older estimating methodology but perhaps valuable for planning purposes. An approximate 55/45 percent mix of local/itinerant activity is planned.

Typical floor space requirements, expressed in square feet per user are as follows for general aviation terminal facilities:

- Waiting Lounge: 15
- Office Space: 3
- Public Conveniences 1.5
- Concession/Vending; 5 and
- Storage, Circulation and HVAC; 24.5.

Terminal building area recommendations are shown in Table 7. The airport's 2,400 square foot terminal will be adequate for the planning period, if refurbishment is in order.

Table 7
Building Area Recommendations

Aircraft Storage Area	**2014**	**2019**	**2024**	**2033**
Single-Engine Based Aircraft (Not on Apron)	*39*	*40*	*42*	*44*
Single-Engine Hangar Area Required	46,800	48,000	50,400	52,800
Multi-Engine Based Aircraft (Not on Apron)	*6*	*6*	*6*	*7*
Multi-Engine/Twin-Turbo Prop Hangar Area Required	13,200	13,200	13,200	15,400
Jet (Small) and Twin Turbo-Prop Based Aircraft	*3*	*3*	*4*	*4*
Jet (Small) Hangar Area Required	12,000	12,000	16,000	16,000
Jet (Large) Based Aircraft	*1*	*2*	*2*	*4*
Jet (Large) Hangar Area Required	12,000	24,000	24,000	48,000
Helicopter/Other Based Aircraft	*2*	*2*	*3*	*3*
Helicopter/Other Hangar Area Required	3,000	3,000	4,500	4,500
Total Aircraft Storage Recommended (Square Feet)	87,000	100,200	108,100	136,700
Terminal Building Area	**2014**	**2019**	**2024**	**2033**
Peak Hour Operations	*11*	*11*	*12*	*12*
Peak Hour Users	*11*	*11*	*12*	*12*
Waiting Lounge	161	161	176	176
Office Space	32	32	35	35
Public Conveniences	16	16	18	18
Vending/Concession	54	54	59	59
Storage, Circulation, HVAC	263	263	287	287
Total Terminal Building Area Recommended (Square Feet)	526	526	573	573

FET currently accommodates 12 conventional hangars and 3 T-hangars, totaling approximately 104,000 square feet of aircraft storage area. It is presumed that 100 percent of future based aircraft will require hangar space given current owner preferences. Note that future aircraft may be located in T-hangar units, in executive conventional, small box hangars, or collocated with other aircraft in a larger hangar. Furthermore, a single aircraft, only requiring 1,200 square feet, may be located in a hangar 2,500 square foot hangar, as is the case in several instances at FET now. The City currently maintains a waitlist for hangars.

Hangar area recommendations found within Table 7 are based upon: 1,200 square feet for single-engine piston aircraft, 2,200 square feet for multi-engine piston, 4,000 square feet for smaller jet and twin-turbo prop aircraft, aircraft, 12,000 square feet for larger jet aircraft, and 1,500 square feet for helicopter/other.

A general aviation terminal and administration building should typically provide office space, a waiting room for pilots and passengers, a small area for food and drink vending, a public telephone, and public restrooms. Terminal building area recommendations (FAA eligible) are also shown in Table 7. Terminal floor space requirements are a function of the anticipated number of peak hour operations and airport users. Peak hour users are computed as 1.5 passengers per each local aircraft arrival and 2.5 passengers per itinerant arrival. Based upon Table 4, a 50/50 percent mix of local/itinerant activity is expected in 2035.

Typical floor space requirements, expressed in square feet per user are as follows for general

Table 8
Automobile Parking Area Recommendations

	2014	2019	2024	2033
Peak Hour Users	11	11	12	12
Tenants/Employees	10	10	11	13
Automobile Parking Positions Required	21	21	23	25
Total Automobile Parking Area Required (Square Yards)	735	735	805	875

aviation terminal facilities: Waiting Lounge; 15, Office Space; 3, Public Conveniences; 1.5, Concession/Vending; 5, Storage, Circulation, HVAC; 24.5. The airport's 2,900 square foot terminal will be adequate for the planning period.

Approximately 22 paved automobile parking spaces are near the terminal building. A formal parking lot is recommended and adequate space should be strategically planned and protected. The number of automobile parking spaces is a function of peak hour users and tenant/employee demand. The number of tenants and employees at an airport like FET is estimated to be one person per five based aircraft. A standard 35 square yards per automobile is used to complete Table 8 on the next page.

4.2 LANDSIDE ALTERNATIVES

Four alternative exhibits are fielded for purposes herein in order to visualize, estimate costs and provide a meaningful basis for City decision making about FET's landside future:

- Terminal Area Alternative No. 1 (Improve Existing Terminal Area)
- Terminal Area Alternative No. 2 (Develop Along Airport Road)
- Terminal Area Alternative No. 3 (Western-Most Development)
- Terminal Area Alternative No. 4 (Relocate Along West 23rd Street)

Several items are worth noting for decision-making purposes at this point:

- ✓ Section 4.1 identifies area which according to FAA modeling and estimating methodologies may be eligible for FAA or NDA financial participation. This in no way obligates FAA, NDA, or City financial participation. The current reality is that general aviation terminal area improvements generally do not compete well for FAA aviation funds. The City may be limited to an annual $150,000 in Non Primary Entitlement funding. Additional funding is the prerogative of FAA and NDA.
- ✓ Planned development is conceptual only, and can be changed at the will of the City Council with a planning update, now or at any time in the future. This narrative and its accompanying planning process is intended to create a 20-year 'road map'; and, figuratively speaking, roads are sometimes improved, modified or relocated. The selected alternative, or modification to make a selected alternative, serves as an informal agreement with FAA and NDA for FET's future development.
- ✓ Environmental clearance, pursuant to the National Environmental Policy Act of 1969, will be necessary for FAA financial participation.
- ✓ FAA or perhaps NDA may require justification beyond that demonstrated in this narrative for improvements eligibility. For example, FAA may wish letters substantiating large aircraft use to make a given portion of a future apron eligible for FAA financial participation.
- ✓ Upon construction, planned development must be shown on the approved Airport Layout Plan (ALP), receive a favorable determination via filing of FAA Form 7460, and the City or the State may have various permits which need approvals prior to commencement.

Overall, a selected course of action for the future represents the formulation of a development policy as much as the process of concept selection. The development policy should:

1. Comply with FAA standards/guidelines,
2. Be compatible with other existing and proposed uses on and off the airport,
3. Dovetail with City comprehensive planning,

Brief alternative descriptions supplement the alternative exhibits following this page. The alternatives shows 5, 10 and 20-year planned, phased development for demand identified in the forecast of aviation demand, and beyond. The mention of *beyond in this instance is important because it is important to show robust in case demand exceeds forecast or a given tenant(s) wish more robust facilities, even though some facilities may not be eligible*. The first five years of planned development is shown in blue, years 6-10 is shown in brown and the final 10 years of the 20-year planning term is shown as purple.

Alternative No. 1 shows:

1. A rehabilitated terminal building with the terminal area remaining where it is for all intents and purposes.
2. The hangar due west of the current terminal building to be removed/relocated.
3. A proposed larger aircraft apron due south of the proposed terminal building along the to-be-closed Runway 1-19.
4. Proposed auto parking west of the rehabilitated terminal building and south of West 23rd Street.
5. The current apron marked to accommodate small aircraft only.
6. An executive hangar area due south of the current terminal area.
7. Two proposed T-hangars due south of the proposed auto parking area.

Alternative No. 2 shows:

1. A proposed terminal building and area along Airport Road south of the terminal area.
2. A proposed larger aircraft apron due west of the proposed terminal building area all the way to the to-be-closed Runway 1-19.
3. Proposed auto parking between the proposed terminal building and Airport Road.
4. The current apron marked to accommodate small aircraft only.
5. An executive hangar area due west of the current terminal area and south of West 23rd Street.
6. The current terminal building to be removed with a ground-leased hangar in its place.
7. Two proposed T-hangars due east of the proposed auto parking area.

Alternative No. 3 shows:

1. A proposed terminal building and area west of the western-most hangar area.
2. A proposed larger aircraft apron due south of the proposed terminal along Taxiway B.
3. Proposed auto parking between the proposed terminal building and West 23rd Street.
4. The current apron marked to accommodate small aircraft only.
5. An executive hangar area due south and east of the current terminal area
6. The current terminal building to be removed with a ground-leased hangar in its place.

Alternative No. 4 shows:

1. A proposed terminal building and area adjacent to the current.
2. A proposed larger aircraft apron due south of the proposed terminal along Taxiway B.
3. Proposed auto parking between the current hangar areas.
4. The current apron marked to accommodate small aircraft only.
5. An executive hangar area due south and east of the current terminal area
6. The current terminal building to be removed with a ground-leased hangar in its place.

4.3 DISCUSSION AND ANALYSIS

Several alternatives were added, removed or modified through the course of the planning. The planning was updated several times based upon FAA and NDA comments and concerns. Alternatives are designed to somewhat allow a 'picking and choosing' of hangars. Generally speaking, hangars sizes are interchangeable at a given location with relatively minor modifications. Alternative No. 4 as the depicted conceptual configuration for the new terminal area. This is based upon consultant recommendation.

Table 9
Alternative Considerations

Issues	**1**	**2**	**3**	**4**
Contiguous/Proximate Apron Operations	✗	✗	✗	✓
Ability to Visualize Runway Ends/Approaches	✗	✗	✓	✗
Closure of Crosswind Runway	✓	✓	✗	✓
New West 23rd Street Integration	✗	✗	✗	✓
Hangars, Aprons and Parking for Demand Accommodation	✓	✓	✓	✓
Estimated Costs	✗	✓	✗	✗
Subjective Score	**2**	**2**	**2**	**4**

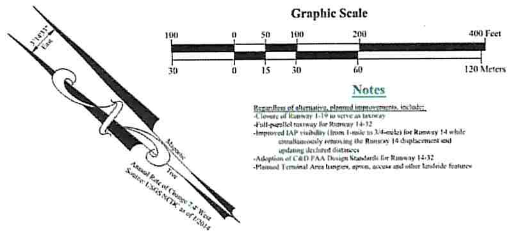
Notes and Pros and Cons:

1. FAA notes that a substantial separation of aprons is sub-optimal for reasons not limited to efficiencies and safety, Alternative No. 4 best fits.
2. Utilities already in place for Alternative No. 1, more expensive in this regard for other alternatives.
3. Review and approval needed for any new auto access points. Alternative No.'s 1 and 4 are most the responsive in this regard. Note that the current westerly access could be relocated for the new access as shown on Alternative No. 3
4. The structure due west of current terminal may be historic register eligible. More auto parking is needed if the terminal is reconstructed in place and this building would need to be removed. Alternative No. 1 is not responsive.
5. Alternative No. 3 is the only alternative which would require relocation of the ASOS, an ineligible item (for FAA AIP dollars).
6. It is perhaps important but not compulsory for terminal business operations to visualize the entire runway; and preferentially, approaches to both runway ends. This is a strong Airport Advisory Board preference, but not an FAA standard. Alternative No. 3 is the only alternative which allows such visualization.
7. Closure of the crosswind runway is compulsory for all but Alternative No. 3.

Consultant Recommendation for Alternative No. 4 and Justification

1. Scores highest subjectively.
2. Aprons operations not constrained by distance.
3. Easy access to the New West 23rd Street intersection.
4. No ASOS relocation, as shown in Alternative No. 3.
5. Sub-surface utilities relatively close, relative to other alternatives (except for number one)
6. Does not require removal or relocation of potentially historic register-eligible structure
7. Apron, hangar and auto parking areas can be relatively easily be expanded, even beyond that show (which is significantly more robust that forecasting might suggest).
8. Facilities and operations are consolidated if forecast demand does not materialize. That is, only a few hangars and portions of the auto parking and apron area could be constructed and operations would continue to be efficient, relative to other alternatives.

Terminal Area Alternative No. 1
(Improve Existing Terminal Area)



Notes

Regardless of alternative, planned improvements, include:
- Closure of Runway 1-19 to serve as taxiway
- Full-parallel taxiway for Runway 14-32
- Improved IAP visibility (from 1-mile to 3/4-mile) for Runway 14 while simultaneously removing the Runway 14 displacement and updating declared distances
- Adoption of C&D FAA Design Standards for Runway 14-32
- Planned Terminal Area hangars, apron, access and other landside features

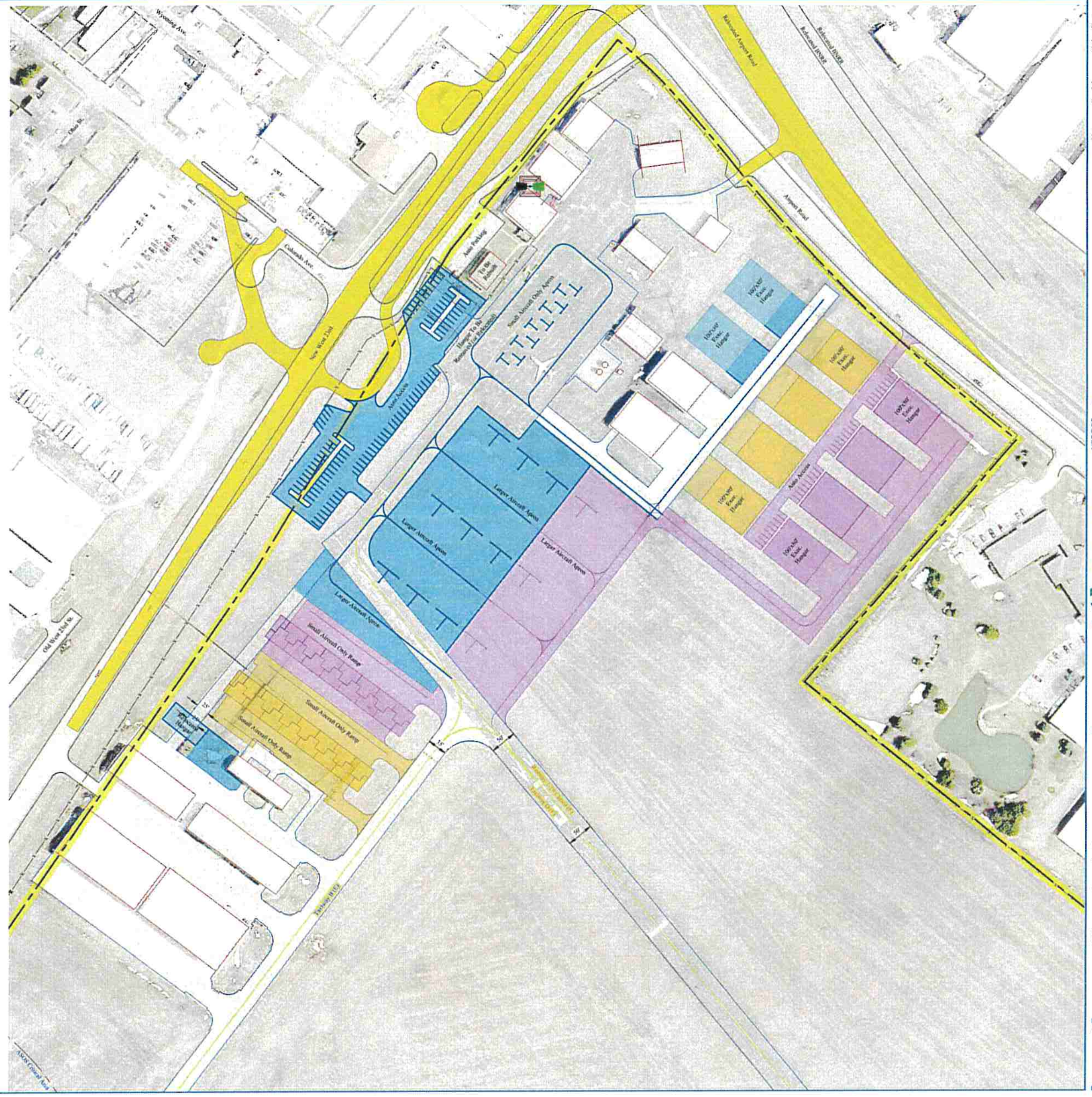
Legend

Existing Fence	Existing Buildings
Existing Property Line	Avigation Easement
Existing Fence	Rotating Beacon
Existing Pavement	
Existing Paved Roads	
Future Paved Roads	

Alternative No. 1 Improvements

	FAA	NDA	City	Others	Totals
Short-Term	$1,200,000	$350,000	$580,000	$150,000	$2,280,000
Intermediate-Term	$125,000	$0	$565,000	$0	$690,000
Long-Term	$670,000	$175,000	$645,000	$0	$1,490,000
Totals:	$1,995,000	$525,000	$1,790,000	$150,000	$4,460,000

Note: Costs associated with box/executive hangar development are not prepared because ground leasing is planned, except eligible portions of access taxiways.



No.	Revision	Ckd	Date

Fremont Municipal Airport
City of Fremont, Nebraska

ADG Airport Development Group
1776 South Jackson Street | Suite 203
Denver, Colorado 80210-3803
303.782.0883 | 303.782.0842 fax
www.ADGAirports.com

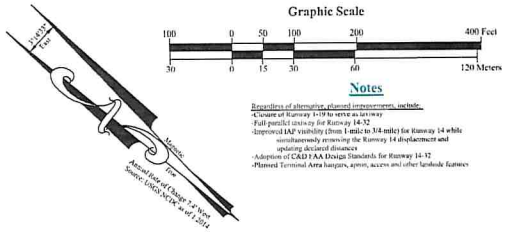
NDA Project Number:

Project No.:	FET1437M
Designed By:	SPM
Drawn By:	MTP
Approved By:	SPM
Date:	December 2014

Terminal Area Alternative No. 1 (Improve Existing Terminal Area)

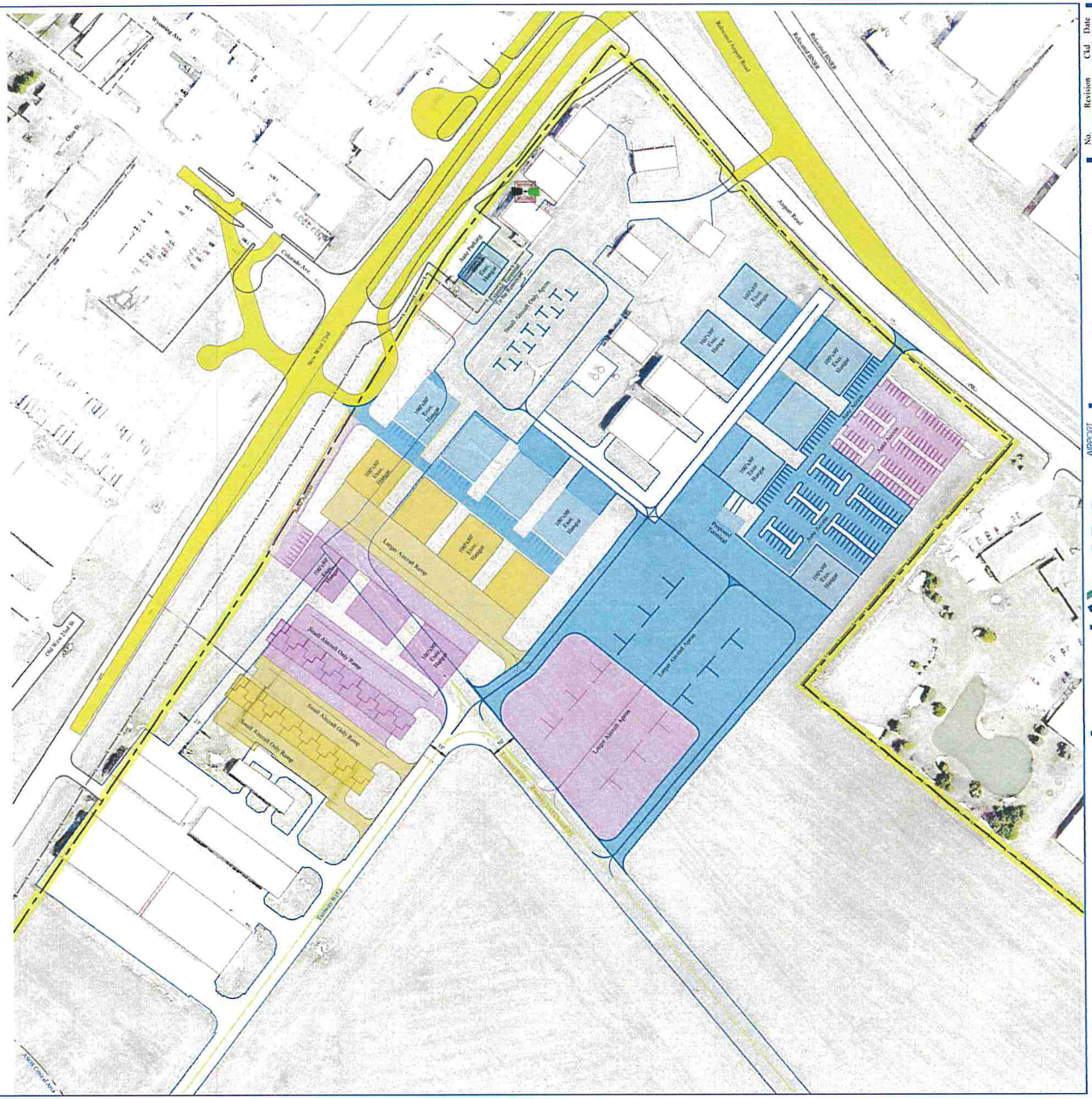
Exhibit: **A1** of VII Exhibits

Terminal Area Alternative No. 2
(Develop Along Airport Road)



Alternative No. 2 Improvements					
	FAA	NDA	City	Others	Totals
Short-Term	$1,000,000	$350,000	$580,000	$150,000	$2,080,000
Intermediate-Term	$125,000	$0	$565,000	$0	$690,000
Long-Term	$670,000	$175,000	$345,000	$0	$1,190,000
Totals:	$1,795,000	$525,000	$1,490,000	$150,000	$3,960,000

Note: Costs associated with box/executive hangar development are not prepared because ground leasing is planned, except eligible portions of access taxiways.



No. Revision Chd Date

Fremont Municipal Airport
City of Fremont, Nebraska

ADG AIRPORT DEVELOPMENT GROUP, LLC
1776 South Jackson Street, Suite 807
Denver, Colorado 80210-5823
303 782 1882 / AIRPORTDEVELOPMENT.COM

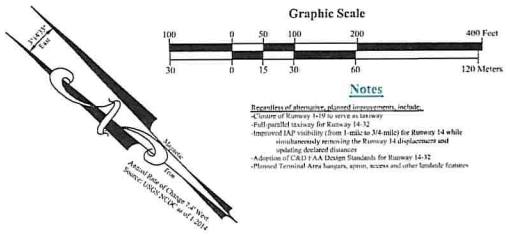
NDA Project Number:

Project No.: FEH1871M
Designed By: SPM
Drawn By: MTP
Approved By: SPM
Date: December 2014

Terminal Area Alternative No. 2 (Along Airport Road)

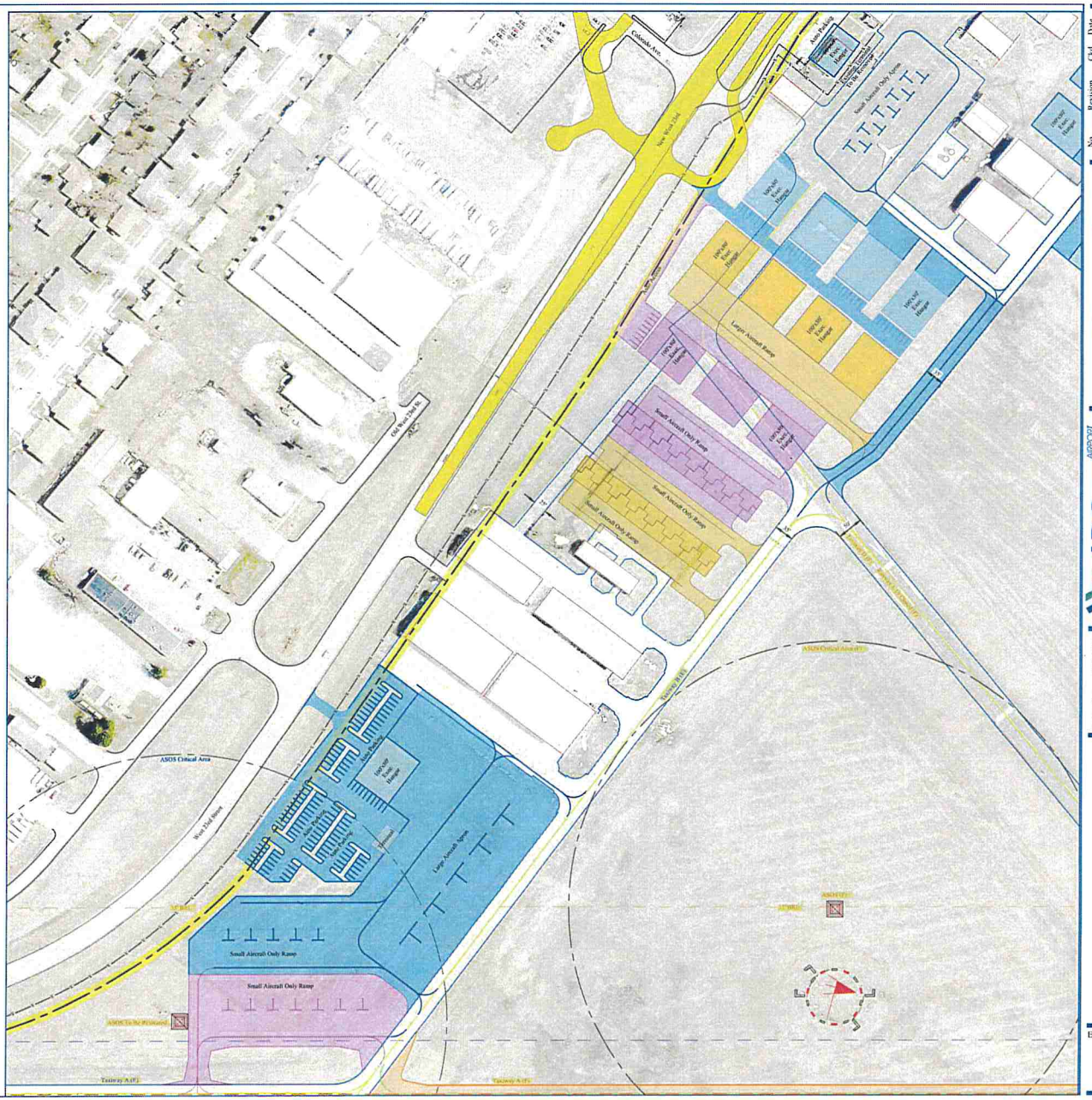
Exhibit:
A2
of VII Exhibits

Terminal Area Alternative No. 3
(Western-Most Development)



Alternative No. 3 Improvements					
	FAA	NDA	City	Others	Totals
Short-Term	$1,200,000	$750,000	$580,000	$150,000	$2,680,000
Intermediate-Term	$125,000	$0	$565,000	$0	$690,000
Long-Term	$670,000	$175,000	$645,000	$0	$1,490,000
Totals:	$1,995,000	$925,000	$1,790,000	$150,000	$4,860,000

Note: Costs associated with box/executive hangar development are not prepared because ground leasing is planned, except eligible portions of access taxiways.
ASOS relocation costs included in Short-Term Estimate



Fremont Municipal Airport
City of Fremont, Nebraska

ADG Airport Development Group
1776 South Jackson Street, Suite 203
Denver, Colorado 80210
303 782 0682 / 303 782 0540 fax
www.ADGdenver.com

NDA Project Number:

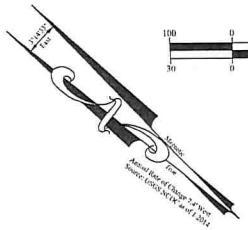
No.	Revision	Ckd	Date

Project No.: FET14374
Designed By: SPM
Drawn By: MTP
Approved By: SPM
Date: December 2014

Terminal Area Alternative No. 3 (Western-Most Development)

Exhibit: A3 of VII Exhibits

Terminal Area Alternative No. 4
(Develop Along West 23rd Street)



Graphic Scale

100 0 50 100 200 400 Feet

30 0 15 30 60 120 Meters

Notes

Regardless of alternative, planned improvements, include:
- Closure of Runway 14-19 to serve as taxiway
- Full-parallel taxiway for Runway 14-32
- Improved IAP visibility (from 1-mile to 3/4-mile) for Runway 14 while simultaneously renewing the Runway 14 displacement and updating declared distances
- Adoption of CAD I FAA Design Standards for Runway 14-32
- Planned Terminal Area hangars, apron, access and other landside features

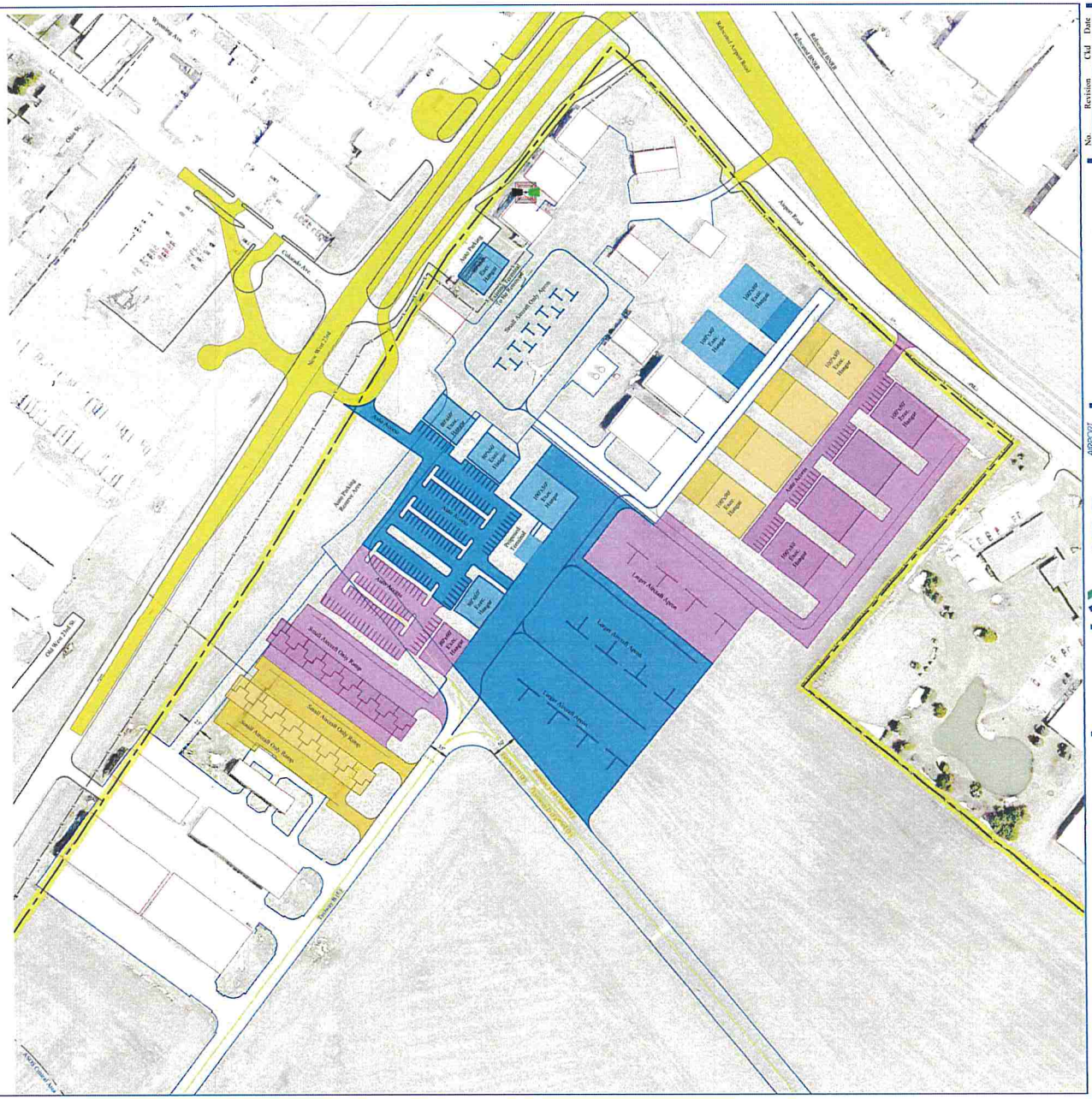
Legend

(EL of)
- Existing, Future
- Existing Property Line
- Existing Fence
- Existing Pavement
- Existing Paved Roads
- Future Paved Roads
- Existing Buildings
- Avigation Easement
- Rotating Beacon

Alternative No. 4 Improvements

	FAA	NDA	City	Others	Totals
Short-Term	$1,200,000	$550,000	$580,000	$150,000	$2,480,000
Intermediate-Term	$125,000	$0	$565,000	$0	$690,000
Long-Term	$670,000	$175,000	$645,000	$0	$1,490,000
Totals:	$1,995,000	$725,000	$1,790,000	$150,000	$4,660,000

Note: Costs associated with box/executive hangar development are not prepared because ground leasing is planned, except eligible portions of access taxiways.



No. | Revision | Chkd | Date

Fremont Municipal Airport
City of Fremont, Nebraska

ADG AIRPORT DEVELOPMENT GROUP
Engineers, Consultants, Planners
Denver, Colorado 80210-3823
303 782 0887 / 303 782 0542 fax
www.ADGdenver.com

Project No:	FET14.37M
Designed By:	SPM
Drawn By:	MTP
Approved By:	SPM
Date:	October 2014

Terminal Area Alternative No. 4 (Along West 23rd St)

Exhibit:
A4
of VII Exhibits

5.0 UPDATED AIRPORT LAYOUT PLAN AND TERMINAL AREA PLAN

This final section describes and depicts the necessary improvements derived from landside facility requirements and alternatives section and shows airport features, not limited to existing airfield and landside configurations, future developments, airport airspace, land uses and other planned development.

The Airport Layout Plan (ALP) is a scaled graphic representation of existing and proposed airport development including pertinent clearance and dimensional information required to show conformance with design standards.

The ALP is a legal document and represents an agreement between FAA, NDA and the City. This agreement primarily concerns design standards compliance, future development locations and obstruction disposition. On-airport development must be depicted on the ALP and it should be kept reasonably current. A reduced-size ALP along with and other drawings can be found at the end of this chapter.

The ALP depicts the City Council-specified location of facilities proposed to accommodate the 20-year demand (and beyond) as discussed in the preceding sections and synthesized through the planning process. These include the five predispositions from previous planning as identified on pages 12 and 13.

The data table provides basic information concerning airport elevation, airport reference point location, airport land ownership, etc. The Runway Data tables provide information such as airport role, approach surface information and end coordinates/elevations. A scale, legend, and north arrow orient the reader.

While the single-sheet ALP drawing shows most airport-related features, the terminal area plan shows closer in features at smaller scale. A number of changes are depicted on the Terminal Area Plan for FET. City and potential private hangar developments are planned for the short, intermediate and long-term, as well as a phased expansion of the existing hangar area. This general aviation area includes phased development for apron, hangar and other aviation facilities.

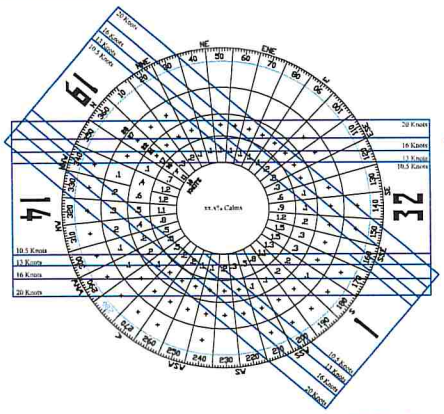
Phased facility construction, utility extension, landscaping, auto access and parking area are planned. Improvements should be constructed as funding and demand allows and are planned to accommodate the expected activity. The proposed size and location in this regard are for planning purposes only and specific plans should be evaluated on a case-by-case basis for general conformance to the ALP.

The updated ALP and Terminal Area Plan exhibits follow.

Fremont Municipal (FET)

Terminal Area Planning For the City of Fremont, Nebraska

September 2015

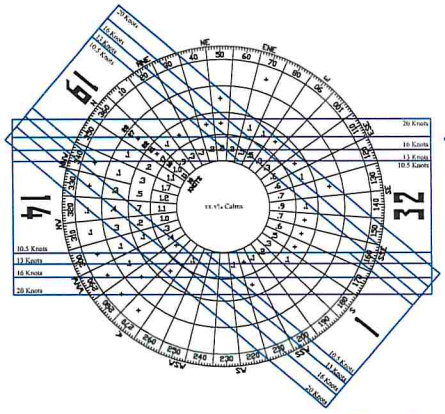


VFR Wind Coverage

Runway	10.5 Knots	13 Knots	16 Knots	20 Knots
14-32	94.83%	97.64%	99.35%	99.82%
1-19	92.29%	95.59%	98.10%	99.34%
Combined	98.02%	99.06%	99.67%	99.93%

VFR Wind Rose

Source: National Climatic Data Center
Location: Fremont, Nebraska 72556 (FET)
Period: January 1, 2000 to December 31, 2009
Number of Observations: 78,676
VFR Mix Conditions
Cloud Ceiling: 1,000 Feet or Greater and Visibility: 3 Statute Miles or Greater

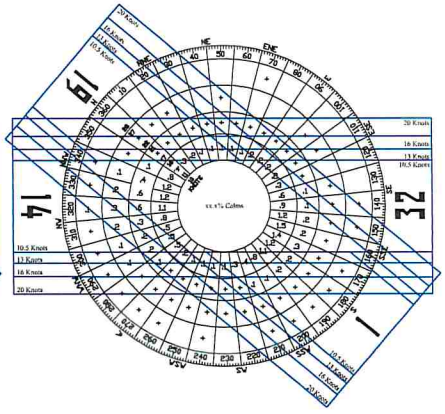


IFR Wind Coverage

Runway	10.5 Knots	13 Knots	16 Knots	20 Knots
14-32	95.79%	98.85%	99.88%	99.98%
1-19	92.04%	95.74%	98.41%	99.74%
Combined	97.81%	99.61%	99.95%	99.97%

IFR Wind Rose

Source: National Climatic Data Center
Location: Fremont, Nebraska 72556 (FET)
Period: January 1, 2000 to December 31, 2009
Number of Observations: 4,896
IFR Mix Conditions
Cloud Ceiling: 200 to 1,000 Feet and Visibility: 1/2 to 3 Statute Miles



All-Weather Wind Coverage

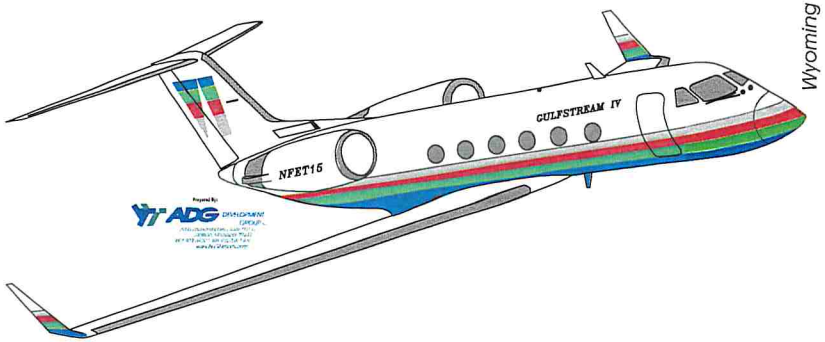
Runway	10.5 Knots	13 Knots	16 Knots	20 Knots
14-32	94.90%	97.66%	99.27%	99.84%
1-19	92.27%	95.59%	98.11%	99.36%
Combined	98.03%	99.08%	99.63%	99.87%

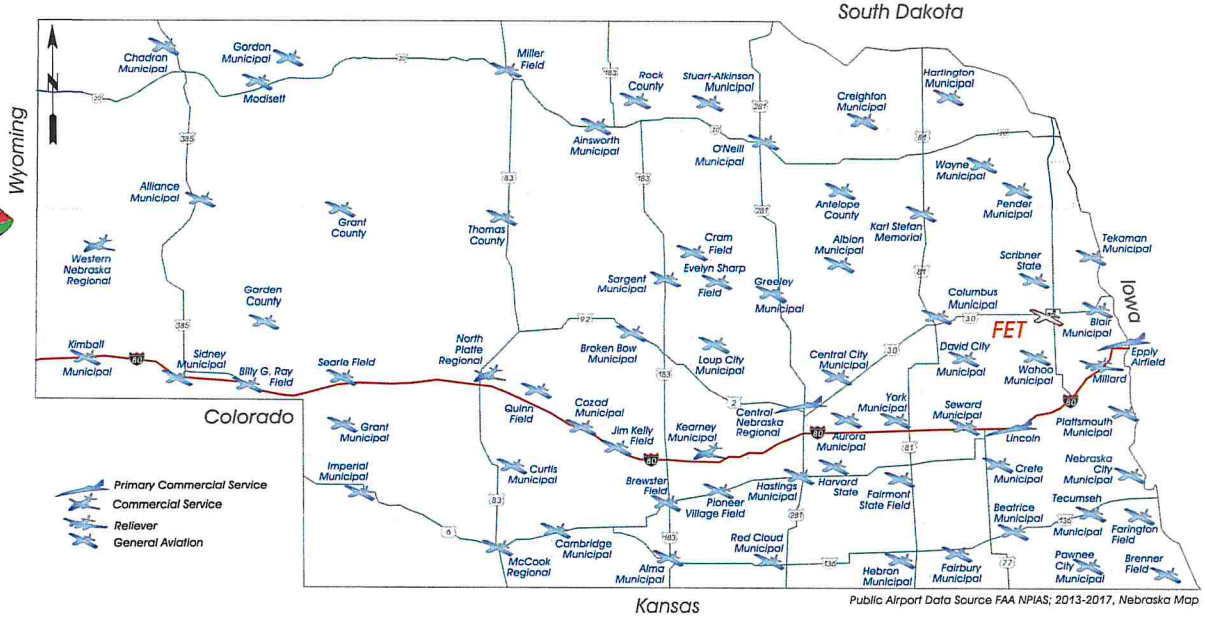
All-Weather Wind Rose

Source: National Climatic Data Center
Location: Fremont, Nebraska 72556 (FET)
Period: January 1, 2000 to December 31, 2009
Number of Observations: 84,325

Airport Layout Plan Exhibits

I Airport Layout Plan
II Terminal Area Plan

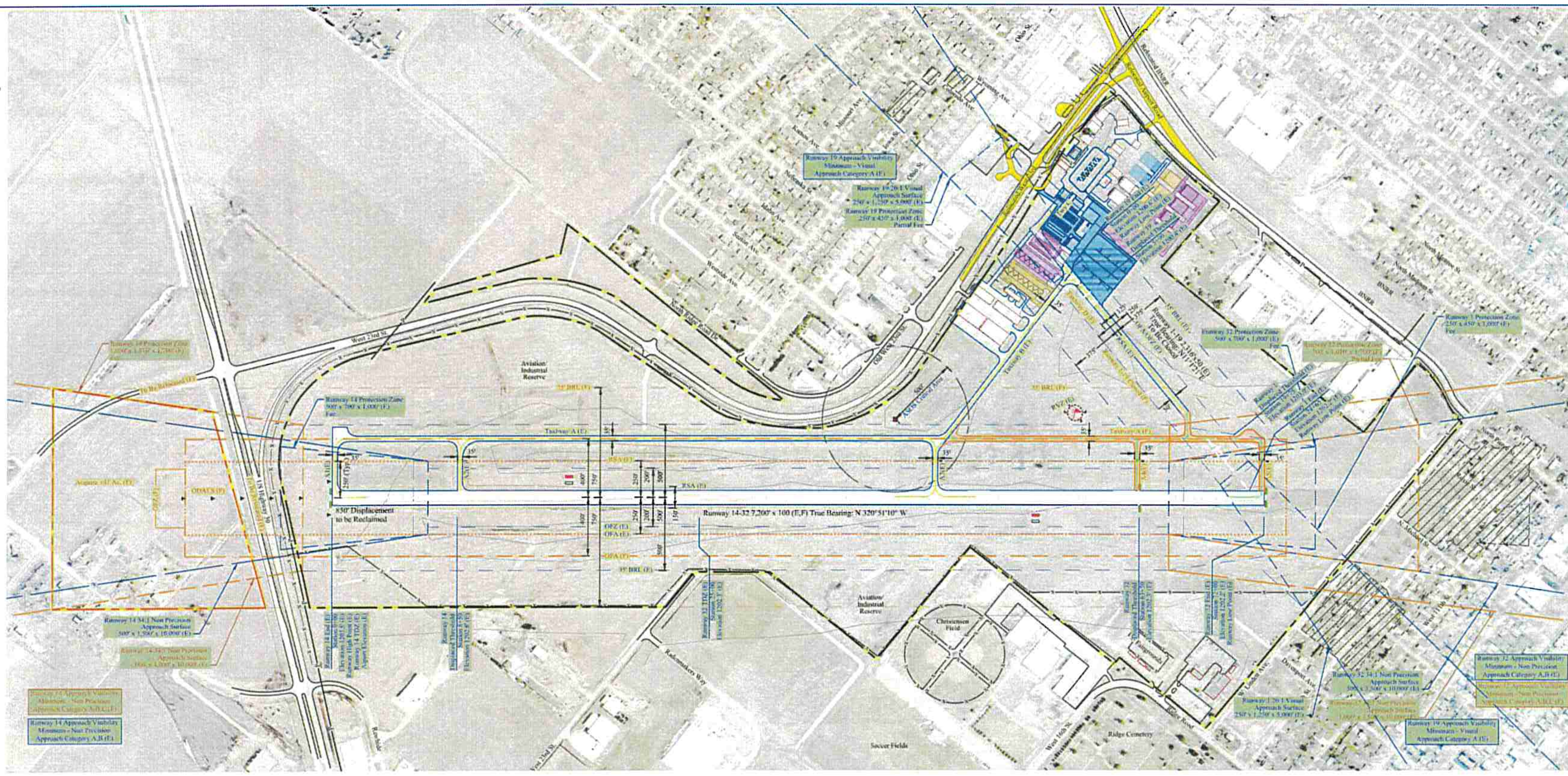


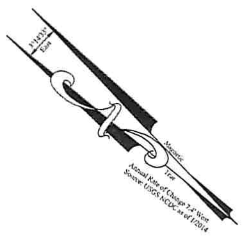


Public Airport Data Source FAA NPIAS; 2013-2017, Nebraska Map

Legend

- (E), (F) Existing, Future
- Existing Property Line
- Future Property Line
- Building Restriction Line (35' BRL)
- Runway Protection Zone (RPZ)
- Approach Surface
- Object Free Area (OFA)
- Runway Safety Area (RSA)
- Obstacle Free Zone (OFZ)
- Runway Visibility Zone (RVZ)
- Existing Fence
- Existing Pavements
- Short-Term Improvements
- Intermediate-Term Improvements
- Long-Term Improvements
- Existing Paved Roads
- Future Paved Roads
- Existing Buildings
- Avigation Easement
- Drainage Line
- Contour Line
- Threshold/Edge Lights (MIRL)
- Runway End Identifier Lights (REIL)
- Section Corner
- Precision Approach Path Indicators (PAPI-2/4)
- Runway Hold Position Sign
- Segmented Circle With Lighted Wind Cone
- Rotating Beacon





Graphic Scale

400 0 200 400 800 1600 Feet

120 0 60 120 240 480 Meters

Runway End Coordinates

Runway	Existing	Future
14	North Latitude 41°27'27.32" West Longitude 96°31'50.35"	North Latitude 41°27'27.32" West Longitude 96°31'50.35"
14 Displaced	North Latitude 41°27'20.80" West Longitude 96°31'43.30"	N/A
32	North Latitude 41°26'38.72" West Longitude 96°30'58.33"	North Latitude 41°26'38.72" West Longitude 96°30'58.33"
32 Displaced	North Latitude 41°26'45.18" West Longitude 96°31'04.75"	North Latitude 41°26'45.18" West Longitude 96°31'04.75"
1	North Latitude 41°27'02.39" West Longitude 96°30'52.01"	To Be Closed
1 Displaced	North Latitude 41°26'02.39" West Longitude 96°30'53.56"	To Be Closed
19	North Latitude 41°27'02.39" West Longitude 96°30'52.01"	To Be Closed
19 Displaced	North Latitude 41°26'38.72" West Longitude 96°30'58.33"	To Be Closed

The preparation of these drawings was financed, in part, through a planning grant from the Federal Aviation Administration (FAA), as provided under Section 505 of the Airport and Airway Improvement Act of 1982, and as amended by the Airport and Airway Safety and Capacity Expansion Act of 1987, as amended. The contents do not necessarily reflect the official views of the FAA. Acceptance of these drawings does not in any way constitute a commitment on the part of the United States to participate in any development depicted herein, nor does it indicate that the proposed development is environmentally acceptable in accordance with appropriate public laws.

Runway Data

	Runway 14/32				Runway 1/19		Runway 1/19
	14 Existing	32 Existing	14 Future	32 Future	1 Existing	19 Existing	To Be Closed
Runway Length and Width	7,200 x 100, Concrete		7,200 x 100, Concrete		2,316 x 50, Asphalt		
Runway Pavement Strength (SWG/DWG/DTWG)(1,000 lbs.)	28 SWG, 48 DWG		28 SWG, 48 DWG		N/A		
Runway Lighting	MIRL		MIRL		None		
Runway Marking (V, NP, PI)	Non Precision	Non Precision	Non Precision	Non Precision	Visual	Visual	
Crosswind Component and Percent Coverage	13 Knots/96.75%		13 Knots/96.75%		10.5 Knots/90.94%		
Blast Pad Width/Length	N/A	N/A	N/A	N/A	N/A	N/A	
Runway Development/Reference Code (RDC/RRC)	A/B-II, 1 Mile		C-II, 3/4 Mile		A-I, Visual		
Critical/Design Aircraft	Cessna Citation 525		Cessna Citation X		Cessna 150		
-Approach Speed, Wingspan, Weight, Haul	115 kts., 49.8', 13,870 lbs., <500 mi.		130 kts., 69.2', 36,600 lbs., <500 mi.		55 kts., 32.7', 1,600 lbs., <500 mi.		
Associated Taxiway Design Group (TDG), Width, Lighting	2, 35', MITL		2, 35', MITL		1, None, None		
Approach Surface (Table 3-2)	20:1; Row 6	20:1; Row 6	20:1; Row 6	20:1; Row 6	20:1; Row 2	20:1; Row 2	
Departure Surface	N/A	N/A	N/A	N/A	N/A	N/A	
FAR Part 77 Approach Surface	34:1 NP, 500'x 3,500' x 10,000'	34:1 NP, 500'x 3,500' x 10,000'	34:1 NP, 500'x 3,500' x 10,000'	34:1 NP, 500'x 3,500' x 10,000'	20:1 V, 250'x 1,250' x 5,000'	20:1 V, 250'x 1,250' x 5,000'	
Landing Navigational Aids	GPS,PAPI,REIL	GPS, PAPI	GPS,PAPI,REIL	GPS,PAPI,REIL	None	None	
Runway End Elevation	1,203.5'	1,202.2'	1,203.5'	1,202.2'	1,202.2'	1,200.6'	
Highest/Lowest Runway Elevation	1,203.5' / 1,202.2'		1,203.5' / 1,202.2'		1,200.6' / 1,202.2'		
Runway Touchdown Zone Elevation (TDZ)	1,203.5'	1,202.9'	1,203.5'	1,202.9'	1,202.2'	1,202.2'	
Runway Intersection Elevation	N/A		N/A		N/A		
Effective Longitudinal Runway Gradient	<0.1%		<0.1%		<0.1%		
Maximum Longitudinal Runway Gradient	<0.1%		<0.1%		<0.1%		
Line of Sight Standards Met (Longitudinal/RVZ)	Yes/Yes		Yes/Yes		Yes/Yes		
Runway Safety Area (RSA) Beyond End/Prior To	300'/300'	300'/300'	1,000'/1,000'	1,000'/1,000'	240'/240'	240'/240'	
Runway Safety Area (RSA) Width	150'		500'		120'		
Runway Object Free Area (ROFA) Beyond End/Prior To	300'/300'	300'/300'	1,000'/1,000'	1,000'/1,000'	240'/240'	240'/240'	
Runway Object Area (ROFA) Width	500'		800'		250'		
Obstacle Free Zone (ROFZ) Length Beyond End/Width	200'/400'		200'/400'		200'/250'		
Precision Obstacle Free Zone (POFZ) Length/Width	N/A	N/A	N/A	N/A	N/A	N/A	
Runway Protection Zone (RPZ) AAC, Visibility, Dimensions Accommodated, Dimensions and Nature of Ownership	A-B, 1 mi., 500' 750'x1,000' Fee	A-B, 1 mi., 500' 750'x1,000' Fee	C, 3/4 mi., 500' 750'x1,000' Fee	C, 1 mi., 500' 750'x1,000' Fee	A, Vis., 250' 450'x1,000' Fee	A, Vis., 250' 450'x1,000' Fee/Ease&ROW	
Runway Centerline Separations: Taxiway, Hold and Parking	240', 200', 250'		300', 250', 400'		150', 125', 125'		
Displaced Threshold Elevation	1,202.8'	1,202.3'	N/A	1,202.3'	1,200.4'	1,203.0'	
Takeoff Runway Available (TORA)	5,500'	5,500'	6,350'	5,500'	1,974'	1,844'	
Takeoff Distance Available (TODA)	5,500'	5,500'	6,350'	5,500'	1,974'	1,844'	
Accelerate Stop Distance Available (ASDA)	5,500'	5,500'	6,350'	5,500'	2,444'	2,284'	
Landing Distance Available (LDA)	4,650'	4,650'	5,500'	5,500'	1,844'	1,844'	

Airport Data

	Existing	Future
Airport Elevation	1,203'	1,203'
Airport Reference Point (ARP)	North Latitude 41°26'36.9" West Longitude 96°31'12.7"	North Latitude 41°26'59.5" West Longitude 96°31'16.0"
Airport Electronic Aids	GPS RNAV, VOR DME	GPS RNAV, VOR DME
Mean Maximum Temperature of Hottest Month	88.6° Fahrenheit (July)	
Most Demanding Runway Design Code	A/B-II, 1 Mile	C-II, 3/4 Mile (Runway 14)
NPIAS/State Role	General Aviation	General Aviation
Most Demanding Critical/Design Aircraft	Cessna Citation 525	Cessna Citation X

Sponsor Approval

City Of Fremont, Nebraska ____________________ Date ____________

Notes

1. Base Mapping from 2010 ALP obtained from the City of Fremont, January 2014 supplemented by 1-meter ortho-referenced *Pictometry* imagery obtained January 2014. Ground contours via the 2010 ALP. Supplemental airspace survey not conducted.
2. No Obstacle Free Zone Penetrations or Threshold Siting Surface Penetrations exist. No Modification to Design Standards approved and no Non Standard Conditions identified.
3. All Coordinates 1983 North American State Plane Projection, all elevations North American Vertical Datum, Epoch Year 1988.
4. Existing airport-related city property approximates 353 acres, and easement acreage approximates 75 acres.
5. See Terminal Area Plan for more detailed building information.
6. Planned improvements include:
   - 6.1. Closure of Runway 1-19 to serve as taxiway
   - 6.2. Full-parallel taxiway for Runway 14-32
   - 6.3. Improved IAP visibility (from 1-mile to 3/4-mile) for Runway 14 while simultaneously removing the Runway 14 displacement and updating declared distances
   - 6.4. Adoption of C&D Design Standards for Runway 14-32
   - 6.5. Planned Terminal Area hangars, apron, access and other landside features

No.	Revision	Ckd	Date

Fremont Municipal Airport
City of Fremont, Nebraska

ADG Airport Development Group
1776 South Jackson Street | Suite 203
Denver, Colorado 80210-3822
303 782 0882 | 303 782 0842 fax
www.ADGAirports.com

NDA Project Number:

Project No.:	FET1437M
Designed By:	SPM
Drawn By:	MTP
Approved By:	SPM
Date:	December 2014

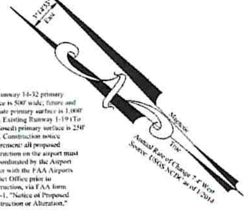
Airport Layout Plan

Exhibit: I of VII Exhibits

Legend

Symbol	Meaning
(E), (F)	Existing, Future
	Existing Property Line
	Future Property Line
	Building Restriction Line (35' BRL)
	Runway Protection Zone (RPZ)
	Approach Surface
	Object Free Area (OFA)
	Runway Safety Area (RSA)
	Obstacle Free Zone (OFZ)
	Runway Visibility Zone (RVZ)
	Existing Fence
	Existing Pavements
	Short-Term Improvements
	Intermediate-Term Improvements
	Long-Term Improvements
	Existing Paved Roads
	Future Paved Roads
	Existing Buildings
	Avigation Easement
	Drainage Line
1200	Contour Line
	Rotating Beacon

Notes:
Existing Runway 14-32 primary surface is 500' wide; future and ultimate primary surface is 1,000' wide. Existing Runway 1-19 (To be Closed) primary surface is 250' wide. Construction notice requirement: all proposed construction on the airport must be coordinated by the Airport Owner with the FAA Airports District Office prior to construction, via FAA form 7460-1, "Notice of Proposed Construction or Alteration."



Existing Airfield Separation Standards

Standard Item	Separation
Runway Centerline To Parallel Taxiway/Taxilane Centerline	240'
Runway Centerline To Edge Of Aircraft Parking	250'
Runway Centerline To Fixed Or Movable Object	250'
Runway Centerline To Holdline	200'
Taxiway Centerline To Parallel Taxiway/Taxilane Centerline	105'
Taxiway Centerline To To Fixed Or Movable Object	65.5'
Taxilane Centerline To To Parallel Taxilane Centerline	97'
Taxilane Centerline To Fixed Or Movable Object	57.5'

*Airplane Design Group II (Wingspans < 79 Feet)

Future Airfield Separation Standards

Standard Item	Separation
Runway Centerline To Parallel Taxiway/Taxilane Centerline	300'
Runway Centerline To Edge Of Aircraft Parking	400'
Runway Centerline To Fixed Or Movable Object	250'
Runway Centerline To Holdline	200'
Taxiway Centerline To Parallel Taxiway/Taxilane Centerline	105'
Taxiway Centerline To To Fixed Or Movable Object	65.5'
Taxilane Centerline To To Parallel Taxilane Centerline	97'
Taxilane Centerline To Fixed Or Movable Object	57.5'

*Airplane Design Group II (Wingspans < 79 Feet)

Existing On-Airport Facilities

No.	Description	±Height (AGL)	±Top Elev. (MSL)	±Size	Comment
1	City-Owned Hangar	30'	230'	100' x 100'	
2	City-Owned Hangar	30'	230'	100' x 100'	
3	City-Owned T-Hangar	20'	220'	200' x 60'	
4	City-Owned T-Hangar	20'	220'	160' x 60'	
5	City-Owned T-Hangar	12'	212'	75' x 75'	
6	Apron	--	--	10,550 sy.	Group I Compliant Only, Not Marked
7	City-Owned Hangar	30'	230'	50' x 315'	
8	Terminal Building	15'	215'	100' x 100'	
9	City-Owned GA Auto Parking	--	--	130'x60' (22 stalls)	New Road Encroaches
10	City-Owned Hangar	30'	230'	75' x 65'	
11	City-Owned Hangar	30'	230'	80' x 60'	
12	City-Owned Hangar	20'	220'	80' x 60'	
13	City-Owned Hangar	15'	215'	80' x 40'	
14	City-Owned Hangar	12'	212'	80' x 40'	
15	City-Owned Hangar	15'	215'	50' x 50'	
16	City-Owned Hangar	20'	220'	75' x 50'	
17	City-Owned Fueling and Farm	15'	230'	--	
18	Ground-Leased Hangar	25'	225'	100' x 85'	
19	Ground-Leased Hangar	25'	225'	100' x 75'	

Building Height Estimated; No Survey Performed

Future On-Airport Facilities

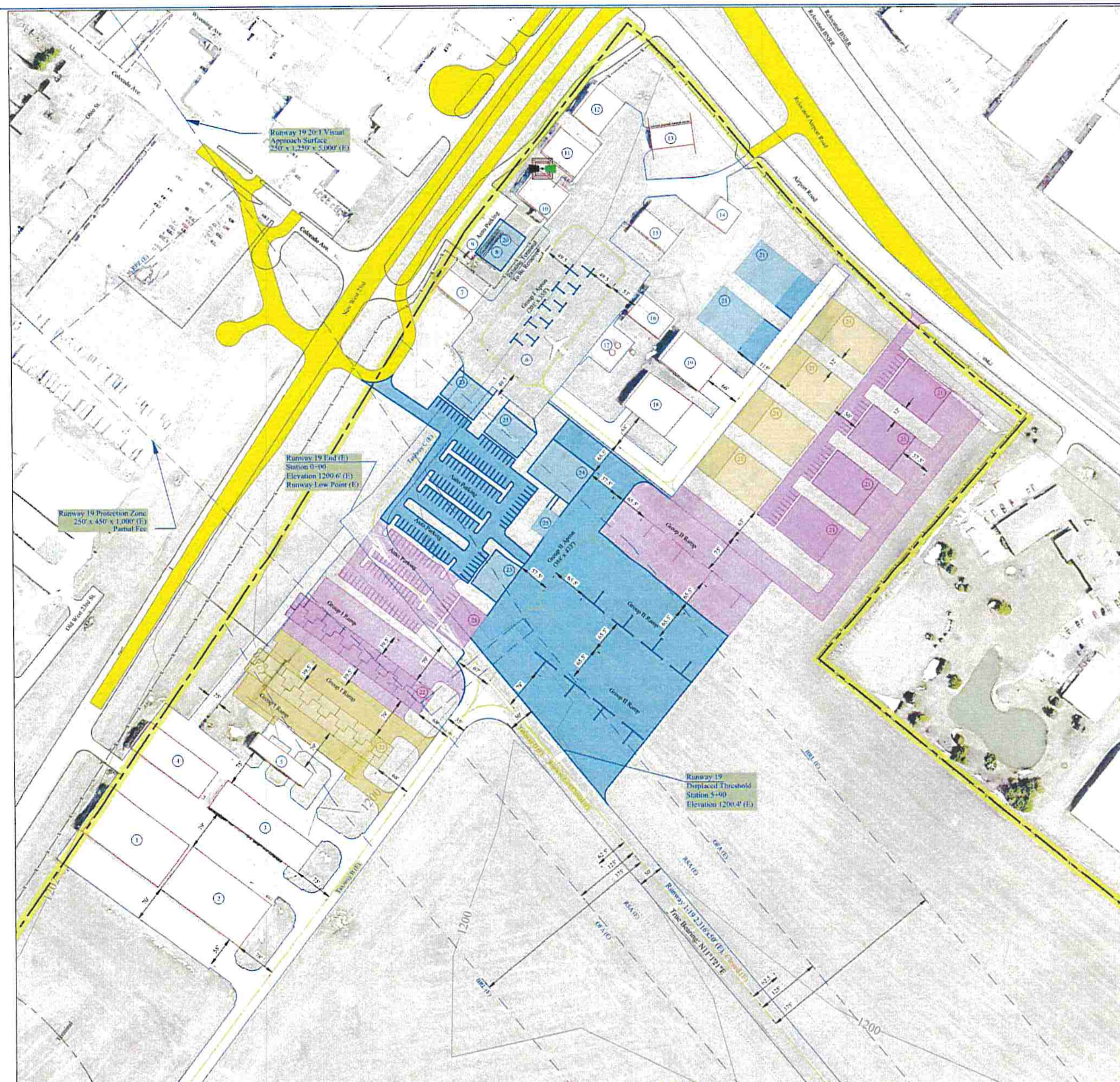
No.	Description	±Height (AGL)	±Top Elev. (MSL)	±Size	Comment
20	Ground-Leased Hangar	22'	222'	60' x 80'	In Place of Current Terminal Building
21	Ground-Leased Hangar	22'	222'	60' x 80'	
22	T-Hangars	16'	216'	315' x 50'	
23	Ground-Leased Hangar	22'	222'	60' x 80'	
24	Proposed FBO Maintenance Hangar	30'	230'	100' x 80'	
25	Proposed Terminal Building	18'	218'	50' x 30'	

Building Height Estimated; No Survey Performed

Graphic Scale

100 0 50 100 200 400 Feet

30 0 15 30 60 120 Meters



No.	Revision	Ckd	Date

Fremont Municipal Airport
City of Fremont, Nebraska

ADG Airport Development Group

Project No.:	FET1437M
Designed By:	SPM
Drawn By:	MTP
Approved By:	SPM
Date:	October 2014

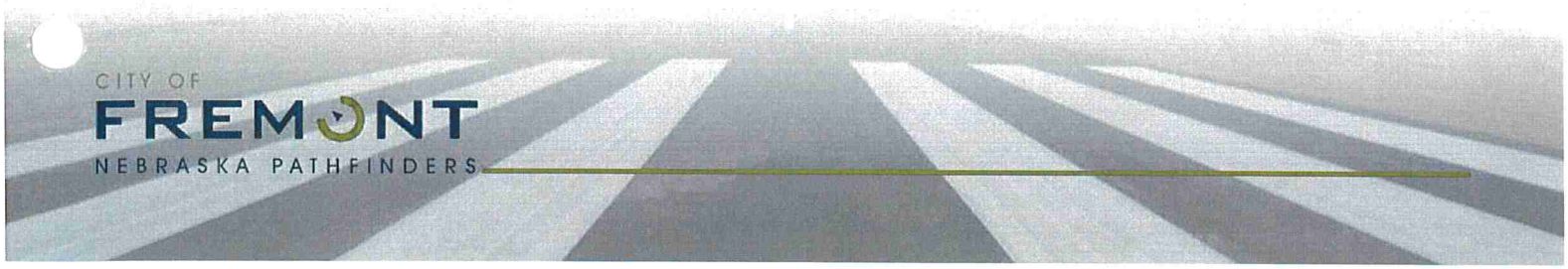
Terminal Area Plan

Exhibit:
II
of VII Exhibits

APPENDIX A

PRE-FINAL PRESENTATION;

OCTOBER 2014

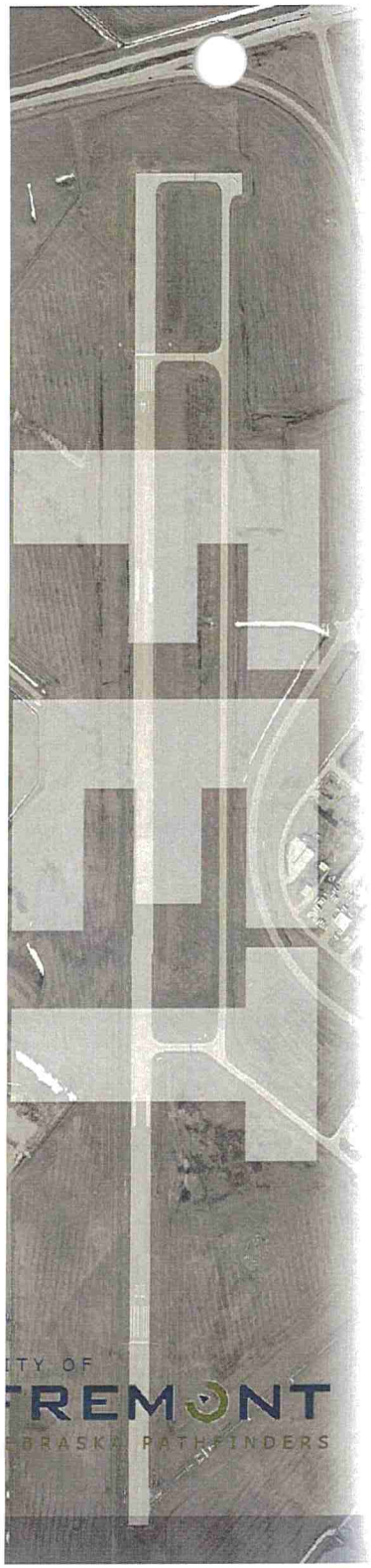


Terminal Area Plan Update

Council Presentation

October 2014

CITY OF FREMONT
NEBRASKA PATHFINDERS



About ADG

ADG Team:

Steve Marshall and Rick Bryant

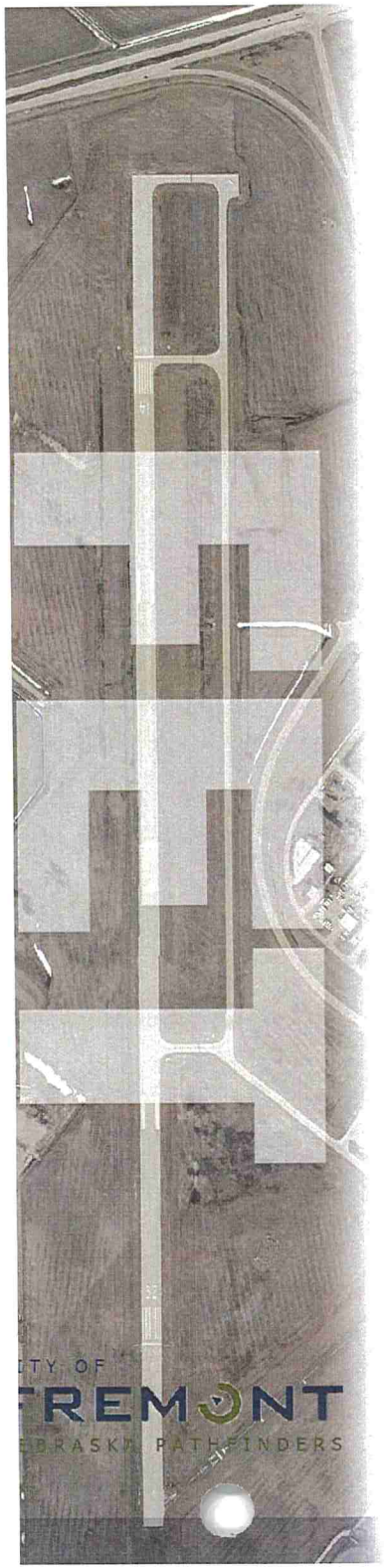
-ADG has worked with communities in the state of Nebraska since 1989

-ADG is a professional aviation consultancy in business since 1984

-ADG has completed 82 planning projects in 12 states with strong similarities to this effort

FET

Fremont Municipal Airport



Plan Participants and Roles

-City Council

Consultation and decision-making

-Fremont Public and Aviation Constituencies

Consultation planned to inform and seek comment

-Airport Advisory Committee

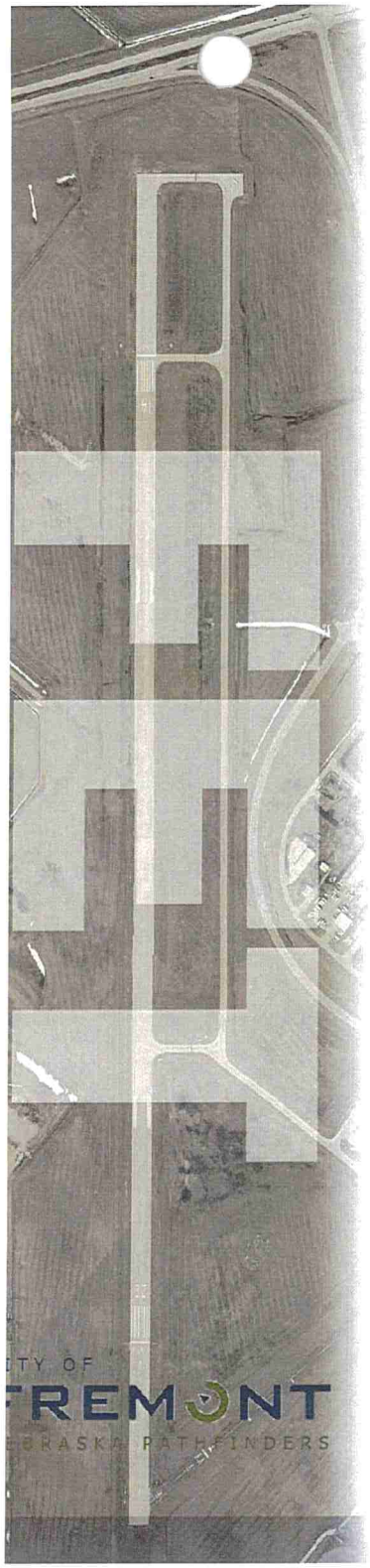
Consultation at key project points, makes recommendation to City Council

-Nebraska Aeronautics and FAA

Will advise on project documents and consult at key project points. FAA will be asked for comment and may 'airspace' the final plan

FET

Fremont Municipal Airport



Project Schedule

-Project Meeting No. 1: March

Introduce the Project to Committee, Preview an Alternative

-Project Meeting No. 2: April

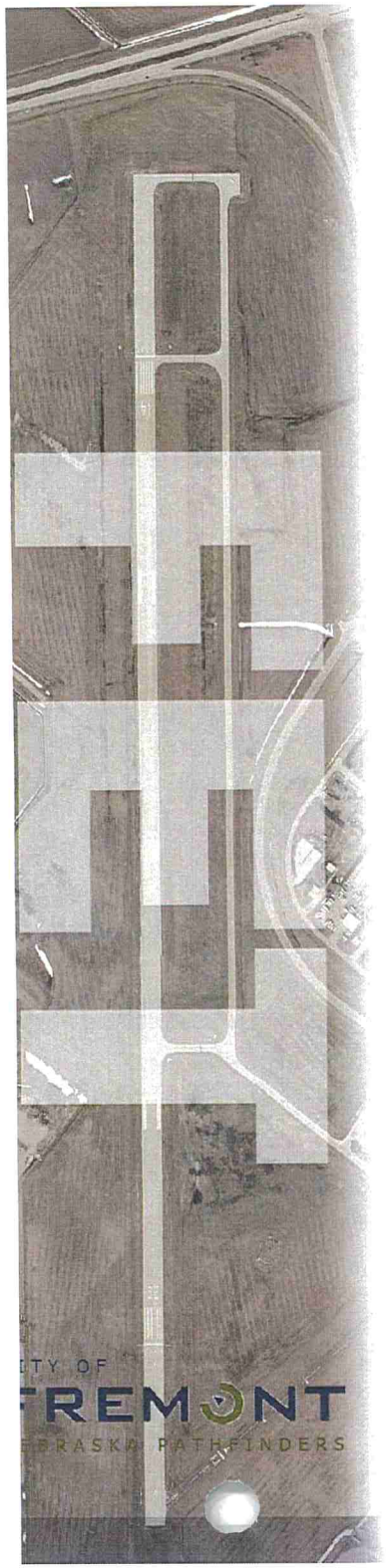
Introduce the Project, Present the Alternatives, Discuss and Seek Direction from Council

-Final City Council Presentation: Right Now

Brief the Project, Brief the Alternatives, Confirm Direction from Council, Finalize the Planning

FET

Fremont Municipal Airport



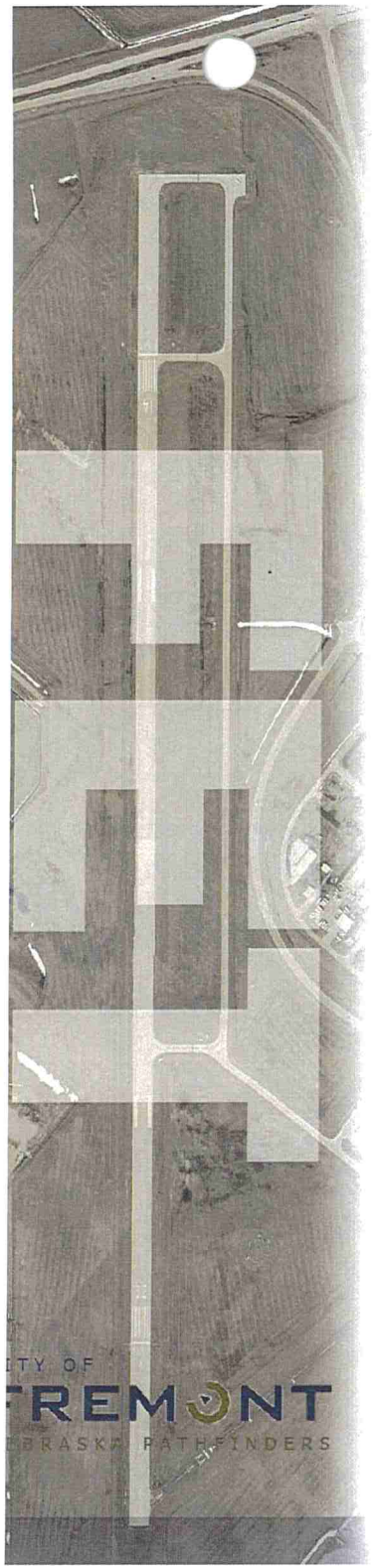
Planning Objectives

-Provide terminal area planning that is able to safely and effectively accommodate demand, should it materialize

-Provide terminal area planning with development suited to a 'highest and best' use

FET

Fremont Municip Airport



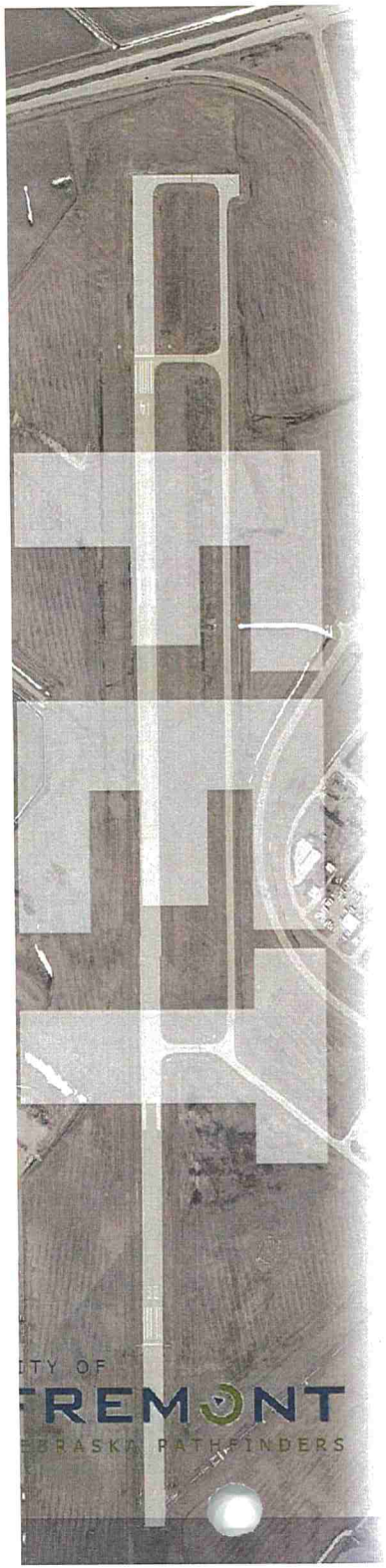
What this work is about...

-Functions as a phased (5, 10 and 20 year) development 'road map' to accommodate anticipated demand as Council sees fit

-Does not obligate development or dollars, but may set the ground work for future funding... *the beginning of the conversation*

FET

Fremont Municipal Airport



Why is this work being done...

-The upcoming West 23rd Street Viaduct may constrain the terminal building's auto parking

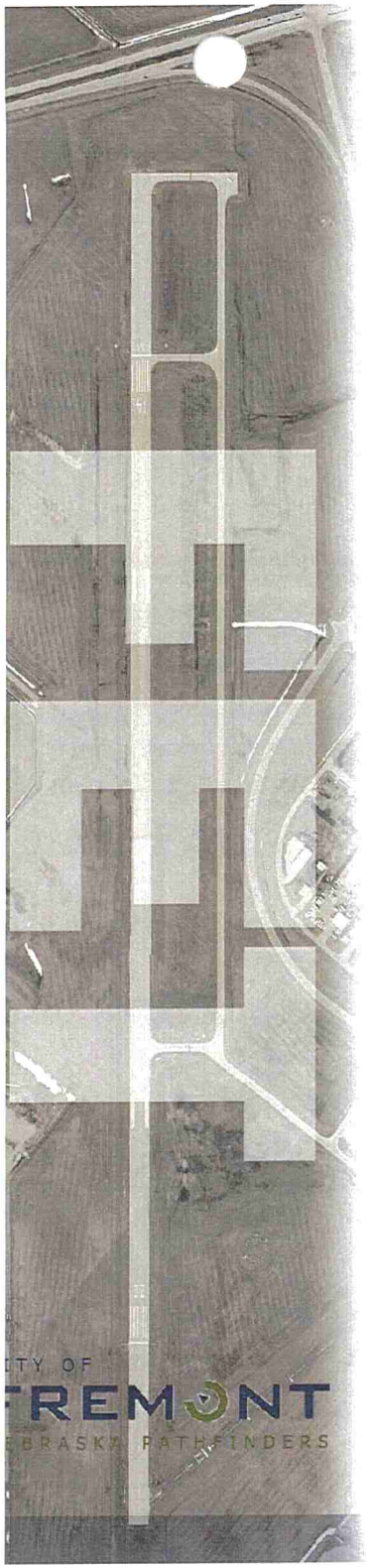
-A waitlist for hangars exists and new hangar and apron area should be planned

-The current terminal building has aged and is perhaps past is useful life without rehabilitation

-FAA and NDA encourage a review and update of FET's planning every so often

FET

Fremont Municip Airport



What is being done...

Project Focus: 5 Down to 3 Alternatives

-Phased development (5, 10 and 20-year periods)

-Visualization of hangars, buildings, apron, auto parking, taxiways and other aviation facilities

-Planning-level cost estimates for each phase

Alternative No. 1: Improve Existing Terminal Area

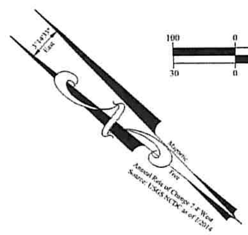
Alternative No. 2: Develop Along Airport Road

Alternative No. 3: Western-Most Development

FET

Fremont Municipal Airport

Terminal Area Alternative No. 1
(Improve Existing Terminal Area)



Graphic Scale

100 0 50 100 200 400 Feet

30 0 15 30 60 120 Meters

Notes

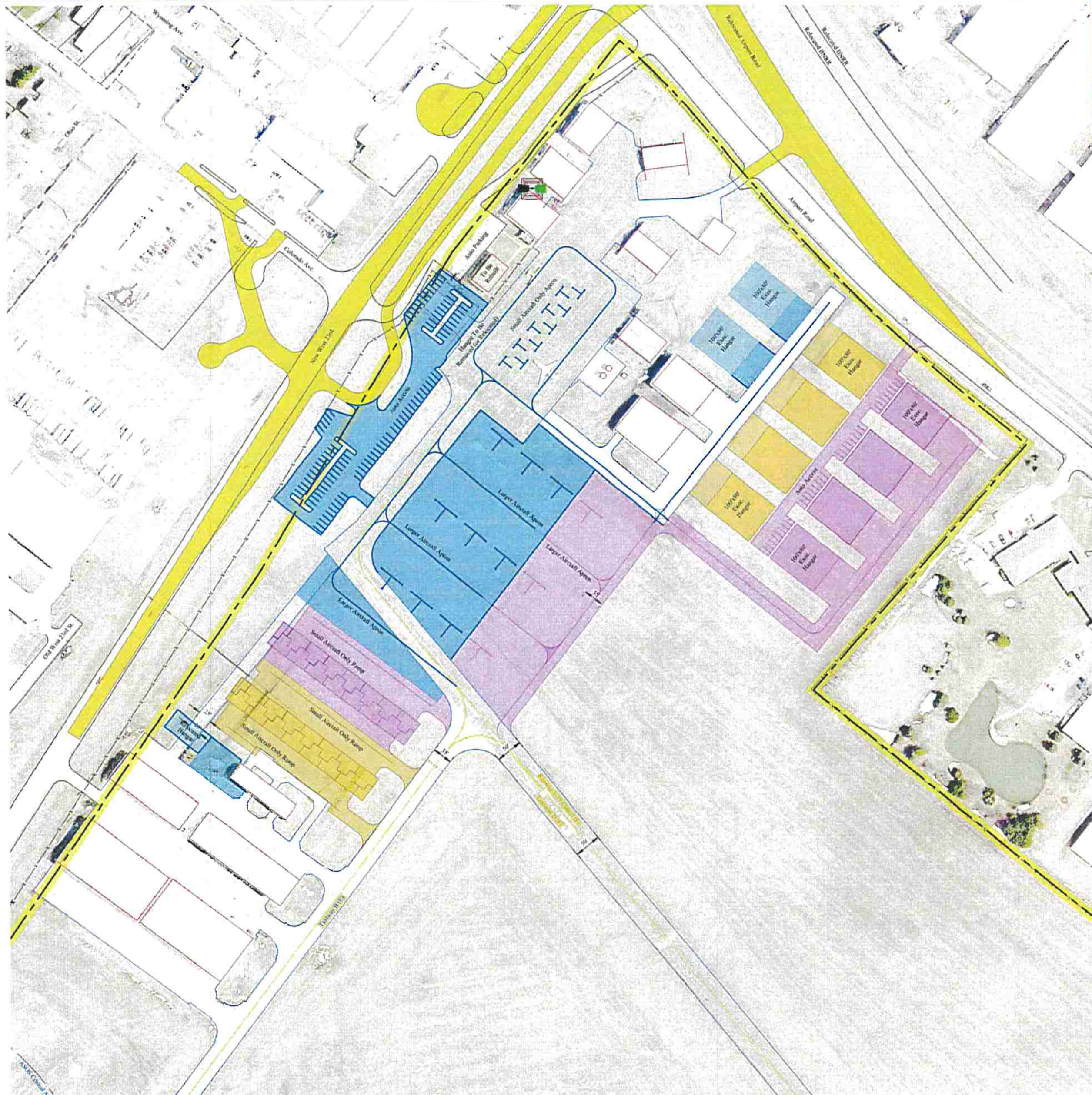
Regardless of alternative, planned improvements, include:
- Closure of Runway 1-19 to serve as taxiway
- Full-parallel taxiway for Runway 14-32
- Improved IAP visibility (from 1-mile to 3/4-mile) for Runway 14 while simultaneously removing the Runway 14 displacement and updating declared distances
- Adoption of C&D FAA Design Standards for Runway 14-32
- Planned Terminal Area hangars, apron, access and other landside features

Legend

- (El. ft') Existing, Future
- Existing Property Line
- Existing Fence
- Existing Pavement
- Existing Paved Roads
- Future Paved Roads
- Existing Buildings
- Avigation Easement
- Rotating Beacon

Alternative No. 1 Improvements					
	FAA	NDA	City	Others	Totals
Short-Term	$1,200,000	$350,000	$580,000	$150,000	$2,280,000
Intermediate-Term	$125,000	$0	$565,000	$0	$690,000
Long-Term	$670,000	$175,000	$645,000	$0	$1,490,000
Totals:	$1,995,000	$525,000	$1,790,000	$150,000	$4,460,000

Note: Costs associated with box/executive hangar development are not prepared because ground leasing is planned, except eligible portions of access taxiways.



No.	Revision	Ckd	Date

Fremont Municipal Airport
City of Fremont, Nebraska

AIRPORT DEVELOPMENT GROUP
1776 South Jackson Street | Suite 950
Denver, Colorado 80210-3802
303 782 0882 | 303 782 0842 fax
www.ADGairports.com

NDA Project Number:

Project No.:	FET1437M
Designed By:	SPM
Drawn By:	MTP
Approved By:	SPM
Date:	December 2014

Terminal Area Alternative No. 1 (Improve Existing Terminal Area)

Exhibit: **A1** of VII Exhibits

Terminal Area Alternative No. 2
(Develop Along Airport Road)

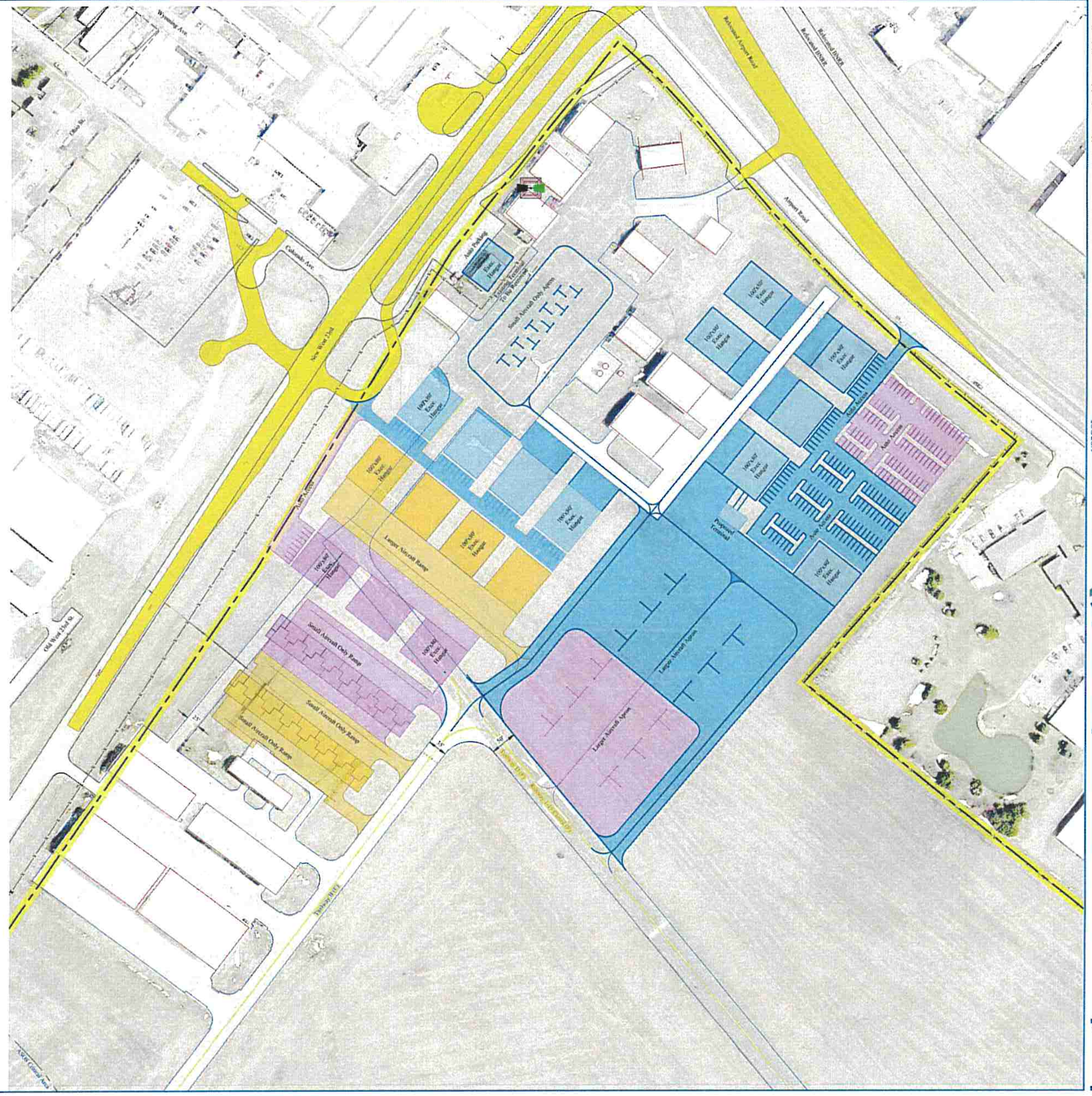
Graphic Scale: 0 – 50 – 100 – 200 – 400 Feet; 0 – 15 – 30 – 60 – 120 Meters

Notes

Regardless of alternative, planned improvements, include:
- Closure of Runway 1-19 to serve as taxiway
- Full-parallel taxiway for Runway 14-32
- Improved IAP visibility (from 1-mile to 3/4-mile) for Runway 14 while simultaneously removing the Runway 14 displacement and updating declared distances
- Adoption of C&D FAA Design Standards for Runway 14-32
- Planned Terminal Area hangars, apron, access and other landside features

Legend

- Existing Fence
- Existing Property Line
- Existing Fence
- Existing Pavement
- Existing Paved Roads
- Future Paved Roads
- Existing Buildings
- Avigation Easement
- Rotating Beacon



	FAA	NDA	City	Others	Totals
Alternative No. 2 Improvements					
Short-Term	$1,000,000	$350,000	$580,000	$150,000	$2,080,000
Intermediate-Term	$125,000	$0	$565,000	$0	$690,000
Long-Term	$670,000	$175,000	$345,000	$0	$1,190,000
Totals:	$1,795,000	$525,000	$1,490,000	$150,000	$3,960,000

Note: Costs associated with box/executive hangar development are not prepared because ground leasing is planned, except eligible portions of access taxiways.

No.	Revision	Ckd	Date

Fremont Municipal Airport
City of Fremont, Nebraska

ADG Airport Development Group
1776 South Jackson Street | Suite 200, Denver, Colorado 80210-3802
303.782.0883 / 303.782.0842 fax
www.ADGAirports.com

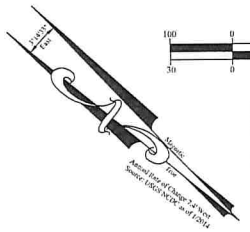
NDA Project Number:

Project No.:	FET1437M
Designed By:	SPM
Drawn By:	MTP
Approved By:	SPM
Date:	June 2014

Terminal Area Alternative No. 2 (Along Airport Road)

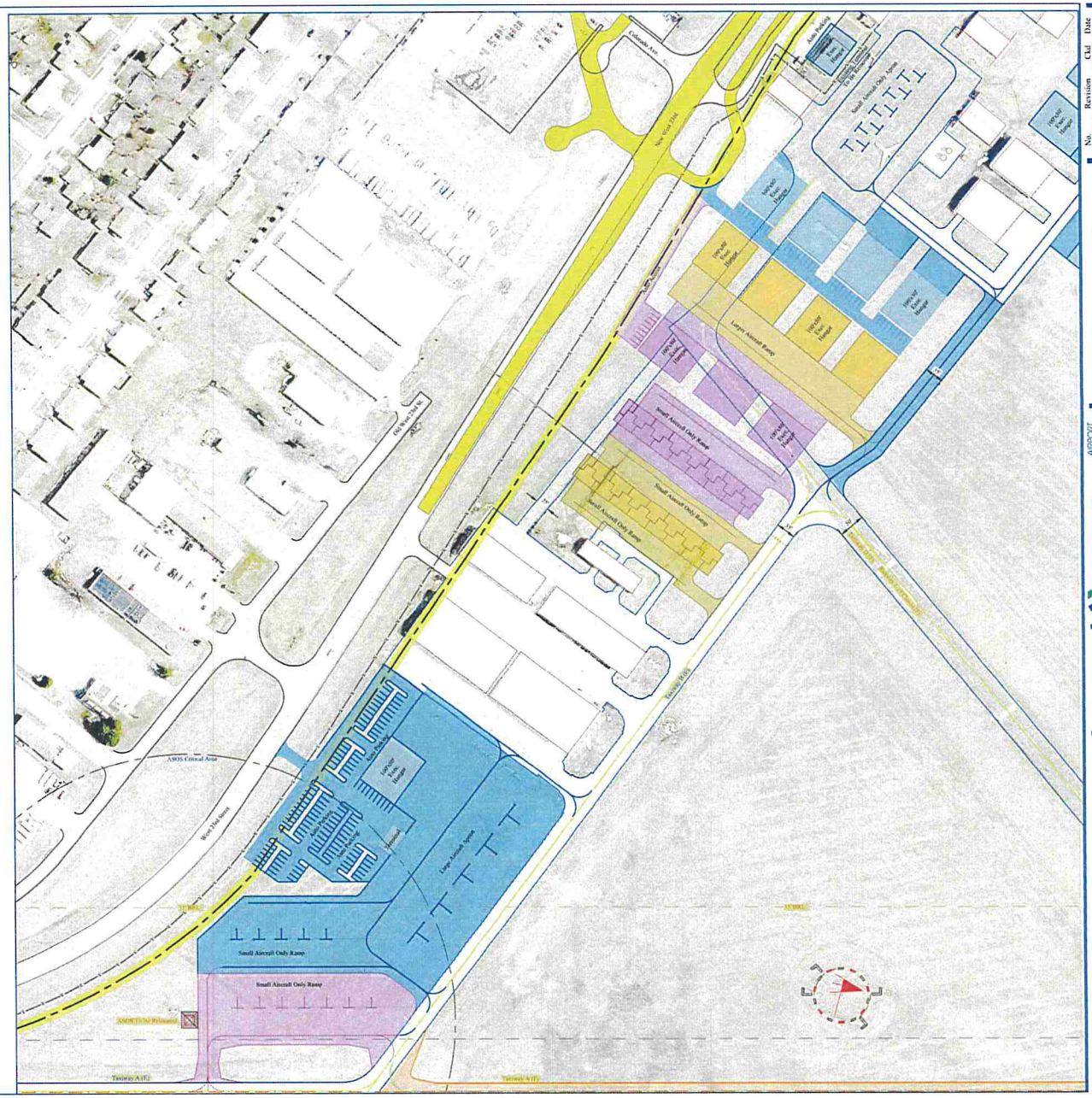
Exhibit: **A2** of VII Exhibits

Terminal Area Alternative No. 3
(Western-Most Development)



Alternative No. 3 Improvements					
	FAA	NDA	City	Others	Totals
Short-Term	$1,200,000	$750,000	$580,000	$150,000	$2,680,000
Intermediate-Term	$125,000	$0	$565,000	$0	$690,000
Long-Term	$670,000	$175,000	$645,000	$0	$1,490,000
Totals:	$1,995,000	$925,000	$1,790,000	$150,000	$4,860,000

Note: Costs associated with box/executive hangar development are not prepared because ground leasing is planned, except eligible portions of access taxiways.



No.	Revision	Ckd	Date

Fremont Municipal Airport
City of Fremont, Nebraska

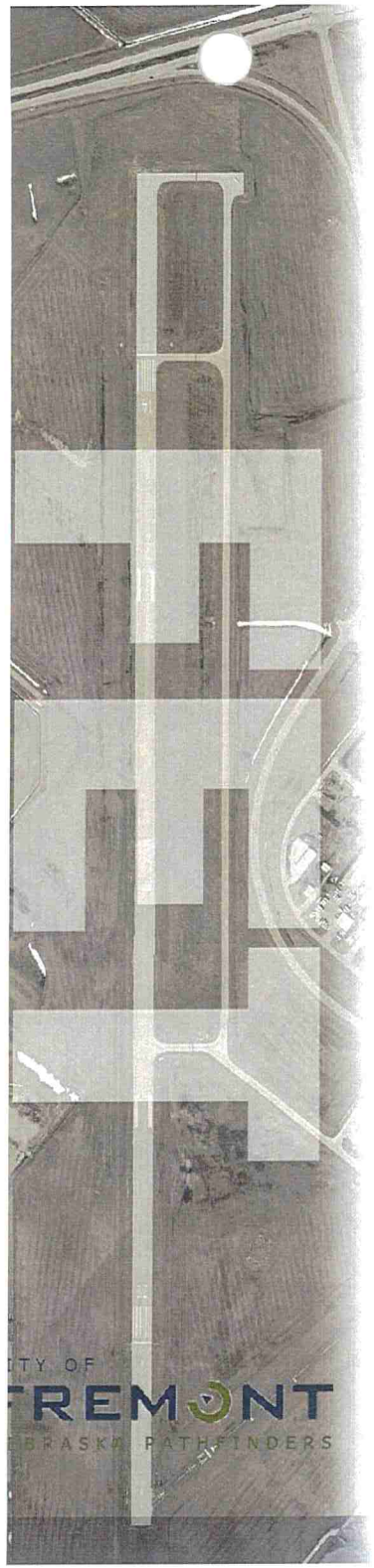
ADG AIRPORT DEVELOPMENT GROUP
1770 South Jackson Street | Suite 203
Omaha, Nebraska 68102-1837
303 752 6887 | 303 752 6842 fax
www.ADGAviation.com

NDA Project Number:

Project No.:	FET14370M
Designed By:	SPM
Drawn By:	MTP
Approved By:	SPM
Date:	June 2014

Terminal Area Alternative No. 3 (Western-Most Development)

Exhibit:
A3
of VII Exhibits



And who pays for all this…

-This planning will be 90% reimbursed by FAA

-FET is 'entitled' to an annual $150,000, more than that is FAA/NDA prerogative

<u>On-The Ground Improvements:</u>

-Apron, Taxiway and Taxilanes are eligible for 90% FAA grants.

-Terminal Buildings are sometimes eligible for 90% FAA grants.

-Hangar and T-Hangars are generally not eligible for 90% FAA grants.

-$600,000± 'in FAA's bank for FET'

FET

Fremont Municipal Airport

APPENDIX B

ARCHITECTURAL REPORT FOR EXISTING TERMINAL BUILDING

Fremont Municipal Airport

Terminal Building Report

HGM Project No. 103214

March 10, 2014

Fremont Municipal Airport

Building Report
HGM Project No. 103214
March 10, 2014

EXISTING FACILITY

The existing Fremont Airport Terminal was established in 1947. The terminal building was constructed in 1962. (See Photos 1 and 2)

The entrance to the terminal is somewhat hidden and isolated from view from the parking lot and as visitors approach the airport. (See Photo 3)

The building is constructed of masonry load bearing walls that are uninsulated. The roof is a pre-cast concrete inverted T system. The masonry walls and roof structure appear to be stable and solid, but there is moisture damage on the north side of the building. (See Photo P4)

The windows are old, deteriorating and not energy efficient. (See Photo P5)

The buildings' roof is old and reached the end of its useful life and should be replaced. (See Photo P7). This sloping roof surface is difficult and problematic to re-roof. Also there are cracks developing with the concrete roof system. (See Photo P6)

A new lay in ceiling was updated and installed in 1985 with insulation added above the lay in ceiling. This is not a suggested way of insulating the ceiling. It makes access to wiring, lights, etc. difficult.

Carpet was recently replaced and is in good shape.

The reception area is cramped and is open to the lobby with a lack of privacy for phone calls and other work. (See Photo P8)

The existing FBO office is cramped with no view of the lobby and minimal view of the apron and runway. (See Photo P9)

The lobby is comfortable with plenty of seating for guests and visitors. (See Photo P10)

There is only one large room which serves as a combination conference room, flight planning area, and break room. There is no privacy area for pilots to plan flights. There is no sink for water. There is no private meeting or training room that could be used for press conferences, political rallies, meetings or training sessions. (See Photo P11)

There are no sleeping rooms or privacy areas for pilots to sleep or take a break when they are waiting for flights. Currently they sleep in the lobby area.

Storage is lacking throughout the facility. Some storage is handled in the mechanical room which is a safety issue. (See Photo P12 and P13)

The drinking fountain appears to not meet current ADA standards and electrical cords provide a safety issue. (See Photo P14)

Photo P15 shows vending machines located where visitors enter the terminal restricting space.

The restrooms are small and not ADA compliant. (See Photo P16)

TERMINAL IMPROVEMENTS

To better facilitate visitors and provide a more helpful work area for the receptionist a glass separation wall should be included between the lobby and the receptionist work area. A drop box for loaner vehicles would be nice and a dedicated security monitor would be preferred. More file storage and a more efficient work area is needed in the reception area.

FBO OFFICE

The FBO office should have visibility of the lobby, receptionist and taxiway. More file storage is needed and a security system should be provided to monitor activities.

FLIGHT PLANNING AREA

A dedicated area should be provided for pilots to plan their flights with a regional map, access to telephone, internet access, and a view of the runway.

TRAINING ROOM

There should be a dedicated training area for use by staff. It could also be used as a conference room or political rally room if needed.

BREAK ROOM

A separate break room should be provided for staff and visitors to use.

SLEEPING ROOM

Probably two private sleeping rooms should be included in the new terminal facility with access to toilets and showers with TV's and a lounging area accessible to pilots 24 hours a day.

MECHANICAL SYSTEM

The HVAC system is comprised of a natural gas fired furnace with condensing unit. The Whirlpool furnace is original to the building and is at the end of its useful life per 2007 ASHRAE Handbook – HVAC Applications, Table 4, page 36.3. The Ruud outdoor condensing, model RAKA, has been replaced since the original system, but information on the unit was not available on site. The system has a single White-Rodgers thermostat for the entire building. The thermostat did not appear to be 7-day programmable to meet current energy codes. The HVAC system does not have outdoor air, which is a violation of ASHRAE Standard 62.1, and the International Mechanical Code. The supply ductwork for the HVAC system is installed below the floor slab, and some sections of this ductwork are collapsed, or have required

heavy maintenance in the past. Without access to the supply ductwork, required maintenance cannot be completed. Each restroom has a wall fan exhauster that is original to the building.

The plumbing system is comprised of a ¾" water service which supplies water to the two (2) restrooms, a service sink, a drinking fountain, a refrigerator ice maker, and the lawn sprinkler system. The cold water piping is expanded to 1" or larger once it enters the building at the Mechanical closet, likely in an attempt to accommodate the lack of pressure required in the building. The building operator reports that if the lawn sprinkler system is operating, the toilets in the restrooms will not flush. The water service size is inadequate and must be redone to accommodate plumbing code. The domestic water heater is an A.O. Smith, 30 gallon, and is not original to the building, but appears to be at the end of its useful life. The restroom plumbing fixtures appear to meet ADA requirements. The drinking fountain in the main corridor does not meet ADA requirements.

ELECTRICAL

The existing electrical system is 120/240V, 1-phase with a 100A main circuit breaker on the exterior of the building. There is a 100A main lug only branch circuit panel located in the mechanical room. The panel is an obsolete ITE Pushmatic type panel. For any future renovations a new electrical service will be required including larger service to the building and new branch circuit panelboard(s).

The existing lighting system throughout uses T12 linear fluorescent fixtures. There does not appear to be any emergency egress lighting or exit lighting. New energy efficient lighting will need to be provided throughout to meet State Energy Codes, including lighting controls. New LED type exit lighting and emergency egress will need to be provided throughout including outside all exterior egress doors.

The existing receptacles are grounded type, however they are minimal and not in a quantity that would meet current needs. Most outlets are recessed in blocks walls which will make it difficult to extend, with the use of surface mounted raceway. Light switches throughout are installed above height allowed by ADA.

There is an existing CCTV system which appears to be newer and in good condition.

The existing telephone entrance is in the mechanical room adjacent to the panelboard.

SUMMARY

The existing terminal is too small for current needs, is not easily expandable and the structure has several integral issues that might warrant its replacement and possible relocation to a better location to serve the public and the airport.

Photo #1 – Overall view of terminal area

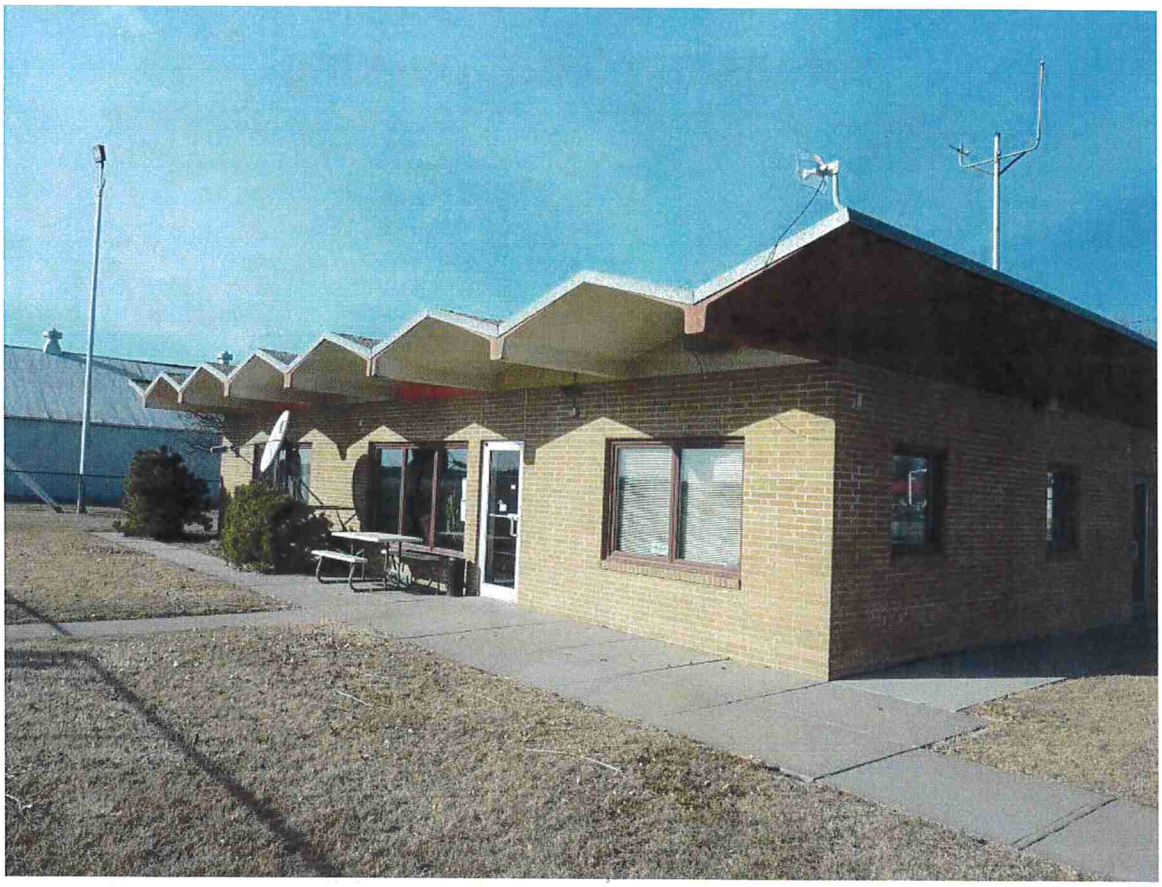


Photo #2 – Terminal building

Photo #3 – Terminal entrance not visible from parking

Photo #4 – Moisture issues

Photo #5 – Deteriorated windows and moisture issues

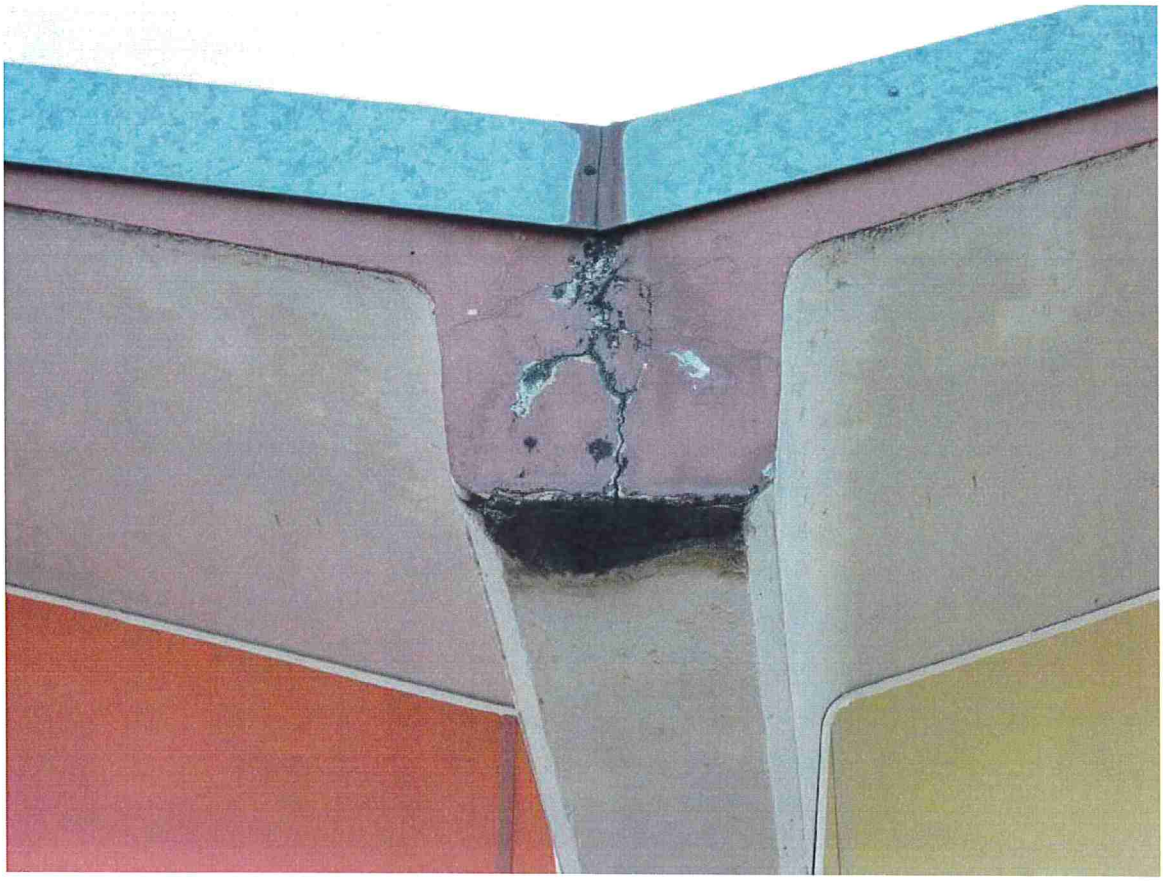


Photo #6 – Cracked, deteriorated concrete roof

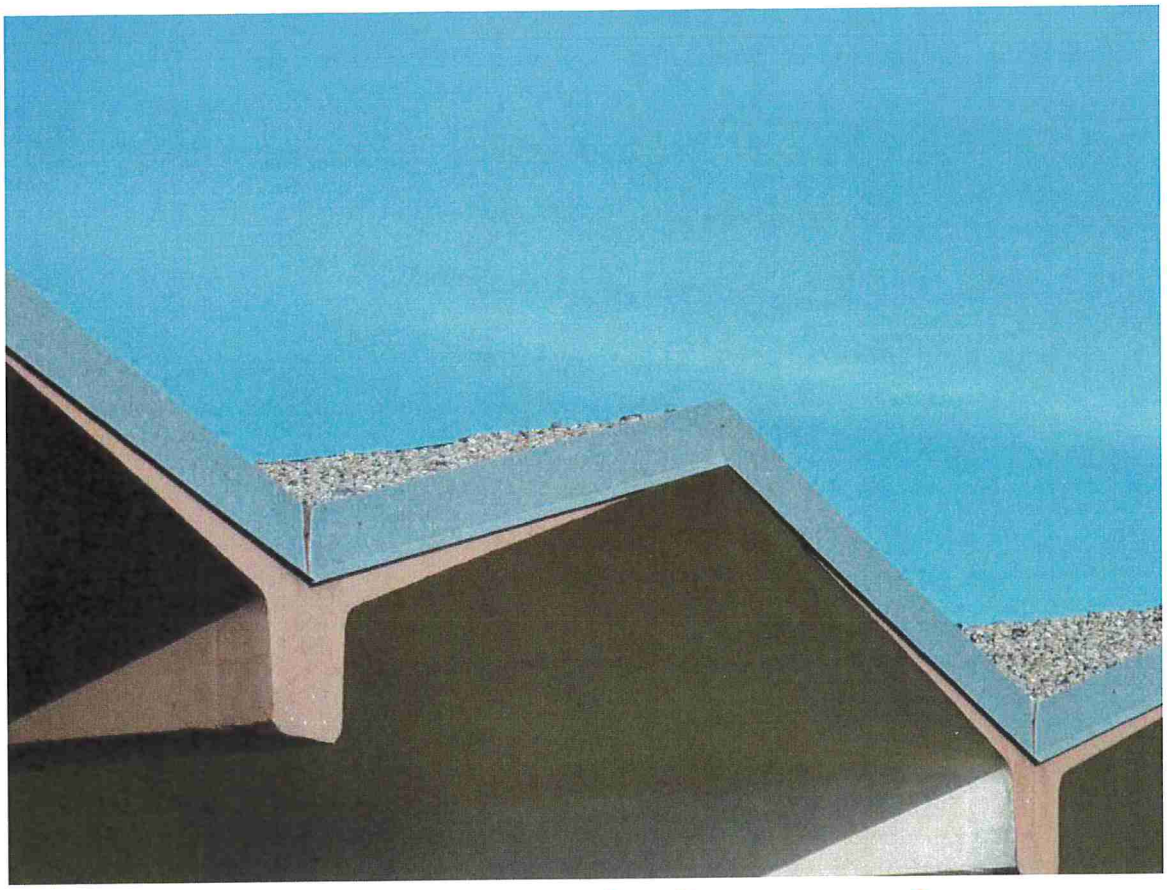


Photo #7 – Worn out built up roof system

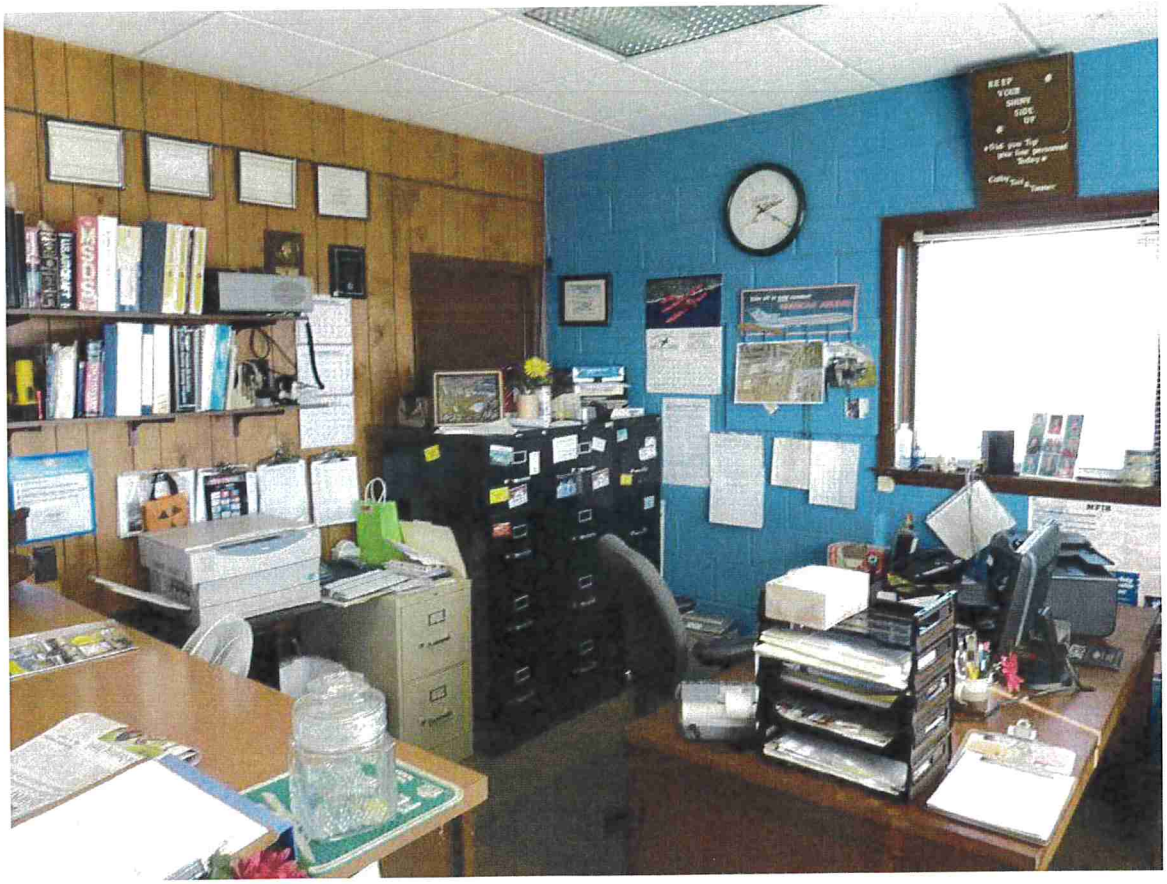


Photo #8 – Cramped reception area

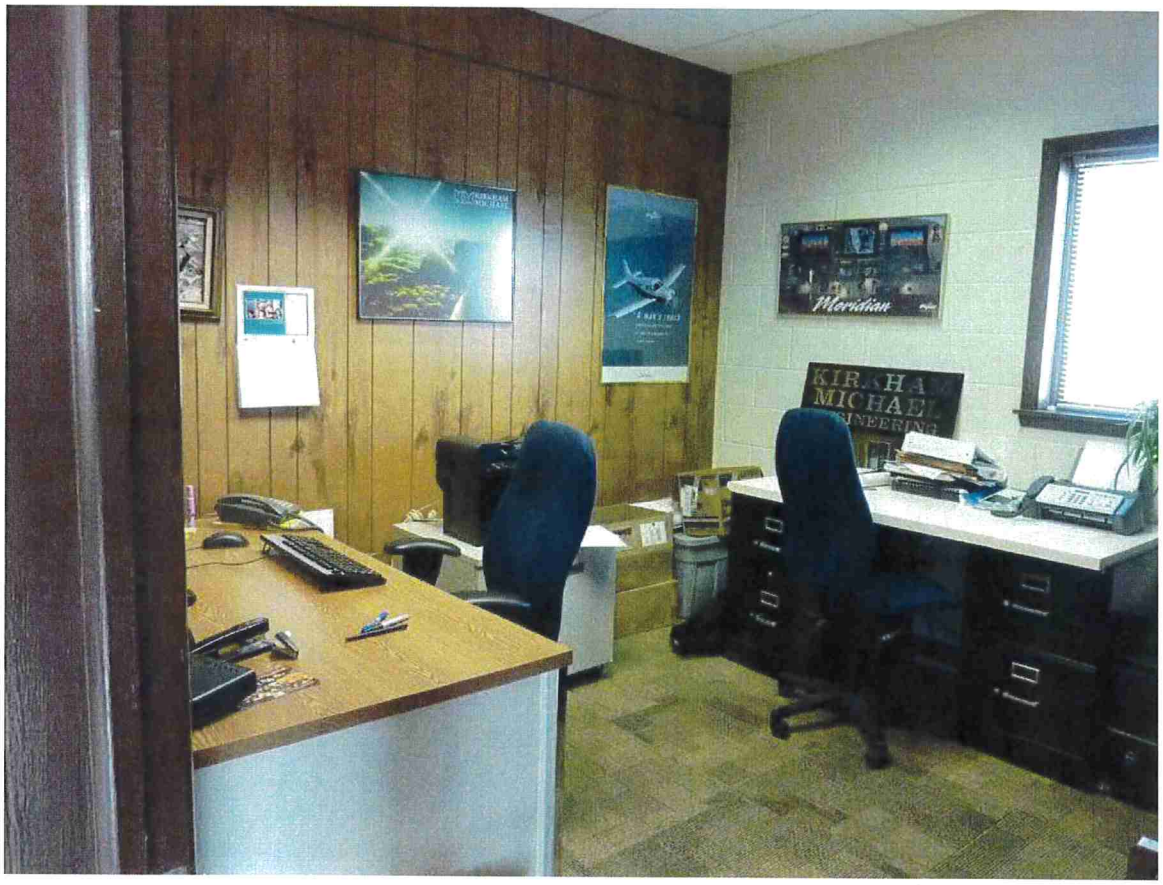


Photo #9 – Cramped FBO Office

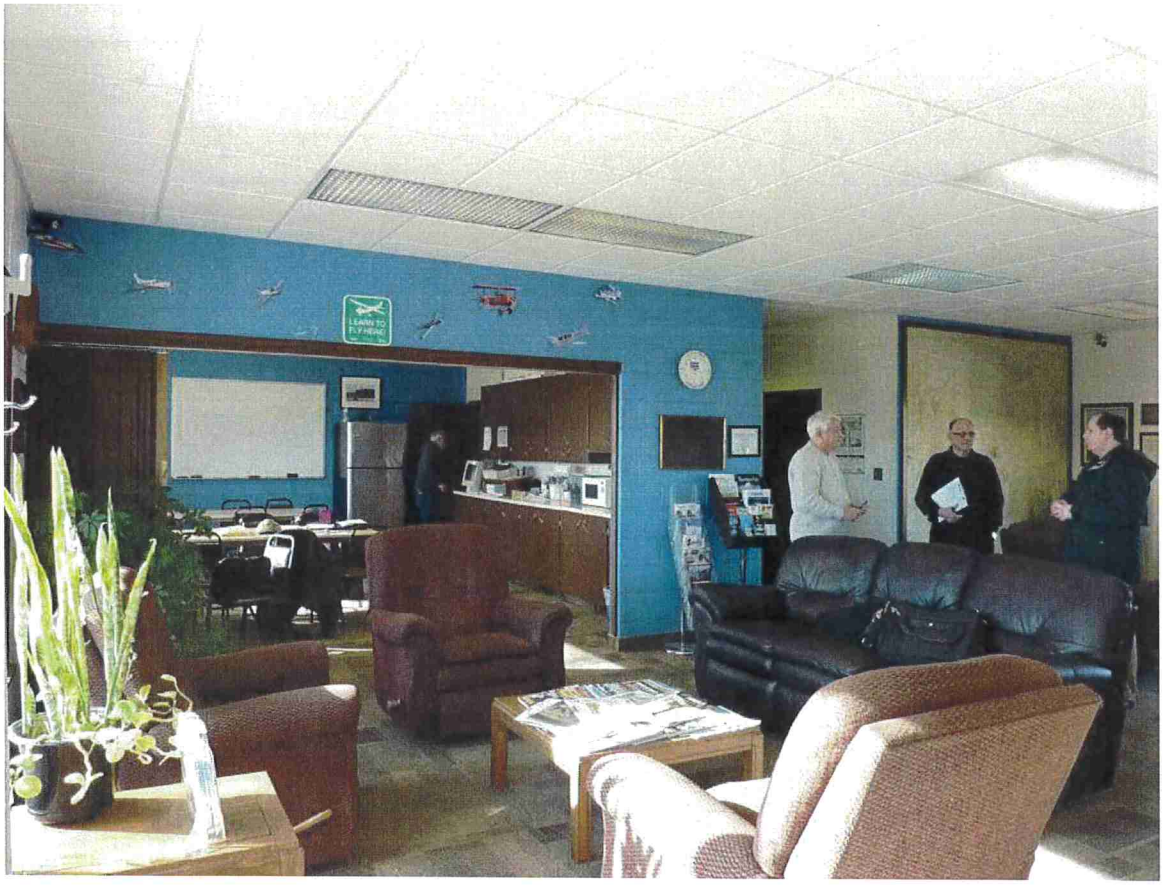


Photo #10 - Lobby

Photo #11 – Breakroom/training room/ conference room

Photo #12 – Storage in mechanical room

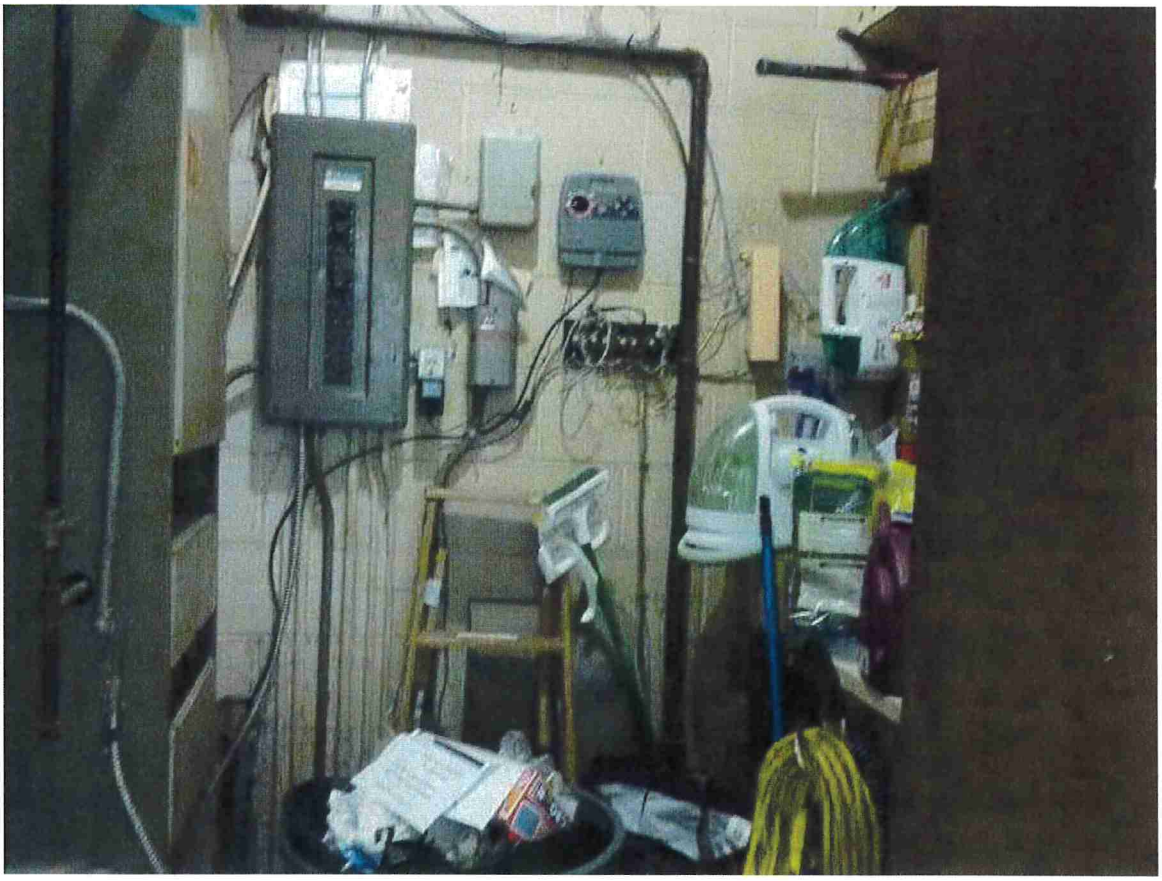


Photo #13 – Storage in mechanical room

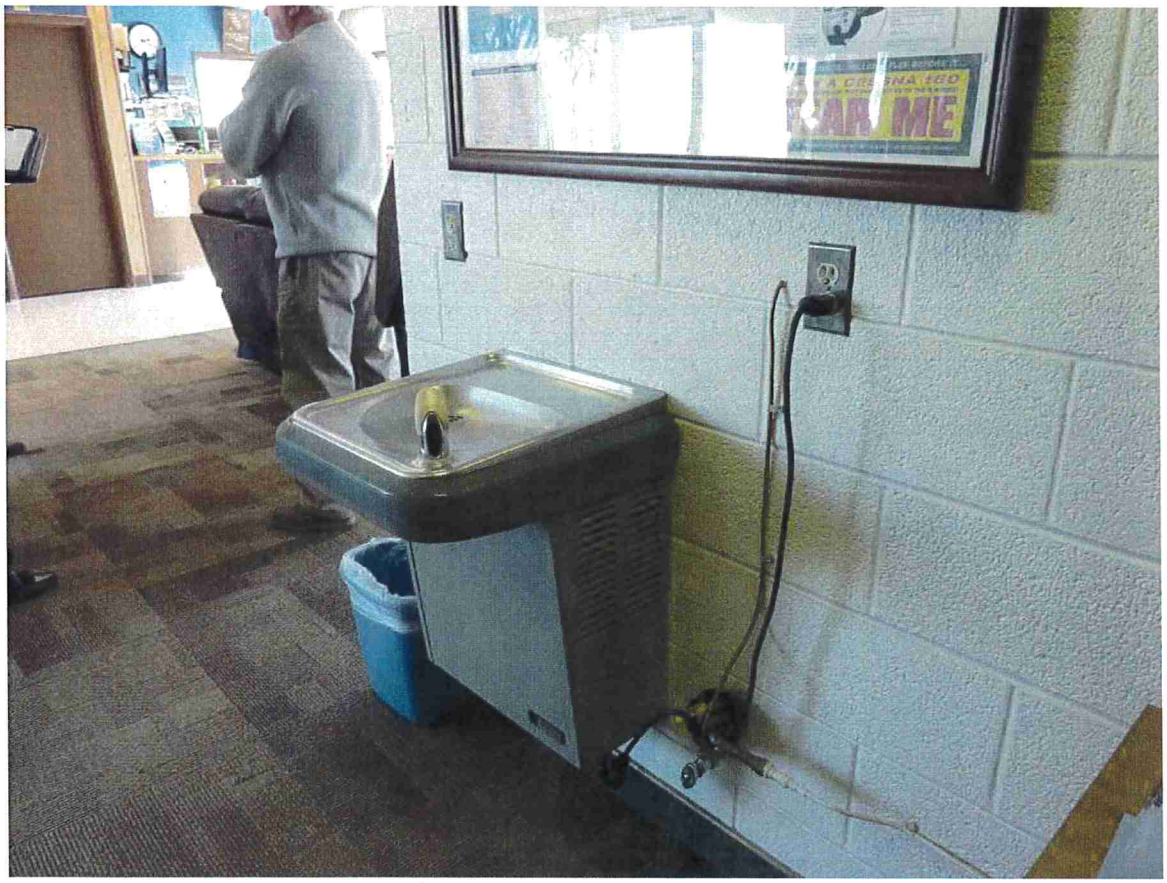


Photo #14 – Non ADA compliant drinking fountain and unsafe cords

Photo #15 – Vending machines limit access into terminal building

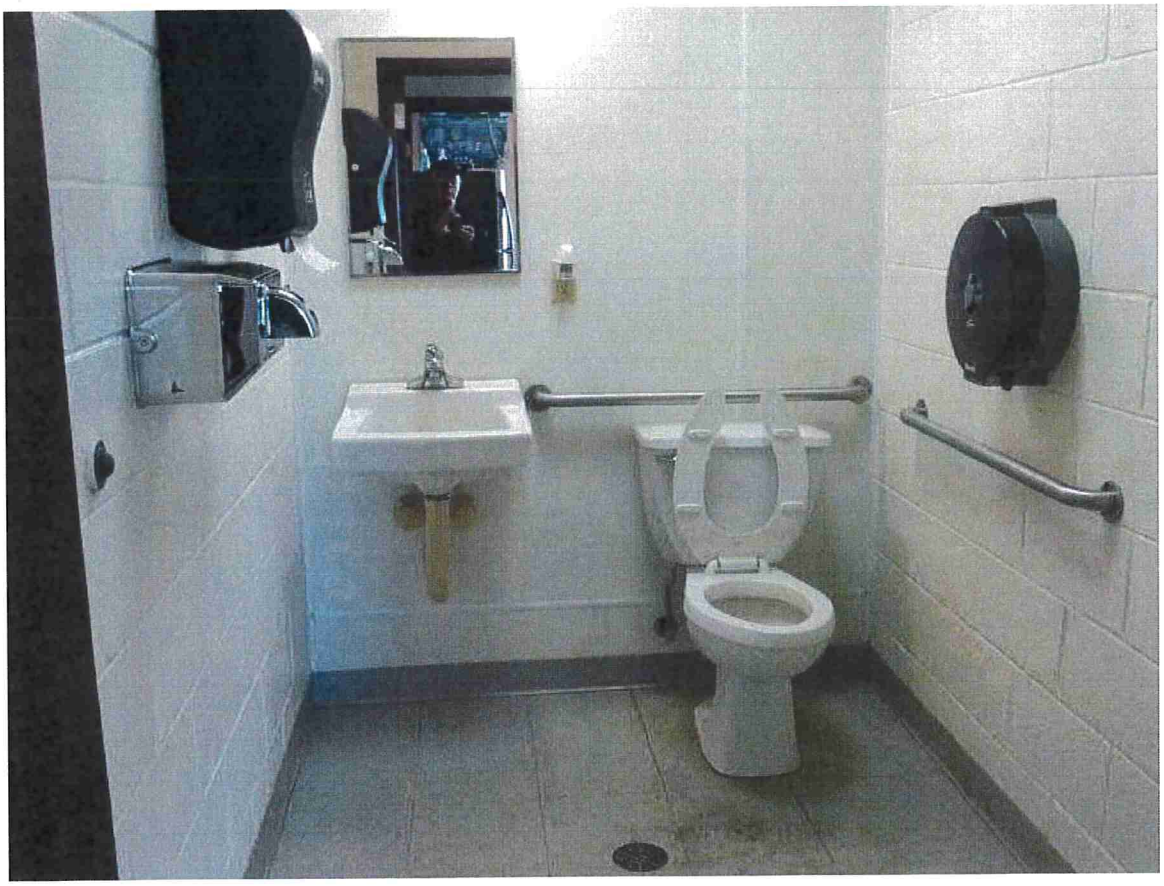


Photo #16 – Non ADA compliant toilets

hgm
ASSOCIATES INC.

TERMINAL COST ANALYSIS
Fremont Municipal Airport Terminal Building
Fremont, Nebraska
March 17, 2014
HGM / ADG

OPTIONS	COST

Renovate Existing Terminal – 1750 SF $175,000

- New Roof
- Windows
- Insulate and Finish Existing Walls
- New Energy Efficient Lights
- New Furnace
- More Outlets
- New Finishes

Renovate / Expand Existing Terminal – 4950 SF $850,000

- Add Training Room
- Sleeping Rooms
- Larger Lobby
- Conference Room
- Flight Plan Room
- Line Workers Room

New Terminal – 4850 SF $950,000

- New Facility with Lobby
- Reception Office
- FBO Offices
- Training Room
- Conference Room
- Break Room
- Line Workers Room
- Flight Plan Rooms
- Sleeping Rooms
- Showers
- Restrooms
- File Storage

S:\ARCH\Projects\103214 Fremont Airport\Word-XL\140317 Terminal Cost Analysis.doc

APPENDIX C

PLANNING-LEVEL COST ESIMATES

Fremont Municipal Airport (FET); City of Fremont, Nebraska; Planning Costs

Alternative No. 1; Improve Existing Terminal Area

Short-Term Improvements	Area	Units	Unit Cost	Total
Auto Parking Area	5140	SQYDS	$40	$205,600
Apron Area	12587	SQYDS	$57	$717,459
Terminal Building New	1	EA	$950,000	$950,000
Relocation/Demolitions/Utilities	1	EA	$400,000	$405,000
Short-Term Improvements Totals				$2,278,059
Intermediate-Term Improvements	Area	Units	Unit Cost	Total
Taxiway Area	2450	SQYDS	$32	$78,400
T-Hangar	1	EA	$610,000	$610,000
Intermediate-Term Improvements Totals				$688,400
Long-Term Improvements	Area	Units	Unit Cost	Total
Apron Area	8371	SQYDS	$57	$477,147
Taxiway Area	7290	SQYDS	$48	$349,920
T-Hangar	1	EA	$665,000	$665,000
Long-Term Improvements Totals				$1,492,067
Alternative No. 1 TOTALS				$4,458,526

Alternative No. 2; Develop Along Airport Road

Short-Term Improvements	Area	Units	Unit Cost	Total
Auto Parking Area	5132	SQYDS	$33	$169,356
Apron Area	11501	SQYDS	$53	$609,553
Taxiway Area	5255	SQYDS	$29	$152,395
Terminal Building New	1	EA	$950,000	$950,000
Utilities	1	EA	$210,000	$210,000
Short-Term Improvements Totals				$2,091,304
Intermediate-Term Improvements	Area	Units	Unit Cost	Total
Taxiway Area	6085	SQYDS	$20	$121,700
T-Hangar	1	EA	$565,000	$565,000
Intermediate-Term Improvements Totals				$686,700
Long-Term Improvements	Area	Units	Unit Cost	Total
Auto Parking Area	2079	SQYDS	$37	$76,923
Apron Area	8211	SQYDS	$59	$484,449
Taxiway Area	1506	SQYDS	$39	$58,734
T-Hangar	1	EA	$565,000	$565,000
Long-Term Improvements Totals				$1,185,106
Alternative No. 2 TOTALS				$3,963,110

Alternative No. 3; Western-Most Development

Short-Term Improvements	Area	Units	Unit Cost	Total
Auto Parking Area	6091	SQYDS	$42	$255,822
Apron Area	14822	SQYDS	$62	$918,964
Taxiway Area	1802	SQYDS	$39	$70,278
Terminal Building New	1	EA	$950,000	$950,000
Utilities	1	EA	$485,000	$485,000
Short-Term Improvements Totals				$2,680,064
Intermediate-Term Improvements	Area	Units	Unit Cost	Total
Taxiway Area	5891	SQYDS	$22	$129,602
T-Hangar	1	EA	$565,000	$565,000
Intermediate-Term Improvements Totals				$694,602
Long-Term Improvements	Area	Units	Unit Cost	Total
Apron Area	11222	SQYDS	$72	$807,984
T-Hangar	1	EA	$665,000	$665,000
Long-Term Improvements Totals				$1,472,984
Alternative No. 3 TOTALS				$4,847,650

Alternative No. 4; Adjacent Development

Short-Term Improvements	Area	Units	Unit Cost	Total
Auto Parking Area	6091	SQYDS	$42	$255,822
Apron Area	11740	SQYDS	$62	$727,880
Taxiway Area	1654	SQYDS	$39	$64,506
Terminal Building New	1	EA	$950,000	$950,000
Utilities	1	EA	$485,000	$485,000
Short-Term Improvements Totals				$2,483,208
Intermediate-Term Improvements	Area	Units	Unit Cost	Total
Taxiway Area	5891	SQYDS	$22	$129,602
T-Hangar	1	EA	$565,000	$565,000
Intermediate-Term Improvements Totals				$694,602
Long-Term Improvements	Area	Units	Unit Cost	Total
Apron Area	11399	SQYDS	$72	$820,728
T-Hangar	1	EA	$665,000	$665,000
Long-Term Improvements Totals				$1,485,728
Alternative No. 4 TOTALS				$4,663,538

Updated as of December 12, 2014

APPENDIX 2: *FAA Apron Calculation Sheet*

FREMONT
NEBRASKA PATHFINDERS

DAVIS DESIGN

BURNS McDONNELL

Apron Size Calculations for Transient Aircraft

Airport	Fremont Municipal Airport
Location	Fremont, Nebraska

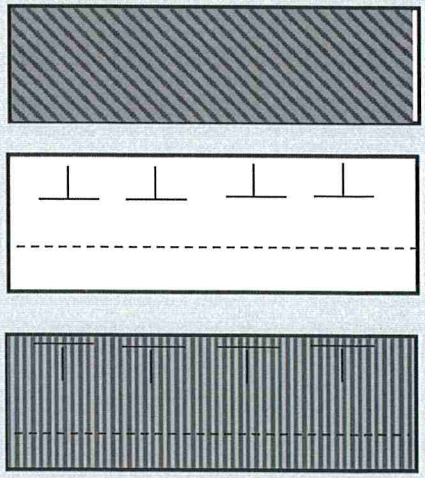
Existing Apron # square yards → 0

Calculations are based upon guidance established within Appendix 5 to AC 150/5300-13. User may calculate size of apron based upon total annual ops or user may develop an estimate of annual operations based upon number of based aircraft.

	Based Aircraft	OR	Total Annual Ops
1. Calculate the total annual operations			
Enter number of based aircraft →	60		
Enter number of operations per aircraft [1] →	372		
Total Annual Operations →	22,300		22,300
2. Busiest Month (% of Annual Ops) [2]			
Enter % of Annual Ops that occur in busiest month →	10.8		
Busiest Month Operations →	2,408		2,408
3. Busiest Day (10%>Avg Day)			
Enter Busiest Month (e.g. August) →	July		
Avg Day Busy Month →	86		86
Busiest Day 10% > avg. day →	95		95
4. # Itinerant Aircraft			
Enter % of Itinerant Operations [3] →	45		
# Itinerant Aircraft operations →	43		43
# Itinerant Aircraft Landing Operations →	21		21
Enter % of Itinerant Operations on ground →	50		
# Itinerant AC on ground (assume 50%) →	11		11
5. Apron area			
# square yards per aircraft [4] →	1385		
Apron Area (sq yds) →	14,742		14,742
6. Planned Apron (10%>)			
# square yards →	16,217		16,217

NOTES:

1. Ops/Based Aircraft:
   Small GA-250 Med GA-350 Reliever-450 Busy Reliever-750
2. 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.
3. Assume 50% of operations are itinerant if no records are available.
4. Planning areas shown assume 10' clearance between wingtips. Taxilane @ edge places taxilane on edge of apron.
5. Users requiring assistance or reasonable accommodation may contact the FAA Central Region at 816-329-2600.



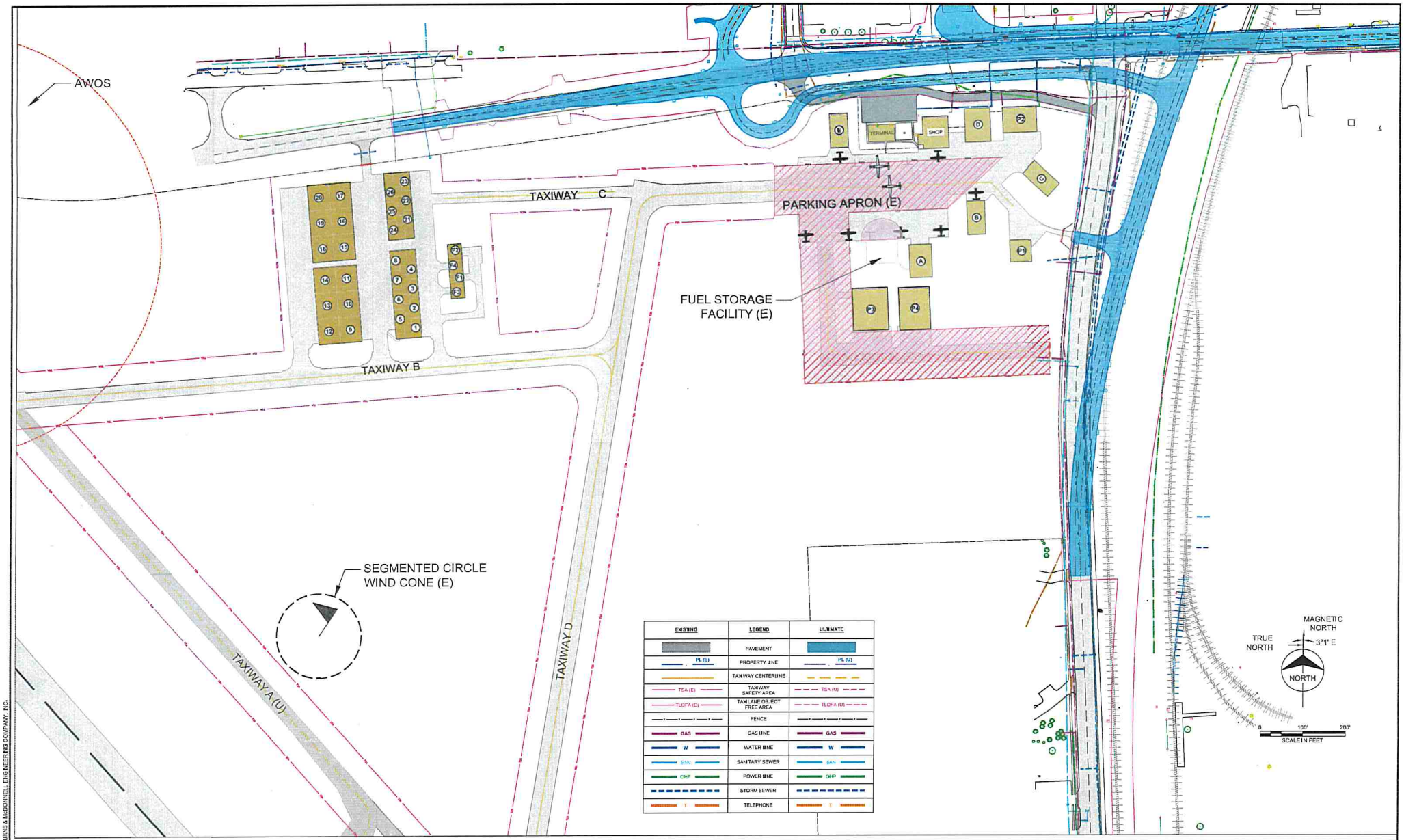
Apron Area	w/Taxilane
Group I	960
Group II	1,385

APPENDIX 3: *Proposed Alternative Layout(s)*

FREMONT
NEBRASKA PATHFINDERS

DAVIS DESIGN

BURNS McDONNELL



BURNS McDONNELL

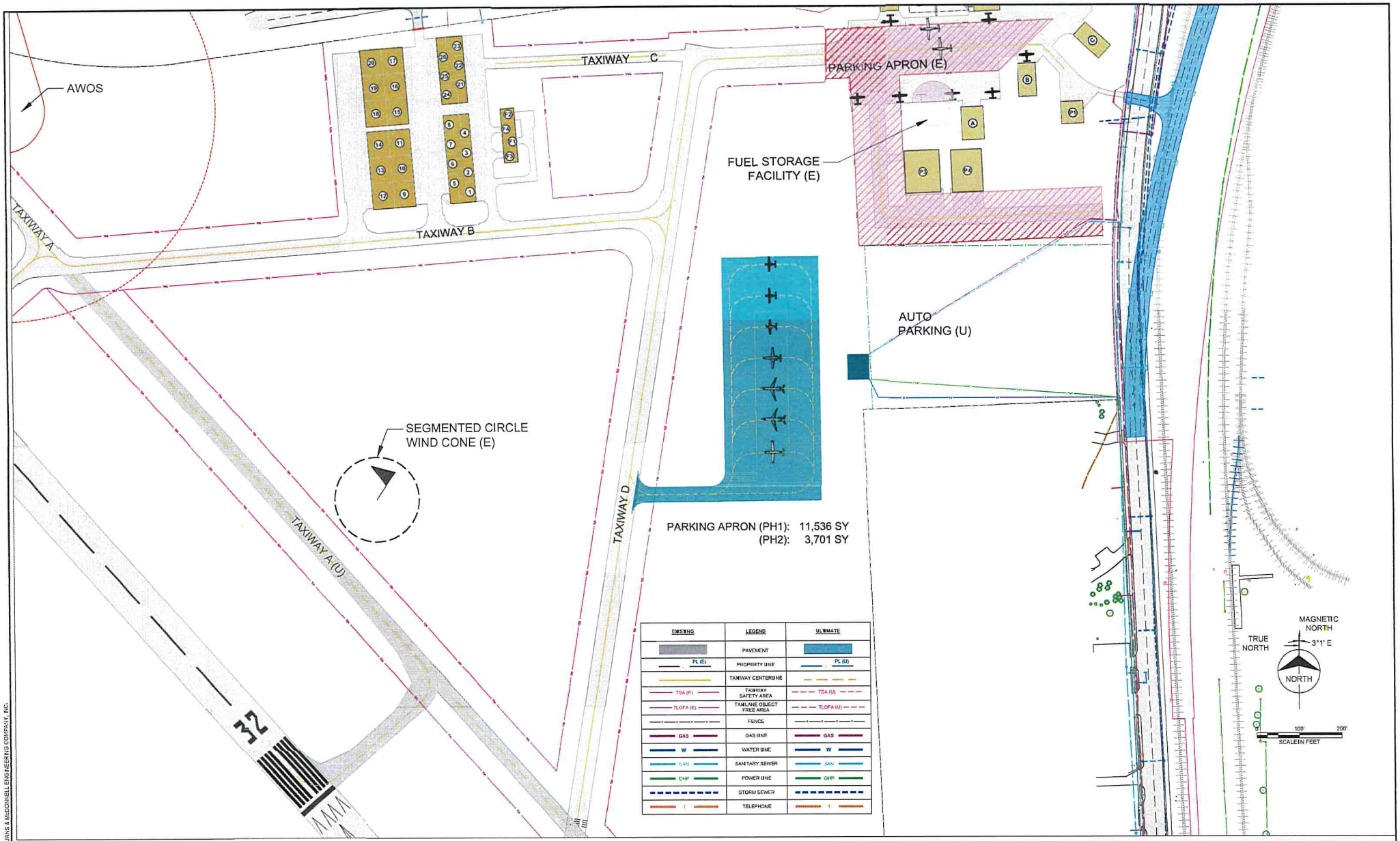
no.	revisions	date	by

ALTERNATIVE 1 - NO BUILD
FREMONT MUNICIPAL AIRPORT
FREMONT, NEBRASKA

CITY OF FREMONT
NEBRASKA PATHFINDERS

date:	AUGUST 2017
checked by:	R. CRAIN
designed by:	M. MODRELL
drawn by:	B. HEADY

Sheet 1 of 4



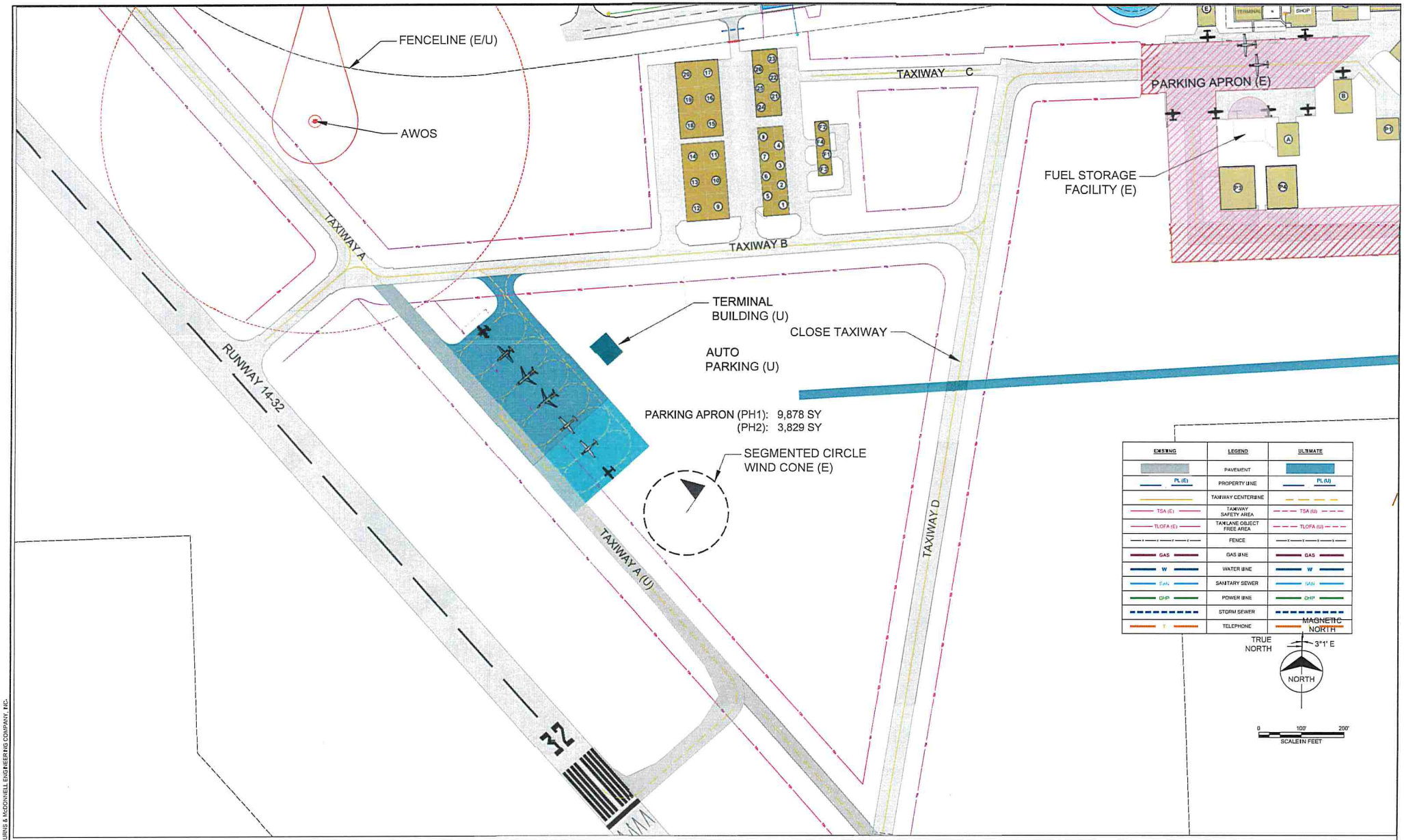
BURNS McDONNELL

no.	revisions	date	by

ALTERNATIVE 2 - EAST SIDE
FREMONT MUNICIPAL AIRPORT
FREMONT, NEBRASKA

CITY OF FREMONT
NEBRASKA PATHFINDERS

date:	AUGUST 2017
checked by:	R. CRAIN
designed by:	M. MODRELL
drawn by:	B. HEADY



BURNS McDONNELL

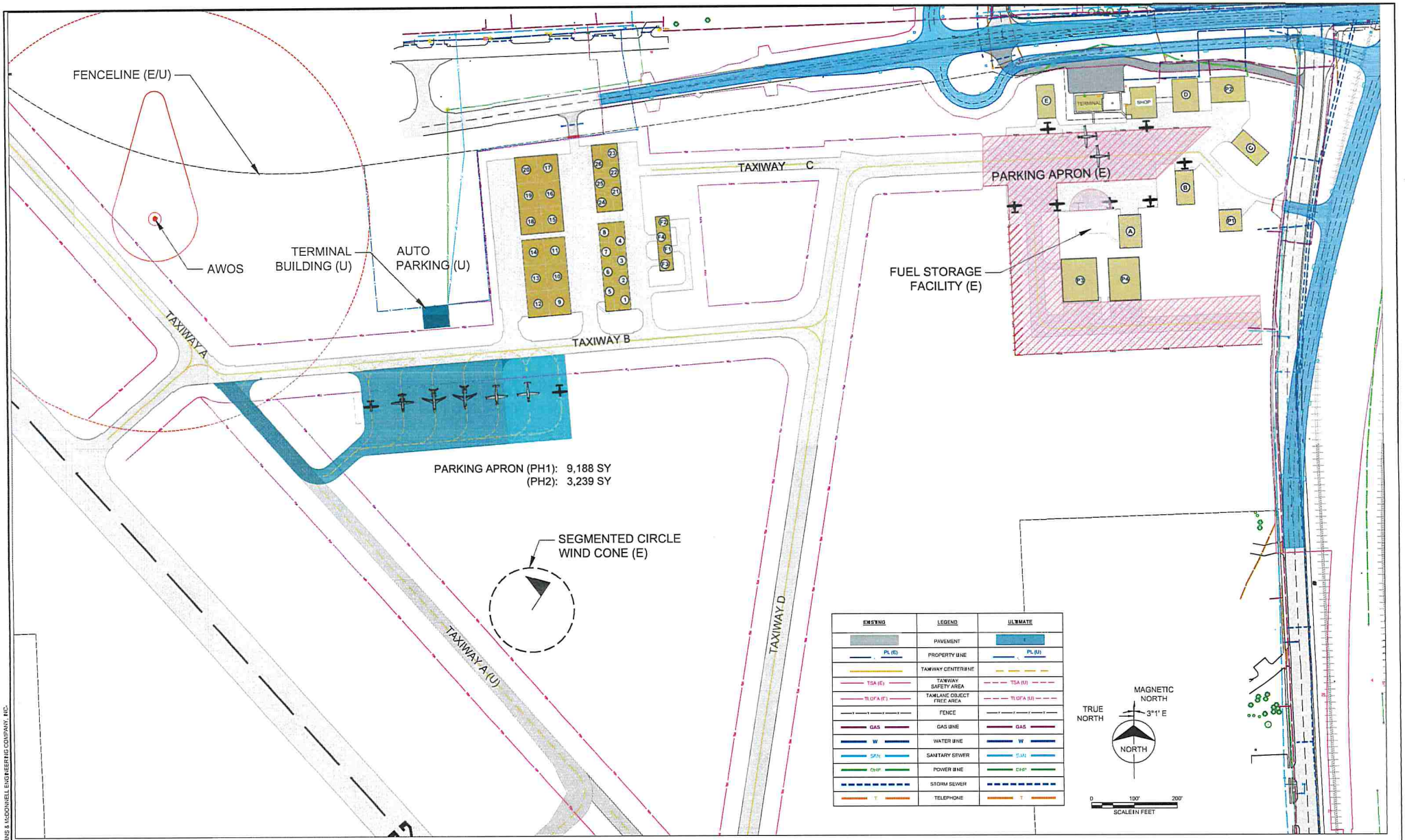
no.	revisions	date	by

ALTERNATIVE 3A - TAXIWAY A
FREMONT MUNICIPAL AIRPORT
FREMONT, NEBRASKA

CITY OF FREMONT
NEBRASKA PATHFINDERS

date:	AUGUST 2017
checked by:	R. CRAIN
designed by:	M. MODRELL
drawn by:	B. HEADY

Sheet 3 of 4



BURNS McDONNELL

no.	revisions	date	by

ALTERNATIVE 3B - TAXIWAY B
FREMONT MUNICIPAL AIRPORT
FREMONT, NEBRASKA

CITY OF FREMONT
NEBRASKA PATHFINDERS

date:	AUGUST 2017
checked by:	R. CRAIN
designed by:	M. MODRELL
drawn by:	B. HEADY

Sheet 4 of 4

FREMONT
NEBRASKA PATHFINDERS

APPENDIX 4: *Preferred Terminal Area Development*

DAVIS DESIGN

BURNS McDONNELL

FREMONT
NEBRASKA PATHFINDERS

DAVIS DESIGN

BURNS McDONNELL

2ND STREET

HANGAR ACCESS (U)

REMOVE T-HANGAR ACCESS (U)

WEST 23RD STREET

AIRPORT ACCESS AND PARKING (U)

TAXIWAY A

TERMINAL AREA TSA (E)

PARKING APRON (E)

AWOS

TERMINAL BUILIDING (U)

FUEL TRUCK SERVICING AREA

FUEL STORAGE TANKS

TAXIWAY B

TAXIWAY B (P1)

AIRCRAFT PARKING APRON (P1)

TAXIWAY D

SEGMENTED CIRCLE
WIND CONE (E)
RELOCATE (U)

EXISTING	LEGEND	ULTIMATE
	PAVEMENT	
N/A	PAVEMENT REMOVAL	
	BUILDINGS / HANGARS	
PL (E)	PROPERTY LINE	PL (U)
	TAXIWAY CENTERLINE	
TSA (E)	TAXIWAY SAFETY AREA	
TLOFA (E)	TAXILANE OBJECT FREE AREA	
X X	FENCE	X X
GAS	GAS LINE	GAS
W	WATER LINE	W
SAN	SANITARY SEWER	SAN
OHP	POWER LINE	OHP
	STORM SEWER	
T	TELEPHONE	T

TRUE NORTH MAGNETIC NORTH 3°1' E

NORTH

0 100' 200'

SCALE IN FEET

BURNS McDONNELL

no.	revisions	date	by

PHASE I DEVELOPMENT
FREMONT MUNICIPAL AIRPORT
FREMONT, NEBRASKA

CITY OF FREMONT
NEBRASKA PATHFINDERS

date:	AUGUST 2017
checked by:	R. CRAIN
designed by:	M. MODRELL
drawn by:	B. HEADY

Sheet 4 of 4

REMOVE PAVEMENT (U)

T-HANGARS (U)

PROPOSED ROAD IMPROVEMENTS (U)

BOX HANGARS (U)

REMOVE PAVEMENT (U)

TERMINAL AREA ACCESS (P1)

AWOS

AIRPORT TERMINAL BUILDING (P1)

FUEL TRUCK SERVICING AREA

FUEL STORAGE TANKS

TAXIWAY B (P1)

TAXIWAY C (U)

CORPORATE HANGARS (U)

CORPORATE HANGARS (U)

AUTO ACCESS (U)

TAXIWAY D (U)

PHASE II DEVELOPMENT

SEGMENTED CIRCLE /WIND CONE (E) RELOCATE (U)

RESERVED FOR FUTURE AERONAUTICAL USE

32

TERMINAL

SHOP

NOTES

1. THE EXISTING HANGAR ACCESS FROM WEST 23RD STREET WILL BE REMOVED UPON CONSTRUCTION OF THE PROPOSED TERMINAL ACCESS ROAD.

EXISTING	LEGEND	ULTIMATE
	PAVEMENT	
N/A	PAVEMENT REMOVAL	
	BUILDINGS / HANGARS	
PL (E)	PROPERTY LINE	PL (U)
	TAXIWAY CENTERLINE	
TSA (E)	TAXIWAY SAFETY AREA	
TLOFA (E)	TAXILANE OBJECT FREE AREA	
X X	FENCE	X X
GAS	GAS LINE	GAS
W	WATER LINE	W
SAN	SANITARY SEWER	SAN
OHP	POWER LINE	OHP
	STORM SEWER	
T	TELEPHONE	T

TRUE NORTH / MAGNETIC NORTH 3°1' E

NORTH

0 100' 200'

SCALE IN FEET

BURNS McDONNELL

no.	revisions	date	by

PREFERRED ALTERNATIVE
FREMONT MUNICIPAL AIRPORT
FREMONT, NEBRASKA

CITY OF FREMONT
NEBRASKA PATHFINDERS

date:	AUGUST 2017
checked by:	R. CRAIN
designed by:	M. MODRELL
drawn by:	B. HEADY

Sheet 4 of 4

APPENDIX 5: *Development Cost Estimates*

FREMONT
NEBRASKA PATHFINDERS

DAVIS DESIGN

BURNS McDONNELL

FEDERAL AVIATION ADMINISTRATION

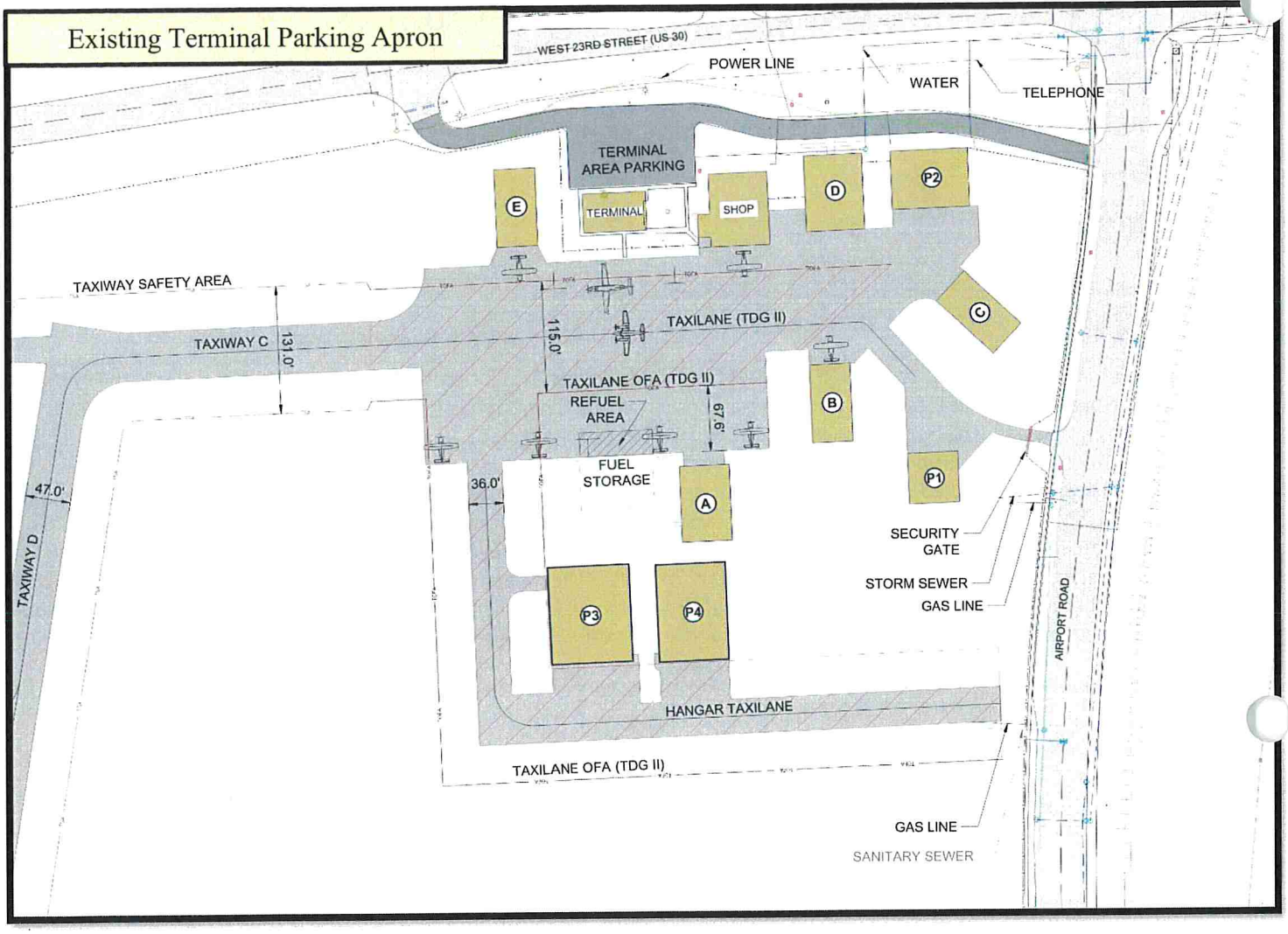
CAPITAL IMPROVEMENT PROGRAM (CIP)
AIRPORTS DIVISION - CENTRAL REGION

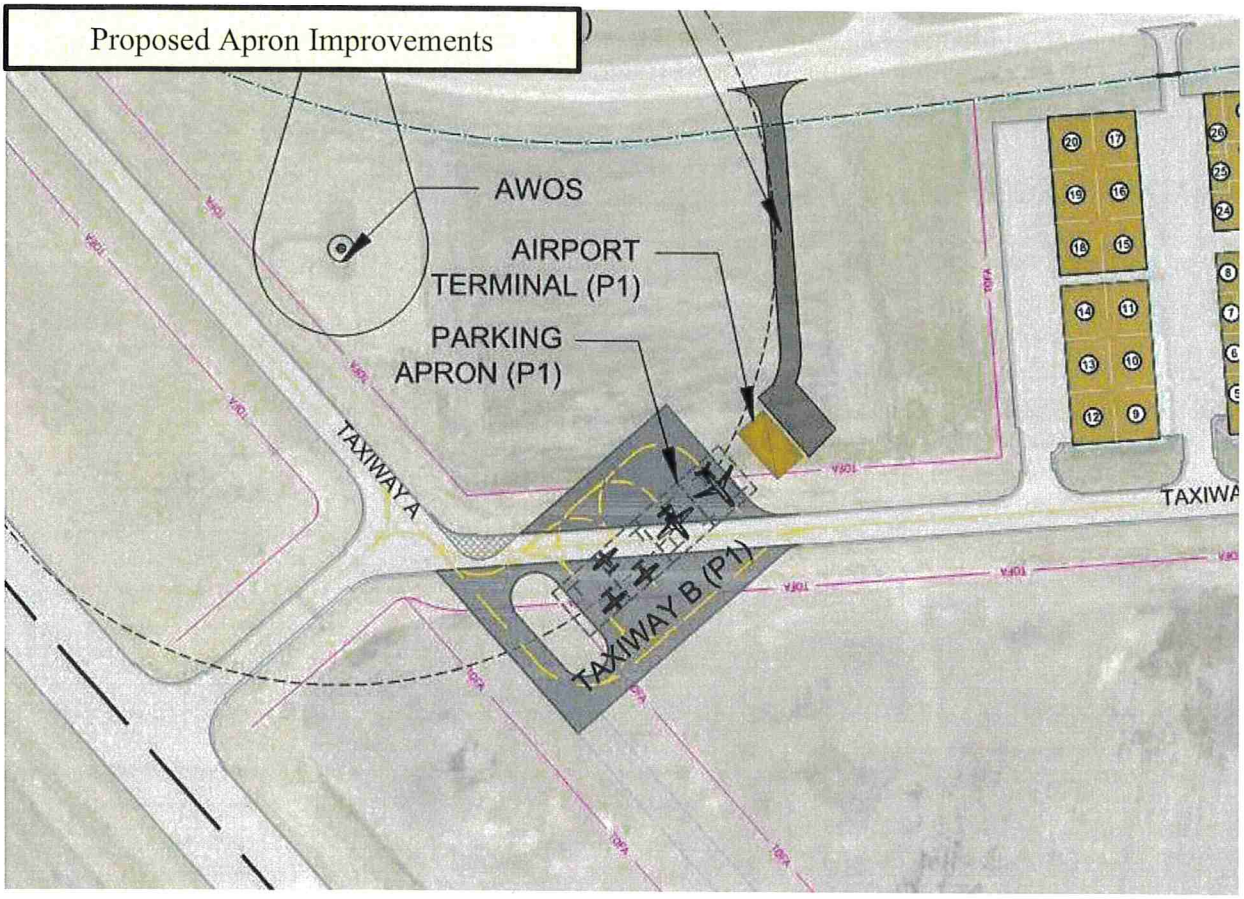
CIP DATA SHEET

SEE INSTRUCTIONS TO COMPLETE THIS INFORMATION			
Airport Name, LOCID, City, State:	Fremont Municipal Airport, Fremont, Nebraska		
AIP Project Type:	Design and Construction of Aircraft Parking Apron		
Local Priority:	1 - Very High	**Federal Share:**	**$** 893,520.00
FFY Requested:	2018	**State Share:**	$0.00
Provide Detailed Project Scope and Justification Below. You must attach a sketch/drawing that clearly identifies the scope of the project.		**Local Share:**	$99,280.00
		Total Project Cost:	**$** 992,800.00

The current aircraft parking apron taxilane OFA (TLOFA) and wingtip clearance for parked aircraft is not concurrent with FAA design standards. The parking apron is located at the northeast corner of the airport at a constrained location. The current 9,722 SY is surrounded by aircraft hangars, terminal building, and airport fuel storage system. Approximately 4,472 SY (46%) of the parking apron is utilized for the taxilane object free area, while the remaining 5,250 SY is reserved for hangar access, refueling operations, and aircraft parking. (See attached exhibit) Expansion of the existing terminal area is limited due to West 23rd Street to the north, Airport Road to the east, and hangars and the airport fuel storage system to the south. As a result of the existing constraints to development, the City of Fremont proposes the design and construction of a new aircraft parking apron that is consistent with FAA design standards. The Apron Size Calculations for Transient Aircraft revealed approximately 16,217 SY is needed to accommodate transient aircraft requirements. However, due to available local and AIP funding considerations, a 5,805 SY aircraft parking apron and taxilane is proposed to meet the immediate needs of the Sponsor. See FAA Apron Calculation Sheet (attached).

SPONSOR SIGNATURE BLOCK			
Signature:		**Date:**	12/12/2017
Printed Name:	Dave Goedeken	**Title:**	Public Works Director
Phone Number:	402-727-2639	**Email:**	Dave.Goedeken@fremontne.gov


Existing Terminal Parking Apron
WEST 23RD STREET (US 30)
POWER LINE
WATER
TELEPHONE
TERMINAL AREA PARKING
TERMINAL
SHOP
E
D
P2
C
B
A
P1
P3
P4
TAXIWAY SAFETY AREA
TAXIWAY C
131.0'
115.0'
TAXILANE (TDG II)
TAXILANE OFA (TDG II)
REFUEL AREA
67.6'
FUEL STORAGE
36.0'
47.0'
TAXIWAY D
SECURITY GATE
STORM SEWER
GAS LINE
AIRPORT ROAD
HANGAR TAXILANE
TAXILANE OFA (TDG II)
GAS LINE
SANITARY SEWER


Proposed Apron Improvements
AWOS
AIRPORT TERMINAL (P1)
PARKING APRON (P1)
TAXIWAY A
TAXIWAY B (P1)

Apron Size Calculations for Transient Aircraft

Airport	Fremont Municipal Airport
Location	Fremont, Nebraska

Existing Apron
square yards → 0

Calculations are based upon guidance established within Appendix 5 to AC 150/5300-13. User may calculate size of apron based upon total annual ops or user may develop an estimate of annual operations based upon number of based aircraft.

	Based Aircraft	OR	Total Annual Ops
1. Calculate the total annual operations			
Enter number of based aircraft →	60		
Enter number of operations per aircraft [1] →	372		
Total Annual Operations →	22,300		22,300
2. Busiest Month (% of Annual Ops) [2]			
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Busiest Month Operations →	2,408		2,408
3. Busiest Day (10%>Avg Day)			
Enter Busiest Month (e.g. August) →	July		
Avg Day Busy Month →	86		86
Busiest Day 10% > avg. day →	95		95
4. # Itinerant Aircraft			
Enter % of Itinerant Operations [3] →	45		
# Itinerant Aircraft operations →	43		43
# Itinerant Aircraft Landing Operations →	21		21
Enter % of Itinerant Operations on ground →	50		
# Itinerant AC on ground (assume 50%) →	11		11
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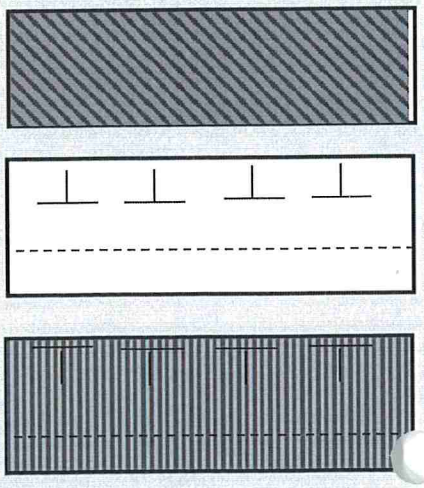
# square yards per aircraft [4] →	1385		
Apron Area (sq yds) →	14,742		14,742
6. Planned Apron (10%>)			
# square yards →	16,217		16,217

NOTES:
1. Ops/Based Aircraft:
   Small GA-250 Med GA-350 Reliever-450 Busy Reliever-750
2. 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.
3. Assume 50% of operations are itinerant if no records are available.
4. Planning areas shown assume 10' clearance between wingtips. Taxilane @ edge places taxilane on edge of apron.
5. Users requiring assistance or reasonable accommodation may contact the FAA Central Region at 816-329-2600.

Apron Area	**w/Taxilane**
Group I	**960**
Group II	**1,385**



ENGINEER'S ESTIMATED COST OF CONSTRUCTION
FREMONT MUNICIPAL AIRPORT
FREMONT, NEBRASKA
AICRAFT PARKING APRON - PREFERRED ALTERNATIVE
PROJECT NO. 97631
BURNS & MCDONNELL
July 19, 2017

Item No.	Description of Work	Units	Estimated Quantity	Total Project Cost		AIP Eligible Cost	Sponsor Cost
				Unit Cost	Total	Total	Total
1	MOBILIZATION	LS	1	$81,392.50	$81,392.50	$73,253.25	$8,139.25
2	FULL DEPTH PAVEMENT REMOVAL (6" +/- PCC)	SY	10	$12.00	$120.00	$108.00	$12.00
3	FULL DEPTH SAW CUT	LF	720	$4.75	$3,420.00	$3,078.00	$342.00
4	TRAFFIC CONTROL	LS	1	$30,000.00	$30,000.00	$27,000.00	$3,000.00
5	STABILIZED CONSTRUCTION ENTRANCE	EA	2	$6,500.00	$13,000.00	$11,700.00	$1,300.00
6	INSTALLATION AND REMOVAL OF SILT FENCE	LF	1,300	$4.00	$5,200.00	$4,680.00	$520.00
7	SEDIMENT REMOVAL	CY	100	$35.00	$3,500.00	$3,150.00	$350.00
8	CLASS A EXCAVATION	CY	1,000	$20.00	$20,000.00	$18,000.00	$2,000.00
9	SOFT SUBGRADE REMEDIATION (12" DEEP)	TON	890	$20.00	$17,800.00	$16,020.00	$1,780.00
10	FLY ASH TREATED SUBGRADE (12")	SY	5,805	$8.50	$49,342.50	$44,408.25	$4,934.25
11	FLY ASH	TON	300	$80.00	$24,000.00	$21,600.00	$2,400.00
12	CRUSHED ROCK AGGREGATE BASE COURSE (6")	SY	5,805	$12.00	$69,660.00	$62,694.00	$6,966.00
13	PORTLAND CEMENT CONCRETE PAVEMENT (6")	SY	5,805	$48.00	$278,640.00	$250,776.00	$27,864.00
14	REFLECTORIZED PAVEMENT MARKING (YELLOW)	SF	1,470	$4.00	$5,880.00	$5,292.00	$588.00
15	NON-REFLECTORIZED PAVEMENT MARKING (BLACK)	SF	2,790	$3.00	$8,370.00	$7,533.00	$837.00
16	24" REINFORCED CONCRETE PIPE, CLASS IV	LF	80	$60.00	$4,800.00	$4,320.00	$480.00
17	24" REINFORCED CONCRETE PIPE, FLARED END SECTION	EA	2	$1,600.00	$3,200.00	$2,880.00	$320.00
18	4 INCH SMOOTH-WALL PERFORATED PVC UNDERDRAIN PIPE	LF	2,200	$20.00	$44,000.00	$39,600.00	$4,400.00
19	4 INCH NON-PERFORATED PE UNDERDRAIN OUTLET PIPE	LF	700	$16.00	$11,200.00	$10,080.00	$1,120.00
20	UNDERDRAIN CONCRETE SPLASH PAD	EA	4	$800.00	$3,200.00	$2,880.00	$320.00
21	UNDERDRAIN CLEANOUT	EA	4	$1,000.00	$4,000.00	$3,600.00	$400.00
22	AIRPORT SEEDING	AC	5	$1,200.00	$6,000.00	$5,400.00	$600.00
23	SODDING	SY	300	$14.00	$4,200.00	$3,780.00	$420.00
24	TOPSOILING	CY	2,000	$12.00	$24,000.00	$21,600.00	$2,400.00
25	AIRPORT MULCHING	AC	4	$1,200.00	$4,800.00	$4,320.00	$480.00
26	TRENCH, DUCT OR CONDUIT	LF	1,200	$2.00	$2,400.00	$2,160.00	$240.00
27	INCLUDING GROUND RODS AND GROUND CONNECTORS	LF	600	$1.75	$1,050.00	$945.00	$105.00
28	SINGLE-WAY 2" ELECTRICAL DUCT, DIRECT BURIED	LF	600	$12.00	$7,200.00	$6,480.00	$720.00
29	PAVEMENT	LF	65	$35.00	$2,275.00	$2,047.50	$227.50
30	ENCASE EXISTING CONDUIT IN CONRETE	LF	400	$65.00	$26,000.00	$23,400.00	$2,600.00
31	NEW ELEVATED TAXIWAY EDGE LIGHT, STAKE MOUNTED	EA	16	$750.00	$12,000.00	$10,800.00	$1,200.00
32	NEW TAXIWAY GUIDANCE SIGN, INSTALLED, LIGHTED	EA	4	$7,500.00	$30,000.00	$27,000.00	$3,000.00
	Total Estimated Construction Cost of Base Bid				**$800,650.00**	**$720,585.00**	**$80,065.00**
	Estimated Design & Administration Cost				**$192,156.00**	**$172,940.40**	**$19,215.60**
	Total Cost				**$992,806.00**	**$893,525.40**	**$99,280.60**