FORT MORGAN MUNICIPAL AIRPORT

MASTER PLAN

Final Report
July 2018

RS&H

FORT MORGAN
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CHAPTER 1

INVENTORY OF EXISTING CONDITIONS

The Fort Morgan Municipal Airport has undergone substantial development since the last update to the Airport's Master Plan and Airport Layout Plan. The Airport Layout Plan was last comprehensively updated in 2003. That document included a narrative description, which included a forecast and an overview of facility requirements. Prior to that Airport Layout Plan, a master plan update was completed in 1992. Since the completion of the 2003 Airport Layout Plan, the Airport has seen development and growth of taxilane infrastructure and hangars. Additionally, between 2014 and 2015 the primary runway was replaced. Part of the focus of this master plan update is to determine the impacts and forecast future demand generated by the upgrade of the Airport's facilities.

1.1 INTRODUCTION

The Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5070-6B Change 2, Airport Master Plans, outlines the necessary steps in the development of an airport master plan. The initial step in documenting the master planning process is the identification of existing conditions at an airport. This involves the collection of data pertinent to an airport and the area it serves. The objective of the existing condition task for the Fort Morgan Municipal Airport is to provide background information for subsequent phases of analysis. In addition, a survey of tenants' facilities and plans was conducted during on-site and phone interviews. A glossary of terms used throughout this master plan is provided in **Appendix A, Glossary**.

The development of a master plan for Fort Morgan Municipal Airport (also referred to as FMM or Airport in this document) requires the collection and evaluation of data relating to the Airport and the surrounding area. This information was obtained through onsite investigations at the Airport, interviews with airport management and airport users/stakeholders, and a collection and analysis of previous reports and studies.

This master plan will replace the *2003 Airport Layout Plan Narrative*, and the previous master plan conducted in 1992.

1.2 AIRPORT BACKGROUND

Since the early 1930s the City of Fort Morgan has always had an aviation presence. Fort Morgan Municipal Airport was founded in 1933. In 1943, the Airport's primary purpose was a training school for gliders that produced trained pilots for the United States military. As the city developed and became an agriculturally based community, crop spraying and dusting businesses became the primary users of the Airport. The Airport also serves the community by providing a facility for life flights which expedite transport of critical medical patients to metropolitan hospitals.

Today, the Airport serves the needs of both the general aviation users and those involved in the businesses of agricultural. The Airport is publicly owned and managed by the City of Fort Morgan. An Airport Advisory Board is in place to advise and make recommendations to City staff and the City Manager of Fort Morgan. The board is made up of a total of seven members, each of which serve three-year terms. Five out of the seven members must live within the city limits of Fort Morgan, while two may

live outside of Fort Morgan, but within Morgan County. The Fort Morgan Director of Engineering and Public Works (who is the acting Airport Manager) and City Manager serve on the board as technical non-voting advisers. The overall objective of the Advisory Board is to recommend to the City Manager on subjects pertaining to long-range planning, capital improvements, operations, maintenance, and other policies meant to improve the operations of the Airport.[1]

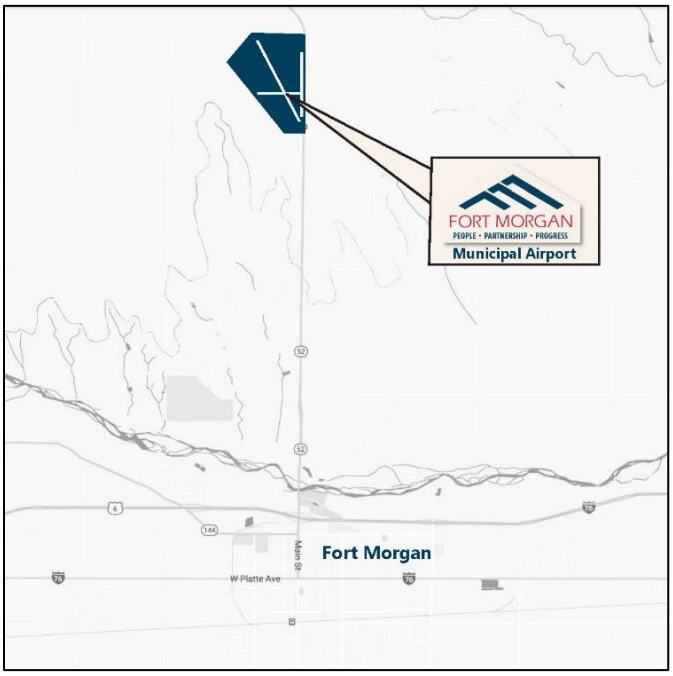
1.2.1 Setting

Fort Morgan Municipal Airport is located in the north-eastern plains of Colorado, as shown on the location map in **Figure 1-1.** The Airport sits within Morgan County which is approximately 75 miles north east of Denver, Colorado. As shown in the vicinity map, the Airport sits outside of the City of Fort Morgan, five miles to the north directly off of State Highway 52.

FIGURE 1-1
LOCATION AND VICINITY MAPS

LOCATION MAP

VICINITY MAP



Prepared By: RS&H, 2016

1.2.2 Airport Role

The Airport is part of the National Plan of Integrated Airport Systems (NPIAS). The NPIAS has identified over 3,000 publicly owned airports that play a significant role in the national air transportation system. The latest NPIAS report has classified the Airport as a local general aviation airport. This classification is defined as an airport that supplements communities by providing access to primarily intrastate and some interstate markets. Airports of this type of classification have greater than 10 instrument operations in a year and more than 15 based aircraft. The state of Colorado has three categories to define each of the 74

[1] Fort Morgan Municipal Airport Advisory Board – Bylaws, January 5th, 2016

public-use airports in the Colorado Airport System. These are major airports, intermediate airports, and minor airports. FMM is currently categorized as an intermediate airport.

In the eastern plains of Colorado, airports within 30 to 90 minute drive time can influence aviation demand at FMM. Public airports within that range of FMM were identified in effort to benchmark services and compare facility infrastructure with FMM. The airports selected that are similar to FMM include Colorado Plains Regional Airport and Sterling Municipal Airport. The airports selected that are larger facilities than FMM include Front Range Airport and Greeley-Weld County Airport. An overview of the types of facilities offered at these four airports are listed in **Table 1-1**.

TABLE 1-1
AIRPORT COMPARISON

	Fort Morgan Municipal Airport	Colorado Plains Regional Airport	Front Range Airport	Greeley-Weld County Airport	Sterling Municipal Airport
Airport Identifier	FMM	AKO	FTG	GXY	STK
Airport Characterisitcs					
NPIAS Role	GA-Local	GA-Basic	GA - Regional	GA - Regional	GA - Local
CDOT Classification	Intermediate	Major General Aviation	Major General Aviation	Major General Aviation	Intermindate
Location from FMM	N/A	28NM East	47NM Southwest	38NM West	30NM NE
Annual Operations	10,000	17,080	44,520	122,500	2,165
Based Aircraft	32	13	277	204	31
Air Traffic Control Tower	No	No	Yes	No	No
Primary Runway Characteristics	**14/32**	**11/29**	**08/26**	**17/35**	**15/33**
Length	5,731'	7,001'	8,000'	10,000'	5,201'
Width	75'	100'	100'	100'	75'
Edge Lighting	MIRL	MIRL	HIRL	MIRL	MIRL
Visual Glide Slope Indicator	2-Light PAPI	2-Light PAPI	2-Light PAPI	2-Light PAPI	2-Light PAPI
Instrument Approach (Visibility Minimums)	RNAV (1 Mile)	GPS (1-Mile)	ILS (1/2-Mile)	ILS (3/4-Mile)	RNAV (3/4-Mile)
Services					
Fuel Types	100LL/Jet A	100LL/Jet A1	100LL/Jet A	100LL/Jet A1	100LL/Jet A
Airframe/Power Plant Repair	N/A	Major	Major	Major	N/A
Part 139 ARFF	N/A	N/A	N/A	N/A	N/A
Based Flight Training	Yes	No	Yes	Yes	No

Source: Airport Records, FAA 5010, Airnav.com,2016

1.2.3 Airport Management

The Airport is owned by the City of Fort Morgan, and the City provides general oversite and management of the facilities. All development, lease agreements, and strategic decisions are managed by the City of Fort Morgan staff. Day-to-day operations are carried out by Scott Aviation under a contract to provide FBO services and conduct general maintenance and upkeep, including mowing and snow removal. In this structure, the city oversees and is involved with all on-airport construction projects, and provides maintenance on airport equipment that is beyond the capability of Scott Aviation. Scott Aviation manages fuel distribution, the airport owned FBO and hangar, and maintains the airport and grounds.

1.2.4 Financial Data

As an airport that is part of the FAA NPIAS, FMM is eligible for and receives FAA grant funds including $150,000 of entitlement funding per year. The Airport has historically received entitlement, and at times

discretionary grant funding from FAA. **Table 1-2** lists the total AIP grant receipts since 2005. As shown in the table, some projects were funded in multiple consecutive years, such as the 2012-2014 Runway 14/32 project. Other projects only require one single year investment. In instances where projects required discretionary funding from FAA, such as the new runway project, discretionary funding levels are typically reduced the following years so that FAA can balance funding allocation to all airports in the region.

TABLE 1-2
AIP GRANTS

Year	Total AIP	City Description of Work
2007	$540,354	Acquire Land For Approaches
2010	$217,094	Conduct Environmental Study
2012	$458,295	Design for Runway - 14/32
2014	$6,395,927	Construct Runway - 14/32
2016	$150,000	Conduct Airport Master Plan Study

Source: Federal Aviation Administration, City of Fort Morgan, 2017

As shown in **Table 1-3**, the City of Fort Morgan has allocated roughly $84,000 towards the Airport's 2016 Operating Budget, and $95,000 for 2017. The largest component of the budget is related to department operations expenses, with the second largest item being maintenance expenses. Department operations expenses are those related to the contracted company, currently Scott Aviation, which operates the FBO and provides light airport maintenance services. The Airport does not have an expense for an airport manager, as the City's Engineering and Public Works Director currently fills this role. That salary is paid through a different budget than the Airport Operating Budget. The operating budget for the airport is part of the City of Fort Morgan's general fund, which is not typical as most airports operate from an enterprise fund to more easily comply with FAA grant assurances.

TABLE 1-3
AIRPORT OPERATING BUDGET

Account Type	2015 Actual Budget	2016 Budget	2017 Budget
Advertising	$0.00	$500.00	$500.00
Department Operations	$24,000.00	$30,000.00	$30,000.00
Utilities	$8,350.56	$12,000.00	$12,000.00
Fuel, Oil, Miscellaneous, Supplies	$768.96	$1,600.00	$1,800.00
Maintenance (Equipment and Property)	$17,342.01	$25,000.00	$25,000.00
Insurance	$12,938.02	$13,153.00	$13,671.00
Training and Dues	$780.00	$1,300.00	$2,050.00
Engineering/Consulting	$0.00	$0.00	$10,000.00
Total	**$64,179.55**	**$83,553.00**	**$95,021.00**

Source: City of Fort Morgan, 2017

1.2.4.1 Grant Assurances

The FAA-administered financial assistance that FMM receives has specific obligations, or grant assurances, that the City of Fort Morgan is required to adhere to. There are 39 grant assurances, each specific to items that the airport owner must comply with. These are outlined within FAA Order 5190.6B, *Airport Compliance Manual*. **Table 1-4** details the 39 grant assurances and notes what general category each is typically associated with. As part of this master plan, specific items will be addressed in relation to these FAA grant assurances, such as examining protections in place to protect the airport's airspace, planning for compatible land use, updating the airport layout plan, and making recommendations to help FMM ensure compliance.

1.2.5 Metrological Conditions

A review of the prevailing meteorological conditions is necessary to assist in the evaluation of aircraft performance characteristics. Temperature, precipitation, winds, visibility, and cloud ceiling heights are elements used to analyze an area's climate for airport planning purposes.

Fort Morgan sits on the plains of north eastern Colorado, which has a moderately dry climate. Typically, Fort Morgan will receive around 15 inches of annual precipitation. Average highs can range from the 80s to 90s during the summer months. July is the hottest month with an average temperature of 89 degrees Fahrenheit. The cooler months normally have highs in the 30s and 40s and lows in the teens and 20s. The airport experiences an average snowfall of 24 inches per year, with December and January contributing to the largest portion of annual snow totals.

TABLE 1-4
AIP GRANT ASSURANCES

Assurance Number	Title/Description	General / Miscellaneous	Airport Management	Airport Operations	Planning	Construction
1	General Federal Requirements	✓				
2	Responsibility and Authority of the Sponsor		✓			
3	Sponsor Fund Availability	✓				
4	Good Title	✓				
5	Preserving Rights and Powers		✓			
6	Consistency with Local Plans				✓	✓
7	Consideration of Local Interest				✓	✓
8	Consultation with Users				✓	✓
9	Public Hearings				✓	✓
10	Metropolitan Planning Organization				✓	✓
11	Pavement Preventive Maintenance			✓		
12	Terminal Development Prerequisites	✓				
13	Accounting System, Audit, and Record Keeping Requirements				✓	✓
14	Minimum Wage Rates					✓
15	Veteran's Preference					✓
16	Conformity to Plans and Specifications					✓
17	Construction Inspection and Approval					✓
18	Planning Projects				✓	
19	Operation and Maintenance			✓		
20	Hazard Removal and Mitigation			✓		
21	Compatible Land Use		✓			
22	Economic Nondiscrimination		✓			
23	Exclusive Rights		✓			
24	Fee and Rental Structure		✓			
25	Airport Revenues		✓			
26	Reports and Inspections		✓			
27	Use by Government Aircraft			✓		
28	Land for Federal Facilities	✓				
29	Airport Layout Plan				✓	✓
30	Civil Rights				✓	✓
31	Disposal of Land	✓				
32	Engineering and Design Services				✓	
33	Foreign Market Restrictions				✓	
34	Policies, Standards, and Specifications		✓	✓	✓	✓
35	Relocation and Real Property Acquisition	✓				
36	Access by Intercity Buses	✓				
37	Disadvantaged Business Enterprises	✓			✓	✓
38	Hangar Construction		✓			
39	Competitive Access		✓			

Source: Federal Aviation Administration, www.faa.gov/airports/airport_compliance/overview, 2016

1.3 AIRFIELD FACILITIES AND CONDITIONS

The Airport's airfield facilities include three runways, six taxiways, four taxilanes, and an aircraft parking apron. Additionally, the airport facilities include navigational aids which support flight procedures. These facilities are detailed below, and are illustrated in **Figure 1-2.**

1.3.1 Runways

FMM has three runways: one paved asphalt runway, and two turf runways. Runway 14/32 serves as the primary runway and is the sole paved runway. This runway is the only runway that serves users flying instrument approaches. In 2015, the primary runway was fully rebuilt. The new runway, 5,730 feet in length, is 510 feet longer than the previous runway and includes medium intensity edge lighting.

Runway 8/26 is a turf/dirt crosswind runway for small aircraft. This runway is in very poor condition, and is considered unusable today. Pilots have noted the severity of the bumpiness which could lead to damage to their aircraft. Runway 17/35 is also a turf runway. This runway is currently in good condition. **Table 1-5** summarizes the runway characteristics for all three of the runways.

TABLE 1-5
RUNWAY CHARACTERISTICS

Runway Characterisitcs	14/32	17/35	8/26
Orientation	SE-NW	S-N	E-W
Length	5,730'	5,214'	2,470'
Width	75'	40'	100'
Aircraft Appraoch Category (AAC)	B	B	B
Design Group	II	I (small*)	I (small*)
Pavement Surface	Asphalt	Turf/Dirt	Turf
Weight Capacity	SW: 30,000lbs	N/A	N/A
	DW: 30,000lbs	N/A	N/A
Runway Markings	Nonprecision	N/A	N/A
Approach Type	Nonprecision	N/A	N/A
Visibility Miniums	1 mile	Visual	Visual

*Small is defined as an aircraft with a maximum certificated takoff weight of 12,500lbs or less.

Source: FAA 5010, Airport Records, 2017

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Airport Facilities

1. Paved Runway
2. Turf Runway
3. Turf/Dirt Runway
4. Taxiway A
5. Segmented Circle/Wind Cone
6. City Hangar
7. FBO Building
8. Fuel Facility
9. Chemical Loading Pad
10. Rotating Beacon/ Electrical Vault

SOURCE: RS&H, 2017

FIGURE 1-2
AIRPORT FACILITIES

1.3.2 Taxiways and Taxilanes

The Airport has a total of six paved taxiways. All are new as of 2015 and were built along with the construction of the new runway. Taxiway A serves as a transition between the apron and the two by-pass taxiways on the approach end of Runway 32. Taxiway A1 and A2 serve as by-pass taxiways that allow users to perform run-up operations, turn around if needed, and bypass aircraft not yet ready to depart. Taxiway A3 and A4 are located on the approach end of Runway 14 and serve as turn-around taxiways, allowing users to turn around and reverse direction on the runway. All taxiways are equipped with medium intensity edge lighting.

A series of taxilanes lead from the aircraft apron to the hangar area. These taxilanes range in condition, with the western-most portion being relatively new and in good condition. Additionally, a taxiway extends east off of the main apron toward the threshold of Runway 35. That taxiway is a remnant of the taxiway connector to the old Runway 14-32, and is not currently labeled nor complete. For the purpose of this report, it is designated as Runway 35 Access taxiway.

A summary of the taxiway and taxilane system is detailed in **Table 1-6.**

TABLE 1-6
TAXIWAY CHARACTERISTICS

Taxiway/Taxilane Designator	Taxiway Design Group (TDG)	Width	Type
Taxiways			
"A"	2	35'	Transitional Taxiway
"A1"	2	35'	By-Pass Taxiway
"A2"	2	35'	By-Pass Taxiway
"A3"	2	35'	Turn-Around Taxiway
"A4"	2	35'	Turn-Around Taxiway
Runway 35 Access	2	35'	Transitional Taxiway
Taxilanes			
"T1"	1A/1B	25'	Taxilane
"T2"	1A/1B	25'	Taxilane
"T3"	1A/1B	25'	Taxilane
"T4"	1A/1B	25'	Taxilane
"T5"	1A/1B	25'	Taxilane
"T6"	1A/1B	25'	Taxilane

Source: RS&H Analysis, 2017

1.3.3 Navigational Aids and Lighting

Navigational aids and lighting, often referred to as NAVAIDS include visual aids, electronic aids, and meteorological aids. FMM features all three types of aids which are detailed below.

1.3.3.1 Visual Aids

Visual aids and airfield lighting are necessary to facilitate flight operations and enhance safety during periods of inclement weather and/or darkness by providing guidance to pilots in the air and on the ground. Visual aids at the airport include medium intensity runway lighting, a rotating beacon, visual slope indicators, approach lighting, a segmented circle with a lighted wind cone, and a lighted wind tree adjacent to the hangar area. Additionally, there is a supplementary wind cone on top of the city hangar.

The Airport also has four cameras that can be viewed on http://www.airportview.net. These cameras allow pilots and/or flight schedulers to examine real time conditions of the airfield.

1.3.3.2 Electronic Aids

Electronic aids include devices and equipment used for aircraft instrument approaches. Runway 14 and Runway 32 have a designated Area Navigation (RNAV) Global Positioning System (GPS) approach. This type of approach allows pilots to fly into the runway in lower visibilities compared to the non-directional beacon (NDB) approaches or visual approaches. RNAV GPS approaches provide pilots horizontal guidance as they make the approach into a runway.

1.3.3.3 Metrological Aids

Metrological aids at the airport include an Automated Weather Observation Station (AWOS), installed in 2012, which provides users real-time weather information. The AWOS installed is a type-III P/T. The system provides barometric pressure, wind speed and direction, visibility, temperature, dew point, density altitude, and cloud ceiling information.

A list of the navigational aids located at the Airport are detailed in **Table 1-7.**

TABLE 1-7
NAVIGATIONAL AIDS

Navigational Aids	Airport Facility	Primary Runway		Turf Runway		Turf Cross Wind Runway	
		14	32	17	35	8	26
Electronic Aids (Approaches)							
RNAV (GPS)	-	Yes	Yes	No	No	No	No
Metrological Aids							
AWOS	Type-3 P/T	-	-	-	-	-	-
Visual Aids							
Edge Light System	-	MIRL	MIRL	-	-	-	-
Approach Lighting	-	REIL	REIL	-	-	-	-
Visual Slope Indicator	-	PAPI	PAPI	-	-	-	-
Segmented Circle with Windcone	Yes						
Rotating Beacon	Yes	-	-	-	-	-	-

Source: FAA 5010, Airnav.com,2016

1.3.4 Airspace

Airspace is categorized as controlled airspace or uncontrolled airspace. Controlled airspace is airspace in which aircraft movements are directed by air traffic control. FMM sits in uncontrolled airspace as the airport does not have an air traffic control tower. Pilots communicate amongst each other on a common traffic advisory frequency (CTAF) in order to maintain a safe flying environment. As noted on the sectional chart in **Figure 1-3**, there are parachute operations that occur within a five mile radius of the airport. The parachute activity was related to a recreational parachute company previously operating at FMM which has since closed. Also within a five mile radius, manufacturing plant stacks are located to the south, the highest being 260 feet above ground level (AGL). There are no special use or military operation area airspaces within the immediate vicinity of the airport.

FIGURE 1-3
SECTIONAL CHART

1.4 SUPPORT FACILITIES

This section describes the location and condition of various support facilities important to the overall operation of the Airport. These facilities include hangars, aircraft tie-downs and parking positions, fixed based operators, fuel facilities, and utilities.

1.4.1 Hangars and Apron

Hangars and aprons provide users with the option to either park and/or store their aircraft on an airport. The Airport has one apron used to park aircraft. This apron is approximately 8,200 square yards, stretching from the FBO building located to the south, to Taxiway A to the north. On the apron there are 13 tie-downs. Eleven tie-downs are located on the east edge of the apron, while the remaining two are located to the west, abeam the adjacent T-Hangars. The tie-downs are not spaced adequately for side-by-side aircraft of the same wing type. To maximize tie-down space utilization, low-wing and high-wing aircraft must be placed in an alternating formation.

There are three T-Hangar units, making a total of 15 hangars. Two of the units are oriented east to west while the third is oriented north to south. The airport has nine box hangars, eight of which are located off the east/west taxilane. The ninth box hangar has been recently constructed on the eastern north/south taxilane. A summary of tie-down and hangar totals is detailed in **Table 1-8.**

TABLE 1-8
HANGARS AND TIE-DOWNS

Aircraft Storage	Totals
Tie-Downs	13
T-Hangars	15
Box Hangars	9

Source: Airport Records, 2016

1.4.2 FBO and FBO Services

The Airport is served by one Fixed Based Operator (FBO), Scott Aviation. Scott Aviation provides fueling services and manages the FBO. The FBO is based in the Airport-owned building which offers guests a conference room and a pilot lounge. Scott Aviation also provides services such as seed treating, aerial applications and aerial firefighting. The FBO owns one Cessna 172 that is used for flight instruction. Here students can learn how to fly to meet the necessary requirements for obtaining their private pilot's license. Scott Aviation is the sole fuel provider at the Airport and maintains both self-serve 100LL and Jet A facilities, and provides full service Jet A.

1.4.2.1 Airport Equipment

The City of Fort Morgan provides equipment to be used to maintain the Airport, however, it is operated by FBO personnel. In total the airport owns five vehicles; a tractor, payloader, runway sweeper and two courtesy vehicles. The runway sweeper and payloader are stored on the west side of the City Hangar. The tractor is a multi-functional piece of machinery and can assist in snow removal, mowing, and general field maintenance. All equipment is stored outdoors. A list of owned equipment along with their condition is shown in **Table 1-9**.

TABLE 1-9
AIRPORT EQUIPMENT LIST

Equipment	Condition
Kubota Tractor	Good
2,200 Gallon Fuel Truck*	Good
V-Plow Blade - Kubota Attachment	Good
Power Broom - Kubota Attachment	Good
Bucket - Kubota Attachment	Good
15-Foot Batwing Mower - Kubota Attachment	Good
8-Foot Snow Blower - Kubota Attachment	Good
Case 30 - Payloader	Fair
Two Plow Blades - Case 30 Attachment	Good
Oshkosh Runway Sweeper	Good
Chevy Tahoe	Fair
MTST Series V sweeper/mower	Good
Astro Van	Fair

Source: Airport Records, 2017
Notes: * Owned by Scott Aviation

1.4.3 Vehicle Parking

The airport has a small paved parking area located on the north side of the FBO building. The area is currently unstripped, but can fit roughly 8 to 12 vehicles. There are no parking spaces dedicated for hangar users. For those accessing their hangars, parking options currently include parking inside their hangar or parking at the FBO and walking to their hangar.

1.4.4 Fuel Storage

FMM has a centralized fuel storage facility located approximately 150 feet east of the FBO building, south of the main apron. Fuel storage includes two 10,000 gallon tanks, one containing 100LL and the other Jet A. From these tanks there are two self-service fuel pumps that pilots can use to fuel their aircraft. Additionally, there is one 2,200 gallon fuel truck that is used for Jet A.

1.4.5 Utilities

The Airport is served by multiple utility companies. Morgan County Rural Electric Association provides the airport with electricity. The main electrical utility is brought into the airport via a main line on Highway 52. From Highway 52, the line runs adjacent to the south side of the airport access road to a junction box located adjacent the FBO building. The line continues into the hangar area on the east side of the eastern-most t-hangar. From there the line proceeds to the rear of the box hangars. The electrical line accessing the airport is two inches diameter and is buried in the ground incased in PVC conduit, and currently all connections to hangars are each on their own transformer.

Morgan County Quality Water District is the sole provider of water to the Airport. Currently a ¾ inch and a 2 inch line serve the airport, both of which are on different water meters. The ¾ inch line serves the city building and provides water for the public restrooms. The 2 inch line serves the agriculture chemical mixing pad currently owned by Scott Aviation.

There is no gas utility that serves the Airport. Buildings requiring heat use propane tanks for fuel storage. These tanks are typically placed to the back of the building they are serving. The airport also has no fiber infrastructure, but telephone lines exist to the FBO terminal. All internet and VoIP communication is served through satellite based providers. Finally, there is no sewerage at the Airport. Currently, any building requiring sewer uses a septic system. Currently, only the city building is connected to a septic system which provides for the buildings restrooms.

The Airport Layout Plan chapter of this master plan includes a detailed illustration of the current utility infrastructure.

1.5 AIRPORT ENVIRONS

The following section discusses existing land use and zoning data within the region surrounding Fort Morgan Municipal Airport. As part of the inventory analysis, local and regional plans were reviewed for information that pertains to FMM and its immediate surroundings.

1.5.1 Land Use and Zoning

Morgan County has an established zoning regulation, the latest revision being in 2007. An amendment has since been added in 2011 outlining language for an airport influence area overlay district. However, Morgan County has not adopted the airport influence area overlay. As part of this master plan, the language proposed will be examined and a recommendation of steps to take to adopt a district overlay will be developed. Once adopted, the approximate boundaries of an airport influence area shall appear on zoning maps and/or other approved planning documents.

In regard to land use surrounding the airport, the Morgan County Comprehensive Plan of 2008 encourages commercial and light industrial development in the immediate vicinity of the airport. Additionally, the plan encourages the preservation of agricultural production land. The majority of land surrounding the airport today is used for agricultural purposes, as determined from aerial photography.

1.6 ENVIRONMENTAL CONDITIONS

According to FAA AC 150/5070-6B Change 2, *Airport Master Plans*, the purpose of considering environmental factors in airport master planning is to help the Airport Sponsor thoroughly evaluate airport development alternatives and to provide information that will help expedite subsequent environmental processing. For a summary description of the existing environmental conditions at the Airport, environmental resource categories outlined in FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures* and the 1050.1F Desk Reference, were used as a guide that help identify potential environmental effects during the master planning process.

Table 1-10 provides a summary of the environmental resource categories studied for the Master Plan Update.

TABLE 1-10
SUMMARY OF ENVIRONMENTAL RESOURCE CATEGORIES

Environmental Resource	Description
Air Quality	Morgan County is in attainment for all National Ambient Air Quality Standards.[2]
Biological Resources	In the vicinity of the Airport, there is the potential for 76 federal- and state-threatened and –endangered species, and 20 migratory bird species (see **Appendix B**).[3, 4] According to the U.S. Fish and Wildlife Service (USFWS), there is no designated critical habitat at the Airport.[3] The Colorado Department of Agriculture lists 42 species of noxious weeds with the potential to be located at the Airport (see **Appendix B**).[5] In addition, there are no fish species currently protected under the Magnuson-Stevens Fishery Conservation and Management Act in Morgan County.[6]
Climate	Activities that require fuel or power are the primary stationary sources of greenhouse gases (GHGs) at the Airport. Aircraft and ground access vehicles that are not under the control of the Airport, typically generate more GHG emissions that Airport controlled sources.
Coastal Resources	The Airport is not within a coastal zone and there are no Coastal Barrier Resource System (CBRS) segments within Airport property. The closest coastal zone, the Gulf of Mexico, is over 1,100 miles south of the Airport. [7]
Department of Transportation Act, Section 4(f)	There are Section 4(f) properties in the vicinity of the Airport. The closest Section 4(f) properties are Riverside Park and the Quail Dunes Golf Course, both located over four miles south of the Airport. [8, 9] There are no 6(f) properties in the vicinity of the Airport. The closest 6(f) property, the Two Ponds National Wildlife Refuge, is over 85 miles southwest of the Airport.[10]

[2] U.S. Environmental Protection Agency, Air Quality Green Book, Colorado. Accessed: https://www3.epa.gov/airquality/greenbook/anayo_co.html, January 2017.
[3] Colorado Parks and Wildlife, Threatened, and Endangered List. Accessed: http://cpw.state.co.us/learn/Pages/SOC-ThreatenedEndangeredList.aspx, January 2017.
[4] U.S. Fish and Wildlife Service, Information for Planning and Conservation (IPaC), Fort Morgan Municipal Airport. Accessed: https://ecos.fws.gov/ipac/location/4H5BJ5D7LNF4ROZ67JVF7FYZE4/resources, January 2017.
[5] Colorado Department of Agriculture, Noxious Weed Species. Accessed: https://www.colorado.gov/pacific/agconservation/noxious-weed-species, January 2017.
[6] National Marine Fisheries Service, Essential Fish Habitat Mapper. Accessed: http://www.habitat.noaa.gov/protection/efh/efhmapper/index.html, January 2017.
[7] U.S. Fish and Wildlife Service, Coastal Barrier Resources System Mapper. Accessed: https://www.fws.gov/ecological-services/habitat-conservation/cbra/maps/mapper.html, January 2017.
[8] City of Fort Morgan, Parks Department. Accessed: http://www.cityoffortmorgan.com/index.aspx?nid=340, January 2017.
[9] U.S. Environmental Protection Agency, National Register of Historic Places via USEPA NEPAssist. Accessed: https://nepassisttool.epa.gov/nepassist/nepamap.aspx?wherestr=For+Morgan+Airport, January 2016.
[10] Land and Water Conservation Fund Coalition, LWCF in Texas. Accessed: http://www.lwcfcoalition.org/colorado.html, January 2017.

Environmental Resource	Description
Farmlands	According to the Natural Resource Conservation Service (NRCS), the Airport does contain prime or unique farmland, or farmland of statewide importance.[11] The Farmland Protection Policy Act (FPPA) "does not apply to land already committed to urban development or water storage regardless of its importance as defined by the NRCS." According to the 2010 Census Urban Cluster Reference Map, the Airport is not classified as an urban area[12] and therefore, is not exempt from FPPA provisions.
Hazardous Materials, Solid Waste and Pollution Prevention	There are no Handler ID owners within the Airport.[13] The Morgan County Landfill, located about five miles southeast of the Airport, is the closest municipal solid waste landfill in Morgan County.[14]
Historical, Architectural, Archaeological and Cultural Resources	There are no historic resources located at the Airport. The closest historic property, Rainbow Arch Bridge, is over four miles south of the Airport.[15]
Land Use	The Airport is not within the City of Fort Morgan limits. It is located five miles north of the City within unincorporated Morgan County. The area surrounding the Airport on all sides is rural agriculture land uses with scattered houses. The closest residence is over 2,000 feet south of the Airport.
Natural Resources and Energy Supply	Water is the primary natural resource used at the Airport on a daily basis (see Water Resources for further details). Asphalt, aggregate, and other natural resources have also been used in various construction projects at the Airport. None of the natural resources that the Airport uses, or has used, are in rare or short supply. Energy use at the Airport is primarily in the form of electricity required for the operation of Airport-related facilities (e.g., terminal building, hangars, airfield lighting) and fuel for aircraft, aircraft support vehicles/equipment, and Airport maintenance vehicles/equipment.
Noise and Noise-Compatible Land Use	As previously described, there are no concentrated residential land uses near the Airport. The area surrounding the Airport is a rural agricultural area with scattered houses. The closest residence, is over 2,000 feet south of the Airport.

[11] Natural Resources Conservation Service, Web Soil Survey. Accessed: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx, January 2017.
[12] U.S. Census Bureau, 2010 Census Urban Area Reference Maps, Fort Morgan, CO. Accessed: http://www2.census.gov/geo/maps/dc10map/UAUC_RefMap/uc/uc30817_fort_morgan_co/DC10UC30817.pdf, January 2017.
[13] U.S. Environmental Protection Agency, Envirofacts, RCRAInfo, Fort Morgan Municipal Airport. Accessed: https://www3.epa.gov/enviro/facts/rcrainfo/search.html, January 2017.
[14] City of Fort Morgan, Sanitation Department. Accessed: http://www.cityoffortmorgan.com/index.aspx?nid=399, January 2017.
[15] U.S. Environmental Protection Agency, National Register of Historic Places via USEPA NEPAssist. Accessed: https://nepassisttool.epa.gov/nepassist/nepamap.aspx?wherestr=For+Morgan+Airport, January 2017.

Environmental Resource	Description
Socioeconomics, EJ, Children's Environmental Health and Safety Risks	The Airport is within one census tract that has about a two percent minority population, about a 10% percent poverty level, about a 0.5% unemployed level, and zero percent of the area's houses are vacant.[16] The closest school to the Airport, Fort Morgan High School, is over five miles south of the Airport.[17] The school serves students in ninth through twelfth grade.
Visual Effects	Various lighting features currently illuminate Airport facilities, such as the airfield (e.g., runways and taxiways), buildings, access roadways, automobile parking areas, and the apron area for the safe and secure movement of people and vehicles (e.g., aircraft, passenger cars, etc.). Structures at the Airport include, but are not limited to, the fixed base operator terminal building, hangars, and maintenance buildings. This lighting is required for safety purposes and is consistent with that of an airport. As previously mentioned, the Airport is surrounded on all sides with rural agriculture land with scattered residences. The closest residence is over 2,000 feet south of the Airport. This residence does have a direct line of sight to the Airport; however, the lighting associated with the Airport is consistent with that of an airport.
Water Resources[18]	The National Wetlands Inventory shows wetlands on Airport property. According to the current Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map for the Airport, there are no floodplains within the Airport property.[19] There is one unnamed stream in the southwest corner of Airport property, but it is not an impaired stream. There are no surface water bodies on Airport property. The Airport is within the Cris Lee Draw-South Platte River and Lower Wildcat Creek watersheds. The Airport does not contain any wild and scenic rivers, or National River Inventory segments. The closest wild and scenic river, the Cache la Poudre River, is over 80 miles northwest of the Airport. [20]

Source: RS&H, 2017.

[16] U.S. Environmental Protection Agency, EJScreen, Blockgroup 080870001001. Accessed: https://ejscreen.epa.gov/mapper/demogreportpdf.aspx?report=acs2014, January 2017.
[17] U.S. Environmental Protection Agency, Places, Schools via USEPA NEPAssist. Accessed: https://nepassisttool.epa.gov/nepassist/nepamap.aspx?wherestr=For+Morgan+Airport, January 2017.
[18] U.S. Environmental Protection Agency, Water Features via USEPA NEPAssist. Accessed: https://nepassisttool.epa.gov/nepassist/nepamap.aspx?wherestr=For+Morgan+Airport, January 21017.
[19] Federal Emergency Management Agency, Flood Map Service Center, Flood Insurance Rate Maps 0801290125C, Effective on September 29, 1989. Accessed: https://msc.fema.gov/portal/search?AddressQuery=Fort%20Morgan%20Municipal%20Airport#searchresultsanchor, January 2017.
[20] National Park Service, Nationwide Rivers Inventory, Colorado Segments. Accessed: https://www.nps.gov/ncrc/programs/rtca/nri/states/co.html, January 2017.

CHAPTER 2

AVIATION FORECASTS

2.1 INTRODUCTION

A critical element in the planning and development of airport facilities is knowing the levels of aircraft operations and based aircraft that can be expected during a prescribed planning time period. This chapter discusses the projected activity levels aircraft operations and based aircraft that might be expected within the next 20 year planning horizon. It also describes the methodology used to estimate those volumes. The chapter concludes with recommended operations and based aircraft forecasts that will be used to plan the requirements for future infrastructure and facilities. The forecast is presented in five and ten year increments beginning with a base year of 2016 outward to 2021, 2026, and 2036.

The Federal Aviation Administration (FAA) annually prepares its Terminal Area Forecast (TAF) for 264 FAA towered airports, 252 federal contract tower airports, 31 terminal radar approach control facilities, and 2,818 non-towered airports. Fort Morgan Municipal Airport (FMM) is one of these airports. For the purposes of this master plan update, the baseline forecasts of aircraft operations and based aircraft annual volumes that will be used in planning various airport facilities will be based on the latest FAA TAF numbers.

2.2 DEMOGRAPHIC AND SOCIOECONOMIC FACTORS

The Fort Morgan Municipal Airport is owned and operated by the City of Fort Morgan, which is the county seat for Morgan County. Morgan County has a total population of approximate 28,000. Of those, about 5,500 people live in Brush, and 11,400 in the City of Fort Morgan.[1]

One of the leading objective sources for assessing market growth in the U.S. is Woods and Poole. The 2016 Woods and Poole data was used to provide forecasted information on population, per capita personal income (PCPI), and employment growth in the local region as detailed in **Table 2-1**. The growth of these categories is used to compare historical patterns of aviation demand with socioeconomic factors, and aid in forecasting future growth scenarios. The data suggests that Morgan County will continue seeing small increments of steady growth through the next twenty years. The steady growth forecasted is an indicator of a strong local economy that is less subject to a boom/bust cycle. As this data relates to aviation demand, it can be assumed that no large changes, positive or negative, should be anticipated within the planning period. Instead, slow and steady growth should be expected through the planning period.

[1] Connect Fort Morgan Comprehensive Plan Update, 2016

TABLE 2-1
MORGAN COUNTY HISTORICAL AND FORECAST SOCIOECONOMIC DATA

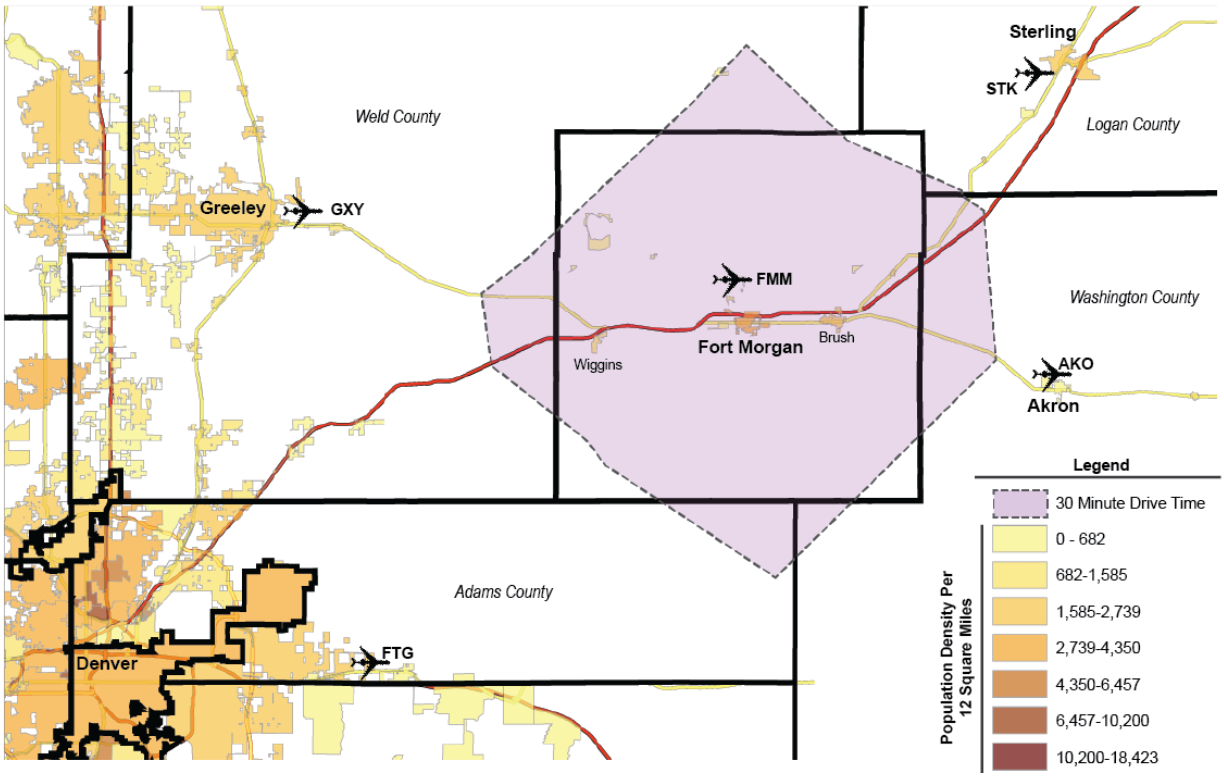
Year	Total Population	Total Enployment (in thousands of jobs)	Total Personal Income Per Capita (in 2009 dollars)
2003	27,736	15.556	$28,614.00
2004	27,736	15.417	$28,688.00
2005	27,727	15.601	$29,117.00
2006	27,816	15.676	$29,390.00
2007	27,745	15.795	$29,260.00
2008	27,701	15.760	$29,793.00
2009	28,099	15.666	$28,539.00
2010	28,141	15.685	$30,663.00
2011	28,498	16.433	$33,186.00
2012	28,355	16.427	$33,454.00
2013	28,389	16.523	$33,966.00
2014	28,328	17.005	$36,622.00
Forecasted Years			
2016	28,555	17.434	$36,639.00
2021	29,153	18.335	$39,697.00
2026	29,704	19.099	$42,759.00
2036	30,471	20.246	$48,094.00
Compund Average Growth Rates			
2003-2014	0.19%	0.81%	2.27%
2016-2036	0.33%	0.75%	1.37%

Source: Woods and Poole, 2016

2.3 AIRPORT SERVICE AREA

In determining airport demand, it is necessary to examine the demographic and socioeconomic conditions of the airport's service area. The airport service area is a broadly based geographical area around the airport where it is reasonable to assume that a market exists for airport services. For a general aviation airport like FMM, the local market for airport services is mostly related to hangars to store private aircraft, and other services such as fuel and light maintenance. The service area of FMM was determined to extend to areas that are within an approximate 30 minute drive time from the Airport. Beyond 30 minutes, it was found that residents were likely closer to other airports with similar or enhanced facilities compared to FMM. The purple polygon within **Figure 2-1** illustrates the service area within roughly a 30 minute drive from Fort Morgan.

FIGURE 2-1
AIRPORT SERVICE AREA



Source: ESRI ArcGIS, US Census, RS&H Analysis, 2017

Within Morgan County and the immediate vicinity, the City of Fort Morgan is the most densely populated area, as can be seen in the figure above. Brush, which is east of Fort Morgan, is the second most populated area within Morgan County. From examining the figure, it is evident that FMM is situated immediately adjacent to the largest population mass within Morgan County, that being the City of Fort Morgan. Fort Morgan is the economic hub of Morgan County, and it can be expected that FMM serves the majority of business travelers flying into the County on private aircraft.

Typically, the greater the population surrounding an airport, the greater the demand is for local airport services, such as based aircraft hangar storage. This is the case at FMM, evidenced in that of the 54 currently registered aircraft in Morgan County, 32 of them are currently based at FMM. **Table 2-2** shows the breakdown of which town specifically each aircraft within Morgan County is registered. Note that the largest number of aircraft are registered with an address in the City of Fort Morgan. This further demonstrates the direct correlation between population and private general aviation aircraft ownership.

TABLE 2-2
AIRCRAFT REGISTERED IN MORGAN COUNTY BY CITY

Registered Aircraft by City	Valid Registered Aircraft
Fort Morgan	33
Brush	7
Hillrose	3
Snyder	2
Weldona	2
Wiggins	7
Total	54

Source: FAA Releasable Aircraft Database, 2017

It is likely that some of the registered aircraft within Morgan County are kept at private airstrips, while others may be based at other public airports in the surrounding region. In gauging overall demand for airport services, these other nearby airport facilities must be considered. Four of the closest airports to FMM with facilities equal to or greater than FMM were examined to develop an understanding of how those facilities impact demand on FMM. Note that Brush Municipal Airport was not included as its facilities do not equal that of FMM.

The airports examined include Greeley-Weld County Airport (GXY), Colorado Plains Regional Airport (AKO), Front Range Airport (FTG) and Sterling Municipal Airport (STK), which are detailed in **Table 2-3**. These airports are all within 45 to 105 minutes drive time from Fort Morgan. In discussions with local tenants and operators, it was learned that Greeley-Weld County Airport is often used by local FMM pilots who require maintenance on their aircraft. Colorado Plains Regional Airport and Greely-Weld County Airport are the airports typically used by business jets if passengers have meetings in Fort Morgan but their aircraft require a greater runway length than provided at FMM.

FMM is most similar to AKO and STK. Both airports are comparable to FMM, albeit AKO offers a longer runway length as well as on-airport airframe and power plant maintenance. STK has slightly lower minimums for its GPS RNAV approach and provides a full length parallel taxiway, though it does have a shorter runway. GXY and FTG are roughly an hour away from Fort Morgan, but offer all the services expected of large metropolitan general aviation airports. FMM's primary advantage over all the airports examined is its proximity to Fort Morgan. For those living in or traveling to Fort Morgan, most are expected to want to use FMM for their aviation needs unless specific circumstances require another airfield.

TABLE 2-3
AIRPORTS ADJACENT THE FORT MORGAN SERVICE AREA

	Fort Morgan Municipal Airport	Colorado Plains Regional Airport	Greeley-Weld County Airport	Front Range Airport	Sterling Municipal Airport
Airport Identifier	FMM	AKO	GXY	FTG	STK
Distance by Air from FMM	-	28 NM East	38 NM West	47 NM Southwest	30 NM NE
Drive Time from FMM	-	45 Minutes	55 Minutes	105 Minutes	45 Minutes
Airport Characteristics					
Based Aircraft	32	13	204	277	31
Primary Runway Length	5,731'	7,001'	10,000'	8,000'	5,201'
Instrument Approach (Visibility Minimums)	RNAV (1 Mile)	RNAV (1-Mile)	ILS (3/4-Mile)	ILS (1/2-Mile)	RNAV (3/4-Mile)
Airport Services					
Fuel Types	100LL/Jet A	100LL/Jet A	100LL/Jet A	100LL/Jet A	100LL/Jet A
Airframe/Power Plant Repair	No	Major	Major	Major	No
Based Flight Training	Yes	No	Yes	Yes	No

Source: FAA 5010, Airnav.com, Google Maps, 2017

The analysis of the airport service area indicates that the majority of aircraft owners within the area have their aircraft based at FMM. With the new runway facility at FMM, it is estimated that local demand for hangar space at FMM will increase. Some residents within Morgan County may want to move their aircraft from airports outside of Morgan County to FMM, and as the population grows new aircraft owners will likely choose to base at FMM. Historically, the FBO typically has anywhere between 10 and 20 people per year who are interested in hangar storage but do not want to build their own hangar. In recent years, the Airport has also seen increased interest in private investors inquiring about sites for building new hangars. These factors were a part of the analysis.

2.4 AVIATION FORECASTS

This section provides a review of historical aviation activity and forecasts, and presents the updated forecasts for operations and based aircraft.

Historical data and forecasts provided by the FAA Terminal Area Forecast (TAF), Colorado Department Aeronautics Division (CDOT), and the 2003 Airport Layout Plan narrative forecast were examined. The 2003 Airport Layout Plan narrative forecast is the oldest, followed by the 2011 CDOT forecast and the 2015 FAA TAF. The 2003 Airport Layout Plan forecast was the only one that shows sizable growth. The 2011 CDOT forecast and the FAA 2015 TAF show essentially no growth. By themselves, it was found that these forecasts were immaterial based on their inconsistencies with each other. However, after discovering growth had occurred in based aircraft that was not accounted for in the 2015 TAF, the 2003 Airport Layout Plan forecast for based aircraft became more relevant. As such, that forecast for based aircraft was taken into consideration and compared to current growth trends for the development of the based aircraft forecast to be used in this study.

A brief overview of the three previous forecasts is provided below. Following that, current national trends and forecasts for aircraft fleets are discussed. Lastly, this studies' forecast of based aircraft and airport operations is illustrated and described.

2.4.1 Historical Forecast Review

Table 2-4 details the forecast that was included in the 2003 Airport Layout Plan narrative. That document's narrative estimated that between 2003 and 2021, compound annual growth of total operations would be 5 percent per year, and total based aircraft 2.6 percent per year. That analysis forecasted operations based on a percentage ratio of operations to based aircraft, which was roughly 240 operations per based aircraft for 2003 and 293 operations per based aircraft in 2016. The increase of operations per based aircraft was rationalized in that study as being related to increases in itinerant operations as the Fort Morgan area grew.

TABLE 2-4
2003 AIRPORT LAYOUT PLAN NARRATIVE FORECAST

Year	Aircraft Operations						Based Aircraft				
	Local GA	Itinerant GA	Total GA	Military	Air Taxi	Total Ops	Single Engine	Multi-Engine Piston	Turbo Prop	Turbo-Jet	Total
2003	3,296	1,689	4,985	100	644	5,729	23	0	1	0	24
2004	3,466	1,824	5,290	100	678	6,068	26	0	1	0	27
2005	3,574	1,878	5,452	100	714	6,266	26	1	1	0	28
2006	3,681	1,933	5,614	100	750	6,465	27	2	1	0	30
2007	3,871	2,078	5,948	100	788	6,836	27	2	1	0	30
2008	3,983	2,135	6,118	100	826	7,044	28	2	1	0	31
2009	4,187	2,287	6,474	100	866	7,440	28	2	1	0	31
2010	4,305	2,346	6,651	100	906	7,657	28	3	1	0	32
2011	4,423	2,406	6,829	100	947	7,875	28	3	1	0	32
2012	4,646	2,568	7,214	100	989	8,303	29	3	1	0	33
2013	4,769	2,630	7,399	100	1,032	8,530	29	3	2	0	34
2014	5,007	2,799	7,807	100	1,102	9,008	29	3	2	0	34
2015	5,376	3,084	8,460	100	1,176	9,736	29	3	2	1	35
2016	5,639	3,266	8,905	100	1,256	10,261	29	3	2	1	35
2017	5,911	3,453	9,364	100	1,340	10,805	30	3	2	1	36
2018	6,194	3,645	9,839	100	1,430	11,369	30	3	2	1	36
2019	6,626	3,962	10,588	100	1,527	12,215	30	3	3	1	37
2020	6,933	4,166	11,099	100	1,629	12,829	30	3	3	1	37
2021	7,400	4,500	11,900	100	1,739	13,739	30	3	3	2	38
CAGR (2003-2021)	4.6%	5.6%	5.0%	0.0%	5.7%	5.0%	1.5%	20.8%	6.3%	18.1%	2.6%

Source: 2003 Airport Layout Plan, Narrative Sheet #13 of 15

Notes: 2003 data was historical. 2004 to 2021 data was forecast

Table 2-5 details the forecast that was included in the Colorado Department of Transportation's (CDOT) 2011 Aviation System Plan. That forecast indicated that operations would have a compound annual growth (CAGR) of 0.22 percent per year and based aircraft at 0.27 percent per year between 2015 and 2030.

TABLE 2-5
COLORADO 2011 AVIATION SYSTEM PLAN

	Existing	Forecasted			CAGR (2015-2030)
	2010	2015	2020	2030	
Total Annual Operations	8,180	8,280	8,370	8,560	0.22%
Based Aircraft	24	24	25	25	0.27%

Source: CDOT 2011 Aviation System Plan

Table 2-6 shows the FAA Terminal Area Forecast (TAF). The TAF includes historical airport data and a forecast based on data provided by the Airport on FAA Form 5010, Airport Master Record. The forecast for FMM shows no growth through the planning period, which is typical of small airports like FMM. Because FMM does not have actual verified operational data provided by an air traffic control tower facility, historic data is estimated by airport management and reported to the State and FAA. That estimate is typically incorporated into the TAF, and for small airports like FMM, no growth forecasts are usually assumed unless a planning study such as this master plan update is provided to FAA. For this study, the FAA TAF serves as the starting point for operations and based aircraft. However, in the inventory analysis, it was found that 32 based aircraft exist today at FMM based on detailed FBO records. This count was later verified against FAA's National Based Aircraft Database that confirms based aircraft reported by airport management with the FAA's National Aircraft Registry. Only airworthy aircraft are included in FAA's National Based Aircraft Database. The new total for based aircraft was deemed reasonable, as historical numbers of based aircraft in the FAA TAF maintained a high of 30 between 1999 and 2003. There were fewer hangars at that point in time, so it is assumed some based aircraft were stored via tie-downs. Today, all aircraft are stored in hangars, but there are approximately six more box hangars than what existed in 1999.

TABLE 2-6
FAA 2015 TAF

Year	Itinerant Air Taxi	Itinerant General Aviaiton	Itinerant Military	Local General Aviaiton	Local Military	Total Annual Operations	Based Aircraft
2006	664	3320	166	4150	0	8300	24
2007	664	3320	166	4150	0	8300	24
2008	664	3320	166	4150	0	8300	24
2009	664	3320	166	4150	0	8300	24
2010	664	3320	166	4150	0	8300	24
2011	664	3320	166	4150	0	8300	24
2012	763	3818	190	4772	0	9543	23
2013	763	3818	190	4772	0	9543	23
2014	800	4000	200	5000	0	10000	23
Forecast							
2015	800	4000	200	5000	0	10000	23
2021	800	4000	200	5000	0	10000	23
2026	800	4000	200	5000	0	10000	23
2036	800	4000	200	5000	0	10000	23
CAGR (2014-2036)	0%	0%	0%	0%	0%	0%	0%

Source: FAA 2015 Terminal Area Forecast

2.4.2 2016 FAA Aerospace Forecast and Industry Trends

Table 2-7, included below, provides information from the FAA Aerospace Forecasts (2016-2036) for the entire U.S. general aviation fleet by aircraft type. The forecasts indicate that there is anticipated to be a restructuring of the aviation fleet over time to larger aircraft; this is a continuation of a trend seen over the last 10 years. In the next 20 years, the total U.S. fleet percentage for piston aircraft is anticipated to decrease by 14 percent for single-engine pistons and 11 percent for multi-engine pistons while increasing by more than 32 percent for turboprop aircraft and 66 percent for turbojets. Essentially, the U.S. fleet is seeing a decline in single engine piston aircraft as many of these aircraft are becoming so old they are not flown any longer, while the fleet of high-performance business aircraft is increasing as more businesses are using these aircraft for transportation purposes.

However, in rural areas outside metropolitan areas, these trends are not as readily found. It is more common in these areas to have residents use their own small aircraft for personal transportation purposes as their travel needs are often far greater in regard to distance than those in metropolitan areas. Additionally, small single piston aircraft are heavily used for agriculture purposes in many rural plains communities. Also, medical transport aircraft operate at FMM, which often include light twin-prop and small jet aircraft. While it is estimated that the fleet mix at Fort Morgan will change slightly over the next 20 years, it is not expected that the based single engine or multi-engine fleet will decrease.

TABLE 2-7
U.S. GENERAL AVIATION FLEET FORECAST BY AIRCRAFT

Year	Single-Engine	Multi-Engine	Turboprop	Turbojet	Total General Aviation Fleet
2008	145,497	17,515	8,907	11,042	228,664
2009	140,649	16,474	9,055	11,268	223,876
2010	139,519	15,900	9,369	11,484	223,370
2011	136,895	15,702	9,523	11,650	220,453
2012	128,847	14,313	10,304	11,793	209,034
2013	124,398	13,257	9,619	11,637	199,927
2014	126,036	13,146	9,777	12,362	204,408
2015	125,050	13,085	9,570	12,475	203,880
2021	119,585	12,760	9,215	13,975	203,225
2026	115,045	12,480	9,775	15,735	204,030
2036	107,160	11,695	12,635	20,770	210,695
CAGR (2015-2036)	-0.7%	-0.5%	1.3%	2.5%	0.2%

Source: FAA Aerospace Forecast Fiscal Years 2016-2036

2.4.3 Based Aircraft Forecast

The based aircraft forecast for FMM took into consideration historical data, prior studies, national trends, and information gained about the local market climate from discussions with Airport management. Between 2003 and 2016, total based aircraft increased at roughly 2.3 percent annually. Based aircraft growth was compared to socioeconomic data outlined in **Table 2-1**. A regression analysis found a strong correlation between historical based aircraft and Morgan County's historical per capita personal income (PCPI), which also grew at roughly 2.3 percent annually between 2003 and 2016. Due to the strong correlation between historical total based aircraft growth and PCPI growth, the forecast rate of PCPI was used as a basis for development of the total based aircraft forecast. Woods and Poole forecasted that Morgan County's PCPI would grow at an average rate of 1.4 percent throughout the planning period. However, for this study's forecast of total based aircraft, a slightly lower rate of 1.2 percent was applied to account for national trends. Specifically, trends of single engine aircraft, as discussed below.

Since the 2003 Airport Layout Plan was completed, single engine based aircraft at FMM grew roughly 2 percent annually, from 24 to 32 between 2003 and 2016. This growth is relatively close to the forecast presented in the 2003 Airport Layout Plan narrative report. Comparatively, over the past decade, there has been a decline nationally in the number of single engine aircraft. In the future, the FAA forecasts nearly a 1 percent decline in the US single engine fleet over the course of the next 20 years. However, national trends do not fully represent trends in rural areas, and as the PCPI of the region grows at the forecasted 2.3 percent rate, it can be assumed that single engine based aircraft will as well. But, it is not likely that growth of single engine aircraft will keep pace with PCPI, particularly since the number of licensed pilots is declining. Considering these factors, a more modest growth rate of 1 percent was used as the single engine aircraft forecast rate of growth through the planning period.

The 1 percent growth rate forecasted for single engine based aircraft was further validated based on other considerations, including demand expressed to airport management for hangar development.

Additionally, it is anticipated that FMM will capture some based aircraft in the region as aircraft owners choose to base at FMM to be closer to their residence. A continuing factor in basing at FMM as opposed to airports closer to the metropolitan areas, is the desire for pilots to be based at an airport that has a less congested airspace. Finally, nearly 20 percent of current based aircraft are single engine aircraft used for agriculture purposes. It is likely that more aircraft used for agriculture purposes may become based at FMM within the planning period.

Multi-engine aircraft are expected to grow by a total of two additional aircraft over the planning period. From 2003 to 2016, multi-engine aircraft have doubled from one to two aircraft. It is estimated that the multi-engine fleet will continue to grow, albeit the fleet may see changes from piston to turbo-prop aircraft, such as the Beechcraft King Air. Twin turbo-prop aircraft are excellent for use for flights under 500 nautical miles, which is a likely routing for any local business that may set up headquarters in Fort Morgan to serve the Midwest and Rocky Mountain region. As business grows in the region, it is anticipated that up to two more of these type of aircraft may be based at FMM. No jet or helicopter is currently based at FMM, and though plausible, none are included in this forecast to be based within the planning period.

Overall, it is estimated that a total of nine additional based aircraft will need accommodation at FMM in the next 20 years. **Table 2-8** details the forecast of based aircraft at FMM.

TABLE 2-8
FMM BASED AIRCRAFT FORECAST

Year	Single Engine	Multi-Engine	Jet	Helicopter	Total
2016	30	2	0	0	32
2021	32	3	0	0	35
2026	33	4	0	0	37
2036	37	4	0	0	41
CAGR (2016-2036)	1.0%	3.3%	0.0%	0.0%	1.2%

Source: Airport Records, RS&H Analysis, 2017

2.4.4 Aircraft Operations Forecast

According to FAA Order 5090.3C *Field Formulation of the National Plan of Integrated Airport Systems*, a general planning parameter for aircraft operations at general aviation airports is 250 to 450 operations per based aircraft. The lower end of the range is typically attributed to rural airports, while the high end is attributed to busy reliever airports. Fort Morgan is in a rural area that is also home to large agricultural corporations. Additionally, FMM is a base for a local aerial agricultural application business. These two factors suggest that FMM will have a greater number of operations per based aircraft than a low activity rural airport, but not as many as a busy reliever airport.

Because FMM has no air traffic control tower, nor has airport management formally tracked operations, it is not possible to determine exact historical operations. As such, historical data has been estimated by airport management and reported to FAA for use in the Terminal Area Forecast (TAF). As of 2014, the FAA

2015 TAF reported FMM served 10,000 annual operations. ACRP Synthesis 4, Counting Aircraft Operations at Non-Towered Airports, provides guidance for airport sponsors in regard to tracking operations. At the time of this writing, airport management was working to install a reliable system to track aircraft operations, potentially through the use of game cameras. Through that system, more accurate and detailed data will be available for use during future planning studies.

With 32 based aircraft identified on the field and an estimated 10,000 annual operations, the number of operations per based aircraft equates to 313. This number is within the range established by FAA as reasonable for a rural general aviation airport that also accommodates agricultural and business traffic. The ratio of operations to based aircraft (313:1) was carried forward through the planning period based on the based aircraft forecast. The historical percentage break out for the types of operations was carried forward, as no data was found to suggest the type of operations have changed. **Table 2-9** below details the forecast for operations through the next 20 years at FMM.

Aircraft operations at small general aviation facilities can trigger the need for enhanced facilities, such as a full length parallel taxiway if certain operations levels are reached (approx. 20,000 annual itinerant operations on a specific runway). A single runway with a parallel taxiway can typically accommodate an annual service volume (ASV)[2] of roughly 200,000 annual operations. A runway without a parallel taxiway (similar in configuration to FMM) typically can only accommodate roughly 50,000 annual operations depending on approaches and aircraft fleet mix. No data suggests that FMM will experience operation activity close to that which would trigger the need to add capacity within the planning period. Thus, at this time no further analysis is recommended as it relates to annual operations at FMM as current facilities provide adequate capacity.

TABLE 2-9
FMM AIRCRAFT OPERATIONS FORECAST

Year	Itinerant Air Taxi	Itinerant General Aviation	Itinerant Military	Local General Aviation	Local Military	Total Annual Operations
2016	800	4,000	200	5,000	-	10,000
2021	863	4,316	216	5,395	-	10,791
2026	928	4,642	232	5,803	-	11,606
2036	1,015	5,076	254	6,345	-	12,689
CAGR (2014-2036)	1.20%	1.20%	1.20%	1.20%	N/A	1.20%

Source: RS&H Analysis, 2017

2.4.4.1 Types of Itinerant Aircraft Operations

As annual operations reported to FAA are based solely on estimations provided by airport management, it is recommended more formal tracking procedures be developed to track the type of aircraft operations, including the type aircraft conducting the operation. In addition to game cameras, the Airport may also

[2] Annual Service Volume (ASV) is a reasonable estimate of an airport's annual capacity. It accounts for differences in runway use, aircraft mix, weather conditions, etc., that would be encountered over a year's time.

consider formally tracking fuel sales, tracking operations during FBO business hours, and transient tie down rentals/use. Note that during this study, fuel sales records were reviewed, and were found to lack the type of data needed to determine aircraft operations. Additionally, when analyzing specific equipment types conducting itinerant operations at FMM, it was found that data beyond fuel sale records would be needed to understand typical annual operations of jet aircraft. This is because some jet operators will not take on fuel prior to departure from FMM so as to keep take-off weight to a minimum to account for the current length of Runway 14-32. FBO management explained that many of the jet operators that use FMM will depart to Greeley or Colorado Springs to fuel up with enough to make it back to their originating destination.

Due to the lack of recorded operational data, discussions with FBO and Airport management were used to gauge operational trends at the Airport. In these conversations, it was noted that the type of operations at the airport were mirroring the trend of increased use of jet aircraft throughout the nation. At FMM, an increase in jet traffic has been witnessed over the course of the past ten years. The new runway was not found to have dramatically increased operations at FMM by jets beyond the general annual increases materializing year-over-year. Management attributed this to the length of the new runway which is too short to be practical for use by some jet aircraft (runway length requirements are detailed in the Facility Requirements chapter of this study). Yet, with the growth of Fort Morgan combined with the growth in national use of jet aircraft, the Airport now commonly accommodates a wide variety of B-II sized jets (the category "B-II" and other categories are explained in the following section). These include Cessna Citation series aircraft and the smaller of the Dassault Falcon jets.

Airport and FBO management also revealed other jets, such as the Lear Jet family, conduct operations at the Airport when temperatures and conditions meet performance requirements for operating on a shorter than ideal runway. Many of the major employers in Fort Morgan are currently using Learjet aircraft, as do Flight-for-Life operators.[3] The Learjet family of business jets are C-I aircraft and have faster approach and departure speeds then aircraft with a 'B' approach category. As such, C-I aircraft typically require a longer runway length than available at FMM. FBO management explained that pilots of these aircraft will often need to use the Akron-Colorado Plains Regional Airport in lieu of FMM because that airport has a longer runway. That said, the Flight-for-Life Lear Jet, and multiple other Lear Jet aircraft do use FMM, when conditions allow, throughout the year.

Discussions with Airport and FBO management also confirmed continued frequent operations at the airport by high-performance turbo-prop aircraft, such as the Beechcraft King Air family of aircraft. These aircraft are ideal for trips within 500 nautical miles, and are commonly used for shorter business trips in the mountain west. Additionally, it was noted that on rare occasion, larger and faster C-II type jets, such as the Canadair Challenger or Gulfstream 400 will conduct operations at FMM.

[3] Colorado 2011 Aviation System Plan Technical Report, Colorado Division of Aeronautics, 2011

2.5 CRITICAL AIRCRAFT

The FAA requires the identification of the existing and future critical aircraft for airport planning purposes. The critical aircraft is the most demanding aircraft, or grouping of aircraft, using the airport regularly. Regular use typically defined as 500 total annual operations, not counting touch-and-go landings. A critical aircraft must be determined for each runway, and sometimes for specific portions of the terminal/hangar area. In regards to FMM, the critical aircraft for the paved runway is different from the critical aircraft for the turf/dirt runways.

Three parameters are used to classify the critical aircraft: Aircraft Approach Category (AAC) shown in **Table 2-10**, Airplane Design Group (ADG) shown in **Table 2-11**, and Taxiway Design Group (TDG) shown in **Table 2-12**. The AAC, depicted by a letter, relates to aircraft landing speeds. The ADG, depicted by a Roman numeral, relates to airplane wingspan and height. The TDG, classified by number, relates to the outer to outer main gear width and the distance between the cockpit and main gear. These parameters serve as the basis of the design and construction of airport infrastructure.

TABLE 2-10
AIRCRAFT APPROACH CATEGORY

AAC	Approach Speed
A	Approach speed less than 91 knots
B	Approach speed 91 knots or more but less than 121 knots
C	Approach speed 121 knots or more but less than 141 knots
D	Approach speed 141 knots or more but less than 166 knots
E	Approach speed 166 knots or more

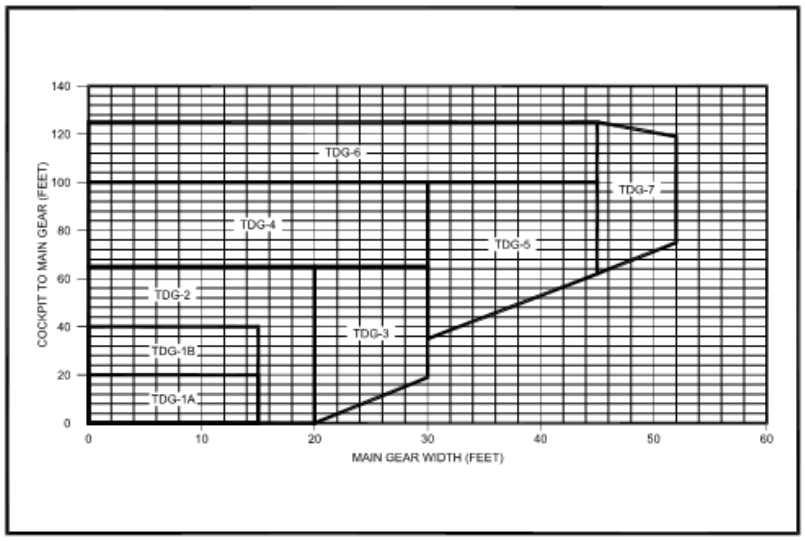
Source: FAA AC 150/5300-13A Change 1 *Airport Design*

TABLE 2-11
AIRCRAFT DESIGN GROUP

Group #	Tail Height (ft)	Wingspan (ft)
I	< 20'	< 49'
II	20' - < 30'	49' - < 79'
III	30' - < 45'	49' - < 118'
IV	45' - < 60'	118' - < 171'
V	60' - < 66'	171' - < 214'
VI	66' - < 80'	214' - < 262'

Source: FAA AC 150/5300-13A Change 1 *Airport Design*

TABLE 2-12
TAXIWAY DESIGN GROUP



Source: FAA AC 150/5300-13A Change 1 *Airport Design*

The 2003 ALP Update listed the turbo-prop Beechcraft King Air 90 as the existing critical aircraft for the paved runway. The King Air 90 requires a Runway Design Code (RDC) B-II. Note that the King Air 90 is categorized as a B-II-small, which is a category for those B-II aircraft equal to or less than 12,500 pounds. The future critical aircraft was listed as the Dassault Falcon 20, which also has a RDC B-II. The critical aircraft for the ultimate condition listed on the previous ALP is the Challenger 601, which has a RDC C-II. Based on facility needs identified in the 2003 ALP Update, Runway 14/32 was reconstructed to the RDC B-II standard based on the future critical aircraft, the Falcon 20.

As discussed in the previous section, data is not available to determine the exact number of operations conducted by specific aircraft. Thus a qualitative analysis was needed to determine the existing and future critical aircraft for FMM today, which was based on the information gathered through this forecasting effort and in discussions with FBO and Airport management, as detailed in the previous section. FBO and Airport management noted that high-performance turbo-prop aircraft frequently use FMM, and there has been an increase in jet traffic over the last ten years. Jet aircraft operations are estimated today to not exceed 500 annual operations, and are not expected to do so within the 20-year planning range considering currently there are no based jet aircraft.

Based on this qualitative analysis, it was concluded that the predominate category of jet aircraft frequenting the airport regularly are B-II aircraft. Similarly, the most demanding turbo-prop aircraft consistently using the Airport are B-II aircraft. These facts concluded that the critical aircraft for FMM will remain a B-II aircraft.

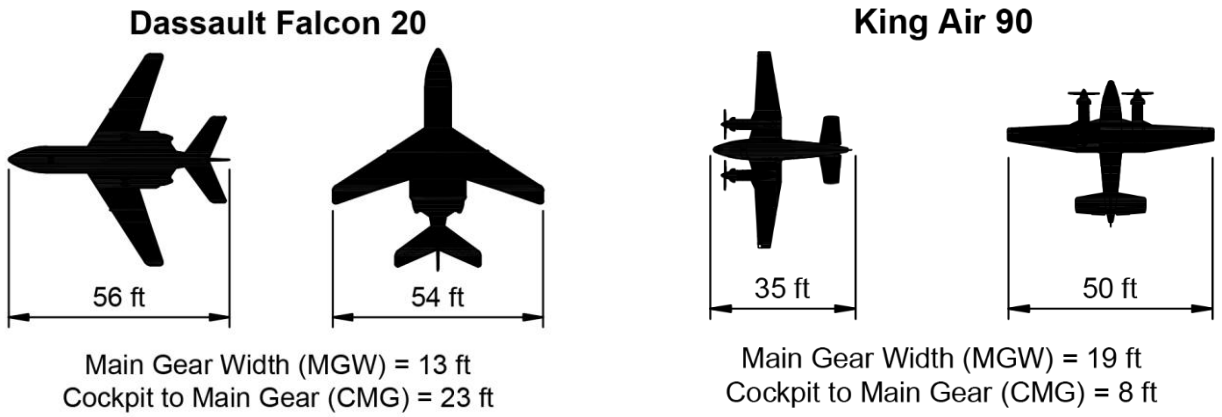
The type aircraft representing the current B-II critical aircraft for FMM was determined to be a blended composite aircraft, made up of the King Air 90 and the Falcon 20. The King Air 90 was carried forward from the previous ALP Update as the critical aircraft, as it was confirmed in this study that the King Air family of aircraft continue to be the most demanding turbo-prop aircraft demonstrating substantial use of

the facility, including turbo-prop aircraft based at the airport. While use of FMM by jet aircraft is not as frequent, B-II jet aircraft are seen at FMM throughout the year. Operations of these jet aircraft are frequent enough that it was deemed prudent they be considered a part of the composite critical aircraft. The Falcon 20 was used as it represents the heavier end of the range of B-II jets that periodically use the airport. Overall, the King Air 90 and Falcon 20 aircraft have similar wingspan and approach speeds, and represent well the typical range of take-off weight and runway length requirements needed by the high performance aircraft using the airport regularly.

In conclusion, the current critical aircraft for the paved runway and taxiways is a composite aircraft made up by the Dassault Falcon 20 and the King Air 90, whose dimensions are shown below in **Figure 2-2**. This composite critical aircraft will determine the design parameters needed for the paved runway, apron area, and any future paved taxiway and taxilane development. This composite critical aircraft is being carried forward as the future critical aircraft as well, as national trends point to continued growth and use of this aircraft segment. In the analysis of operations in this forecast, no indication was found that larger or faster (C-I or C-II) aircraft would be operating at FMM in the future, or ultimately, to the extent that would justify an upgrade in critical aircraft.

In regard to the turf-runways, the previous critical aircraft identified is the Cessna 182 which requires a RDC B-I. Multiple Cessna 182 aircraft are based on the airfield, and use the turf runways when needed. The Cessna 182 is also a good representation of design characteristics of the agricultural aircraft that use the airfield. Thus, it was determined the Cessna 182 will be carried forward as the existing and future critical aircraft for both turf runways.

FIGURE 2-2
CRITICAL AIRCRAFT



2.6 FORECAST SUMMARY

The summary of aviation forecasts as it relates to aircraft operations and based aircraft is provided below in **Table 2-13** and **Table 2-14**. To ensure consistency with FAA databases, it is recommended the Airport update FAA 5010 for FMM to reflect the findings of this forecast and request FAA to update the FAA TAF accordingly.

TABLE 2-13
AVIATION FORECAST SUMMARY

						Average Annual Compound Growth Rates		
	Base Yr. Level	Base Yr.	Base Yr.+5yrs.	Base Yr.+10yrs.	Base Yr.+20yrs.	Base Yr. to +5	Base Yr. to +10	Base Yr. to +20
	2016	2016	2021	2026	2036	2021	2026	2036
Operations								
General aviation	4,800	4,800	5,179	5,570	6,091	1.53%	1.50%	1.20%
Military	200	200	216	232	254	1.55%	1.50%	1.20%
Local								
General aviation	5,000	5,000	5,395	5,803	6,345	1.53%	1.50%	1.20%
Military	0	0	0	0	0	0.00%	0.00%	0.00%
TOTAL OPERATIONS	10,000	10,000	10,790	11,605	12,690	1.53%	1.50%	1.20%
Based Aircraft								
Single Engine	30	30	32	33	37	1.30%	0.96%	1.05%
Multi Engine	2	2	3	4	4	8.45%	7.18%	3.53%
Jet Engine	0	0	0	0	0	0.00%	0.00%	0.00%
Helicopter	0	0	0	0	0	0.00%	0.00%	0.00%
Other	0	0	0	0	0	0.00%	0.00%	0.00%
TOTAL	32	32	35	37	41	1.81%	1.46%	1.25%

Source: RS&H Analysis

TABLE 2-14
FAA TAF COMPARISON

	Year	Master Plan Forecast	2015 TAF	MPU Forecast/ 2015 TAF % Difference
Total Operations				
Base yr.	2016	10,000	10,000	0.00%
Base yr. + 5yrs.	2021	10,790	10,000	7.32%
Base yr. + 10yrs.	2026	11,605	10,000	13.83%
Base yr. + 20yrs.	2036	12,690	10,000	21.20%

Source: RS&H Analyis

CHAPTER 3

FACILITY REQUIREMENTS ANALYSIS

3.1 INTRODUCTION

To properly plan for the future requirements of Fort Morgan Municipal Airport, it is necessary to translate the forecasts of aviation demand into the specific types and quantities of facilities that are needed. This chapter details the analyses and findings of the facility requirement determinations, as well as other circumstantial criteria specific to FMM.

At the onset of this master plan study, specific focus areas were identified, and are addressed in this chapter.

3.2 RUNWAYS

Analysis of the runways addresses the ability of the existing runways to meet both current and forecasted demand. At a minimum, runways must have the proper length, width, and strength to meet FAA recommended design standards to safely accommodate the design aircraft. This section analyzes specific runway criteria and makes recommendations based on the forecast. Elements to be examined in this section include runway designation, length, width, and strength.

3.2.1 Runway Orientation

Runway designations provided on each runway indicate the runway orientation according to the magnetic compass bearing. Runway designations can change due to the slow drift of the magnetic poles on the Earth's surface, which over time change the runway's magnetic bearing. Magnetic declination relates to the degree of drift that must be accounted for. Depending on an airport's location and how much drift takes place, it may be necessary to change the runway designation. It is recommended that runway designations be changed if there is more than a 5° difference from the runway's true bearing.

As of December 27, 2016, the magnetic declination at the Airport is 7° 44′ E and was changing by 0° 6′ W per year. Based upon this, all runway designations are currently within the 5° range of difference, and do not need to be changed. If magnetic declination continues to change at its current rate, Runway 14-32 will need to undergo a change in the runway designation numbers in 2027, and Runway 17-35 in year 2031. **Table 3-1** details the existing and forecasted future magnetic bearing and runway heading based on the current annual change in magnetic declination.

TABLE 3-1
RUNWAY DESIGNATION

Runway Designation	Existing			Future		
	Runway Heading	True Bearing	Magnetic Bearing	Magnetic Bearing	Runway Heading	Runway Designation
14	143°	151° 36' 32.87"	143° 92' 32.87"	145° 92' 32.87"	145°	Runway 15
32	323°	331° 36' 55.64"	323° 92' 55.64"	325° 92' 55.64	325°	Runway 33
17	173°	181° 12' 51.52	173° 68' 51.52"	175° 68' 51.52"	175°	Runway 18
35	353°	01° 12' 50.85"	353° 68' 50.85"	355° 68' 50.85	353°	Runway 36
8	82°	89° 57' 00.69"	82° 13' 00.69"	84° 13' 00.69"	84°	Runway 8
26	262°	269° 57' 21.34	262° 13' 21.34"	264° 13' 21.34"	264°	Runway 26

Source: NOAA - National Centers for Environmental Information, 2017

3.2.2 Wind Analysis

FAA runway design standards recommend an airport's runway system provide a minimum of 95 percent wind coverage. The 95 percent wind coverage is computed on the basis of the crosswind component not exceeding the set value based on the Runway Design Code (RDC)[1]. If a single runway cannot provide this level of coverage, then a crosswind runway is often warranted. To analyze the wind coverage of a runway system, historical data is examined using the FAA's Airport GIS Airport Design Tools Wind Analysis. Data for this tool is supplied by the National Climatic Data Center from surface weather observation stations (AWOS) located on site at airports. FAA Advisory Circular 150/5300-13A Change 1, *Airport Design*, suggests that a record of wind observations over the last 10 consecutive years is recommended.

At FMM, only five years of wind data is available as the FMM AWOS was installed in 2012. The 2003 Airport Layout Plan used wind data from the AWOS located at the Colorado Plains Regional Airport (AKO). That AWOS was and currently still is the nearest system that has 10 consecutive years of historical wind data. However, the FAA guidance notes that when wind data is not available, one year of observations is typically adequate to determine wind fluctuations and patterns. For this study, it was determined that FMM AWOS data was sufficient and was deemed superior than data that was captured over 30 miles away at AKO.

The RDC for Runway 14-32 is B-II, meaning the allowable crosswind component for analysis purposes is 13 knots. As shown in the green highlighted areas in **Table 3-2**, Runway 14-32 provides greater than 95 percent wind coverage for all in all weather and VFR conditions. Typically, it is the all-weather condition data that is used as the benchmark for runways with any type of instrument approach. Thus, for Runway 14-32, which has a RNAV GPS approach, the wind analysis indicates the runway is properly oriented and no crosswind runway is needed to support the critical aircraft.

[1] The RDC is a design standard specific to a single runway, and per FAA Advisory Circular AC 150/5300-13A Change 1, *Airport Design*, "runway standards are related to aircraft approach speed, aircraft wingspan, and designated or planned approach visibility minimums." This practice properly configures runways to meet necessary physical and operational characteristics for the most demanding aircraft operating at the airport.

TABLE 3-2
RUNWAY DESIGN CODE B-II WIND ANALYSIS

	ALL WEATHER WIND DATA		IFR WIND DATA		VFR WIND DATA	
RUNWAY	**10.5 KNOTS**	**13 KNOTS**	**10.5 KNOTS**	**13 KNOTS**	**10.5 KNOTS**	**13 KNOTS**
RUNWAY 14-32	93.36%	96.59%	79.98%	88.93%	94.08%	97.00%
RUNWAY 17-35	92.09%	95.53%	85.93%	92.77%	92.50%	95.76%
RUNWAY 8-26	86.65%	90.93%	81.24%	86.70%	87.21%	91.38%
COMBINED	99.49%	99.87%	98.37%	99.56%	99.56%	99.89%

Source: NOAA National Climatic Data Center, FMM AWOS, Data Range 2012-2016

Though the critical aircraft is a B-II aircraft, the majority of operations at FMM are conducted by A-I and B-I aircraft. As such, consideration of the needs of these aircraft is required. An allowable crosswind component of 10.5 knots is used for analyzing runway requirements for A/B-I aircraft. The analysis indicated that the primary runway is slightly deficient in providing 95 percent coverage under all-weather and VFR conditions. At FMM, this level of coverage was deemed sufficient, specifically for a 10.5 knot crosswind component. This is because those pilots who are operating on an RNAV approach in all-weather conditions are experienced and trained to land in 13 knot and greater crosswinds. Additionally, in VFR conditions, two differently oriented runways are currently available for these smaller aircraft.

While the essence of the wind analysis is based on a crosswind component, the narrative of what this data explains goes further than the speed of the wind described. The data is helpful in understanding how crosswind and secondary runways work to aid the overall system. Note that though the crosswind component being analyzed is 10.5 knots, the wind speeds during the wind events that created the data can be much stronger than the crosswind component.

To understand how the turf/dirt runways fit into the runway system at FMM, each was analyzed independently with the primary runway. **Table 3-3** below details the result of that analysis. It was found that Runway 8-26 works within the system as a crosswind runway whereas Runway 17-35 does not. This is expressed in the data in that by itself Runway 8-26 provides less crosswind coverage than Runway 17-35. However, when paired with the primary runway, the combination provides more coverage than a paired Runway 17-35 and primary runway. This factor is related to the wind coverage that Runway 8-26 provides when winds shift dramatically at FMM. During those times when winds are a-typical, Runway 8-26 provides good crosswind coverage. Otherwise, Runway 8-26 provides poor wind coverage due to its almost perpendicular orientation with Runway 14-32 and the prevalent wind direction.

TABLE 3-3
CROSSWIND RUNWAY WIND ANALYSIS

Runway 8-26 and Runway 14-32

	VFR WIND DATA
RUNWAY	**10.5 KNOTS**
RUNWAY 14-32	94.08%
RUNWAY 8-26	87.21%
COMBINED	97.78%

Source: NOAA National Climatic Data Center
FMM AWOS, Data Range 2012-2016

Runway 17-35 and Runway 14-32

	VFR WIND DATA
RUNWAY	**10.5 KNOTS**
RUNWAY 14-32	94.08%
RUNWAY 17-35	92.50%
COMBINED	96.41%

Source: NOAA National Climatic Data Center
FMM AWOS, Data Range 2012-2016

In summary, Runway 14-32 was found to provide adequate wind coverage to serve B-II aircraft, the Airport's critical aircraft. Runway 8-26 is required to provide adequate cross wind coverage for A/B-I aircraft, while Runway 17-35 was found to be inconsequential as it relates to providing wind coverage at the Airport.

3.2.3 Runway Length

Runway length is determined by the greater requirement of the takeoff or landing performance characteristics of the existing and future design aircraft, or the composite family of airplanes as represented by the design aircraft. The takeoff length, including takeoff run, takeoff distance, and accelerate-stop distance, is typically the more demanding of the runway length requirements.

As described below, there are two primary means for determining the Airport's recommended runway lengths:

Guidance A **FAA Recommended Runway Length:** General runway length guidance based on FAA computer modeling software and Advisory Circular performance graphs for composite aircraft groups, as adjusted for FMM mean maximum temperature[2] (89°F), field elevation (4,595 feet above mean sea level), difference in runway centerline elevations[3] (49 feet for Runway 14-32) and aircraft flight range of 500 nautical miles.

Guidance B **Critical Aircraft Planning Manual (Performance Curves):** Determines runway length for specific aircraft models and engines based on data from the aircraft manufacturer, as adjusted for Fort Morgan Municipal Airport to the extent possible based on aircraft operating (payload) weights, flight range, non-standard temperatures, and field elevation.

Much analysis was conducted in regard to runway length of Runway 14-32 prior to the construction of the new runway. The Environmental Assessment[4] (EA) for the new runway, published in 2011, summarized that analysis. The document stated the current paved runway at the time limited the use of the airport by medium and large size business aircraft. It was determined that a new runway with a length of 7,500 feet would be ideal, 6,500 feet would be preferred, and 5,730 feet would be the minimum suitable replacement length. The 5,730 foot minimum length reflected the reality of environmental and financial constraints at the time.

That previous analysis was vetted in this study, and the runway length recommendations listed were found to be relevant today. The new runway's length of 5,730 feet remains the minimum suitable length to serve the existing known fleet mix of aircraft. It was found that Guidance A provides sufficient information to recommend no additional runway length is required throughout the planning period,

[2] National Oceanic and Atmospheric Administration, National Weather Service, Portland Office.

[3] Runway Survey – 9-13-2016.

[4] Environmental Assessment Final Report, Armstrong Consultants, December 9, 2011

making Guidance B unnecessary at this time. This is based on the 5,730-foot length of Runway 14-32, the forecast of aircraft operations, and the expected aircraft stage lengths. **Table 3-4** provides the FAA recommended runway length requirements. However, the current length remains the minimum length required for the current fleet. It is still recommended that the runway be extended to the preferred length of 6,500 feet. At that length, the runway would be able to accommodate 100 percent of small airplanes (12,500 pounds or less), meet the minimum runway length objective for all emergency aircraft[5] (specifically the Learjet 35), and increase the ability to accommodate larger airplanes on hot days. This study validated the EA's assessment that a runway extension up to 7,500 feet would be "ideal." At that length, local businesses in Fort Morgan that currently operate Lear Jet aircraft (as described in the Forecast Chapter) could use FMM instead of AKO (Colorado Plains Regional Airport).

It is evident that more runway length is desired by multiple stakeholders in the community. In the future, prior to implementation of an extension to Runway 14-32, a detailed runway length analysis should be completed, complemented with an evaluation to re-validate the Airport's fleet mix and critical aircraft. As noted in the Forecast Chapter, the Airport is currently examining techniques to better document operations. This data will provide the ability to determine exact length requirements to satisfy the demand at FMM. In the meantime, the Airport should work obtain and preserve land for a runway extension for up to 7,500 feet.

TABLE 3-4
RUNWAY LENGTH REQUIREMENTS

Aircraft Category	FAA Recommended Runway Length
Existing Runway 14-32 Length	**5,730'**
Small Airplanes with approach speeds of less than 50 knots	1,160'
Small Airplanes (< 12,500 lbs)	
75% of Fleet (< 10 seats)	4,320'
95% of Fleet (< 10 seats)	5,690'
100% of Fleet (< 10 seats)	5,950'
100% of Fleet (> 10 seats)	5,950'
Large Airplanes (12,501 lbs - 60,000 lbs)	
75% of Fleet @ 60% Useful Load	6,900'
75% of Fleet @ 90% Useful Load	9,090'
100% of Fleet @ 60% Useful Load	9,800'
100% of Fleet @ 90% Useful Load	11,490'

Sources: FAA Advisory Circular 150/5325-4, R*unway Length Requirements for Airport Design,*
FAA Airport Design Microcomputer Program 4.2D

[5] The Colorado Department of Aeronautics 2011 Aviation System Plan Update lists a minimum runway length objective of 4,600 feet for the King Air B200 and 6,000 feet for the Learjet 35 for all Eastern Plains airports. Currently, FMM does not meet the minimum runway length objective to accommodate the Learjet 35.

3.2.3.1 Turf Runways

In analyzing the runway length requirements of the two turf runways, the fleet mix that is served and the type of use must be considered. Through discussions with airport users, it was found that Runway 17-35 is primarily used by agricultural spraying operators as it is convenient to the chemical load pad that is near the FBO building. Runway 8-26 (when in good condition), is primarily used by small single engine aircraft in crosswind situations. Turf runways require additional length than pavement runways for takeoff operations. Likewise, landing operations are aided by the added resistance of the soft surface, which effectively shortens a landing aircraft's rollout. Runway 17-35 was found to be adequate for use by Air Tractor aircraft, which is the aircraft that most frequents that runway. Runway 8-26 was found to be adequate for crosswind operations for small single engine aircraft such as Cessna 182's, which is a B-I aircraft.

However, the current length of Runway 8-26 of 2,468 feet does not meet recommend length requirements for general use by aircraft within A and B approach categories[6]. That is, without a strong headwind, the length is not sufficient for takeoff operations for a majority of the small general aviation fleet. To accommodate 75 percent of small airplanes with less than 10 seats, **Table 3-4** suggests a 4,320-foot runway is needed. For turf runways, AC 150/5300-13A Change 1, *Airport Design*, recommends that distances for aircraft landing and takeoff operations be increased by a factor of 1.2 to account for the added friction of the runway surface. The suggested runway length multiplied by a factor of 1.2, equates to the need for a 5,184-foot runway.

As discussed, Runway 8-26 serves as the Airport's crosswind runway. As such, an upgrade to this runway may be needed in the future depending on local tenant needs and the fleet mix using the airport. An upgrade to Runway 8-26 may be needed in the form of an extension, a conversion to pavement, or both. Thus, it is recommend that a final length of 4,320 to 5,184 feet be considered for planning purposes when examining alternatives and establishing land use reservations.

3.2.4 Runway Design Requirements

This section analyzes the existing runway geometric and separation distances against the dimensional standards set for the critical aircraft category designated for each runway. Compliance with FAA airport geometric and separation standards, without modification to standards, is intended to meet a minimum level of airport operational safety and efficiency.

Table 3-5 compares the FAA airport design standards for the primary runway. The comparison is based on the recommended and existing design. The primary runway was found to comply with all FAA recommendations and design standards.

[6] AC 150/5300-13A Change 1, Airport Design, categories aircraft approach speeds. Category A aircraft have approach speeds less than 91 knots. Category B has approach speeds of 91 knots but less than 12 knots.

TABLE 3-5
RUNWAY 14-32 DESIGN STANDARDS

Airfield Components	RDC B-II Requirement	Runway 14/32	
		Existing	Future Met (✓)
Runway Design			
Runway Width	75'	75'	✓
Runway Shoulder Width	10' Stablilized	10' Stablilized	✓
Runway Protection			
Runway Safety Area (RSA)			
Length beyond departure end	300'	300'	✓
Length prior to threshold	300'	300'	✓
Width	150'	150'	✓
Runway Object Free Area (ROFA)			
Length beyond runway end	300'	300'	✓
Length prior to threshold	300'	300'	✓
Width	500'	500'	✓
Runway Obstacle Free Zone			
Length	200'	200'	✓
Width	400'	400'	✓
Runway Separation			
Runway centerline to:			
Holding position	200'	200'	✓
Parallel Taxiway/Taxilane Centerline	240'	300'	✓
Aircraft parking area	250'	630'	✓
Building Restriction Line	-	495'	✓
Runway Weight Capacity			
Single Wheel Gear	-	30,000lbs	✓
Dual Wheel Gear	-	30,000lbs	✓

Source: Advisory Circular 150/5300-13A Change 1, *Airport Design, RS&H Analysis, 2017*

3.2.4.1 Runway 14-32 Design Code

The existing Runway 14-32 was designed as a B-II runway. The "B" category is related to the approach speed of the critical aircraft the runway was designed to serve. The previous ALP had indicated that the runway be a B Category in the future and then move to a C Category ultimately. This study found no indication that C Category aircraft would be operating at FMM in the future, or ultimately, to the extent that would justify an upgrade to a C Category. To bring Runway 14-32 to C Category standards, the runway would need to be relocated/shifted to the north away from the existing terminal area to provide adequate spacing between the runway and fixed objects. Additionally, a large amount of earth would be required to be cut to comply with C Category runway gradients, which have less allowed gradient than B Category runways.

Though C aircraft operate at FMM today on occasion, and are forecasted to operate at FMM in the future, it is estimated that the cost of developing a new C Category runway will not provide enough benefit to be justified. The cost of this work would be extreme compared to extending the existing B Category runway which would help to better serve C Category aircraft (such as the Learjet 35), and other larger B Category aircraft.

As the Airport collects more detailed operations data, future analyses will be able to reevaluate the level of C Category aircraft use. Prior to any major expansion of the existing runway, it is recommended that the issue of C Category design be revisited, and if necessary a cost-benefit-analysis be conducted to determine if a C Category runway should be planned for.

3.2.4.2 Turf/Dirt Runway Deficiencies

Elements determined to be deficient were all found related to the Airport's two turf runways. Unmet design standards are denoted by a bold "X" within **Table 3-6**. Both turf runways have insufficient runway safety areas, runway object free areas, and runway obstacle free zones. Runway 8-26 has no safety area at the Runway 8 threshold and only a partial safety area and object free area/obstacle free zone on the Runway 26 threshold. The Runway 26 threshold safety area ends at the Airport property boundary at Highway 52. The safety area and object free area/obstacle free zone at the Runway 17 threshold extends only to the airport property boundary, which is not adequate. In all instances where the safety area or object free areas/obstacle free zones are not adequate, the areas are extending beyond the airport property line.

TABLE 3-6
TURF/DIRT RUNWAY DESIGN STANDARDS

Airfield Components	RDC B-I Small Requirement	Runway 17/35		Runway 8/26	
		Existing	Future Met (✓)	Existing	Future Met (✓)
Runway Design					
Runway Width	60'	80'	✓	100'	✓
Runway Shoulder	10' Stablilized	10' Stablilized	✓	10' Stablilized	✓
Runway Protection					
Runway Safety Area (RSA)					
Length beyond departure end	240'	83'/ 11'	X	116'/ 35'	X
Length prior to threshold	240'	11'/ 83'	X	35'/ 116'	X
Width	120'	120'	✓	120'	✓
Runway Object Free Area (ROFA)					
Length beyond runway end	240'	83'/ 11'	X	116'/ 35'	X
Length prior to threshold	240'	83'/ 11'	X	116'/ 35'	X
Width	250'	162'	X	250'	✓
Runway Obstacle Free Zone					
Length beyond runway end	200'	83'/ 11'	X	116'/ 35'	X
Length prior to threshold	200'	83'/ 11'	X	116'/ 35'	X
Width	250'	162'	X	250'	✓
Runway Separation					
Runway centerline to:					
Holding position	125'	N/A	✓	N/A	✓
Parallel Taxiway/Taxilane Centerline	150'	N/A	✓	N/A	✓
Aircraft parking area	125'	490'	✓	500' +	✓
Building Restriction Line	-	370'	✓	370'	✓

Source: Advisory Circular 150/5300-13A Change 1, *Airport Design, RS&H Analysis, 2017*

Additionally, in discussions with Airport users, it was found that Runway 8-26 is in very poor condition and is not currently suitable for operations due to excessive roughness of the turf. At the time of this writing, a project was in place to correct the surface of the runway. It was noted too that the grades where Runway 8-26 crosses Runway 14-32 are steep enough that pilots typically avoid that portion of the runway and often land beyond the runway intersection when landing Runway 26. This effectively shortens the runway length. A future configuration should be examined that removes the current runway intersection.

3.2.5 Runway Protection Zones (RPZ)

For the protection of people and property on the ground, the FAA has identified an area of land located off each runway end as the Runway Protection Zone (RPZ). The size of these zones varies according to the design aircraft characteristics, visual approaches, and the lowest instrument approach visibility minimum defined for each runway. RRZ's are categorized under three approach visibility minimum categories: not lower than 1 mile; not lower than ¾ mile; and lower than ¾ mile. All three runways at FMM fall under the approach category of not lower than 1 mile of visibility. RPZ's are also categorized based on the approach speed and size of aircraft the runway serves. At FMM, both turf runways are designed for to serve small

aircraft exclusively. That is, only aircraft 12,500 pounds and less. Runway 14-32 is designed to serve aircraft with a B approach category. **Table 3-7** details the required RPZ dimensions for each runway.

TABLE 3-7
RUNWAY PROTECTION ZONES

Approach Visibility Minimums	PRZ Design Requirements	Existing Runway RPZ		
		14-32	17-35	8-26
Not Lower than 1 mile	Aircraft Expected to Serve	A-B Aircraft	Small Aircraft	Small Aircraft
	Length	1000	1000	1000
	Inner Width	500	250	250
	Outer Width	700	450	450
	Acreage	13.77	8.035	8.035

Source: Advisory Circular 150/5300-13A Change 1, *Airport Design,* RS&H Analysis, 2017

It is recommended that a future RPZ be planned for Runway 14-32 that will meet requirements for approach visibility minimums of "not lower than ¾ mile." This is prudent planning for an eventual upgrade of the RNAV approach for Runway 14-32. Additionally, it should be noted that the RPZ's for the turf/dirt runways are not adequate in regard to ownership and control. This is further discussed in Section 3.7.3.

3.3 TAXIWAYS AND TAXILANES

The taxiway and taxilane infrastructure at FMM includes taxiways serving Runway 14-32, a partially paved taxiway serving Runway 17-35, and multiple taxilanes serving t-hangars and box hangars. **Table 3-8** details the existing design of these taxiways and taxilanes, and denotes if they are currently adequate based on FAA design standards. The analysis of the taxiway surfaces found that all except the Runway 35 Access taxiway are adequate and meet the existing and future fleet mix. The Runway 35 Access taxiway is a mix of concrete and turf surfaces and is not labeled with any signage. Because the taxiway is paved and is not signed, transient pilots have been noted to taxi onto this taxiway instead of Taxiway A. This can pose great issues for larger turbo-prop and jet aircraft that are not designed to taxi on turf surfaces. It is recommended this connector be converted to a purely turf surface, and that signage be provided if the connector remains in its current location.

The need for a full or partial parallel taxiway was examined in this study. An established planning standard suggests that a 20,000 itinerant operations is needed to justify a full parallel taxiway. This threshold is per the specific runway. At FMM, itinerant operations are not expected to near even ½ of that threshold within the planning period. Thus, it was determined that no parallel taxiway is needed. However, prudent planning requires that land be reserved for a parallel taxiway and that any other development proposed consider separation requirements of that facility.

In examining the 2003 Airport Layout Plan, it was found that prior planning had proposed the old Runway 14-32 be converted into a full parallel taxiway when the new Runway 14-32 was constructed. Due to issues with grade, connecting the old runway to the new runway with taxiway connectors was not feasible, thus the reason the old runway was fully removed.

TABLE 3-8
AIRPORT TAXIWAY AND TAXILANES

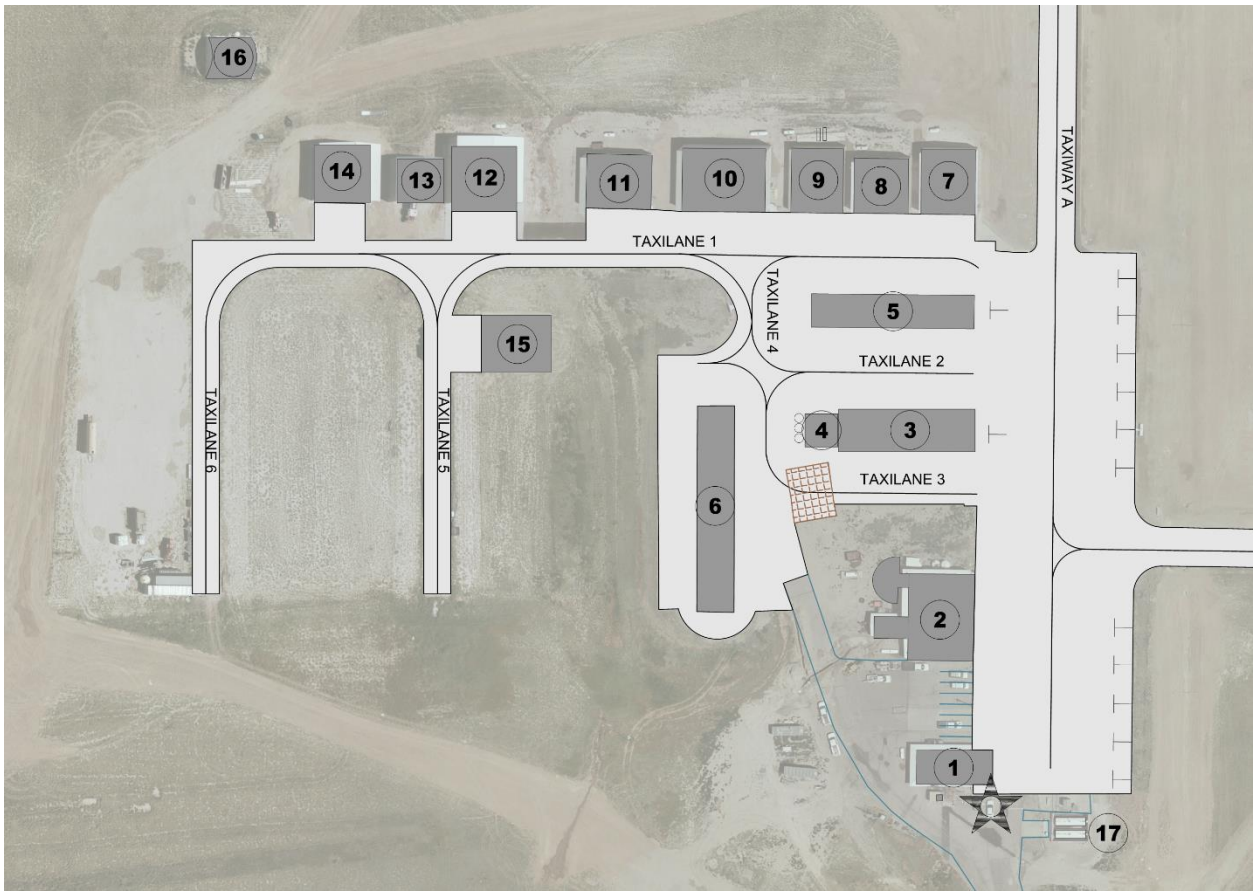
Taxiway/Taxilane Designator	Taxiway Design Group (TDG)	Type	Adequate (✓) or Deficient (X)	Problem Area
Taxiways				
"A"	2	Transitional Taxiway	✓	-
"A1"	2	By-Pass Taxiway	✓	-
"A2"	2	By-Pass Taxiway	✓	-
"A3"	2	Turn-Around Taxiway	✓	-
"A4"	2	Turn-Around Taxiway	✓	-
"Runway 35 Access"	2	Transitional Taxiway	X	Location and Surface
Taxilanes				
"T1"	1A/1B	Taxilane	✓	-
"T2"	1A/1B	Taxilane	✓	-
"T3"	1A/1B	Taxilane	✓	-
"T4"	1A/1B	Taxilane	X	Object Free Area
"T5"	1A/1B	Taxilane	✓	-
"T6"	1A/1B	Taxilane	✓	-

Source: AC 150/5300-13A, FAA 5010, RS&H Analysis, 2017

In regard to the terminal area taxilanes, it was found that distances from taxilane centerline to a fixed object varied. Current taxilane infrastructure is built to ADG I and TDG 1A/1B standards. There is a section of taxilane adjacent to the agricultural spray material tanks on Taxilane T4 (between Hangar #4 and #6 as shown in **Figure 3-1**) that fails to meet the 79 foot taxilane object free area separation requirements. The tanks alone reduce the total width of the taxilane to roughly 50 feet. Additionally, the entrance to Taxilane T1 is only 74.5 feet wide between Hangar #5 and #7, which is 4.5 feet less than required for an adequate object free area. ADG I aircraft can still taxi safely on Taxilane T1, however greater caution is recommended due to reduced wingtip separation with buildings.

The entrance to T1 is currently marked as a slight bend because the pavement surface on the north is not complete to allow a fully perpendicular alignment with Taxiway A. This alignment greatly reduces separation with Hangar #5. This situation prevents the widest wingspan aircraft in the ADG I category from safely accessing T1. As such, additional pavement is needed on the north side of the taxilane to allow for a perpendicular orientation with Taxiway A.

FIGURE 3-1
HANGARS AND TAXILANES



Source: RS&H, 2017

To accommodate the critical aircraft, an ADG II aircraft, 115 feet of total unobstructed width is required of a taxilane to meet object free area requirements. Some ADG II aircraft, depending on wingspan, may be able to fit through narrower taxilane corridors, but not with FAA standardized wingtip separation. Because the design aircraft is an ADG II aircraft, some future hangar infrastructure should be built to fully accommodate that aircraft design group.

3.4 NAVIGATION AIDS AND LIGHTING

Navigational aids and lighting, often referred to as NAVAIDS, consist of equipment to help pilots locate the airport. NAVAIDS can provide information to pilots about the aircraft's horizontal alignment, height above the ground, location of airport facilities, and the aircraft's position on the airfield. FMM features all three types of navigational aids (visual, electronic, and meteorological), as detailed in the Chapter 1, Inventory of Existing Conditions.

No deficiencies in NAVAIDS were found at FMM, as noted in **Table 3-9.** However, supplemental lighted wind cones adjacent to each runway end of Runway 14-32 is recommended. These are not required per

FAA design standards, but are encouraged as they aid pilots in landing and takeoff operations and help in determining wind-shear conditions.

TABLE 3-9
NAVIGATION AIDS AND LIGHTING

Navigational Aids	Airport Facility	Primary Runway		Turf Runway		Turf Cross Wind Runway		Adequate (✓) or Deficient (X)
		14	32	17	35	8	26	
Electronic Aids (Approaches)								
RNAV (GPS)	-	Yes	Yes	No	No	No	No	✓
Metrological Aids								
AWOS	Type-3 P/T							✓
Visual Aids								
Edge Light System	-	MIRL	MIRL	-	-	-	-	✓
Approach Lighting	-	REIL	REIL	-	-	-	-	✓
Visual Slope Indicator	-	PAPI	PAPI	-	-	-	-	✓
Segmented Circle & Primary Windcone	Yes							✓
Supplemental Wind Cone		No	No	-	-	-	-	✓
Rotating Beacon	Yes	-	-	-	-	-	-	✓

Source: FAA 5010, Airport Records, RS&H Analysis, 2017

3.5 SUPPORT FACILITIES

Support facilities at an airport encompass a broad set of functions that exist to ensure the airport is able to fill its primary role and mission in a smooth, safe and efficient manner. The following sections outline the requirements for different supporting facilities at Fort Morgan Municipal Airport.

3.5.1 Snow Removal Equipment Facility

Currently, FMM has no dedicated structure to store snow removal equipment. All snow equipment is currently stored outside, which is not ideal as the equipment is exposed to the elements year round which decreases life span. It is recommended that a snow removal equipment (SRE) facility be constructed large enough to house the Airport's snow blower, runway sweeper, loader, attachments/blades, and other corresponding equipment.

3.5.2 Aircraft Storage

Understanding aircraft storage demand is an important element when considering facility requirements for general aviation based aircraft. The quantity and type of hangar space is driven by many different factors including: total number of based aircraft, fleet mix, local weather conditions, airport security, and user preference. This section outlines requirements for T-hangars, box hangars, and corporate hangars. These hangar types are generic terms for different sized hangars. T-hangars are small hangars that are typically arranged so small aircraft are "nested" next to each other in alternating directions. Box hangars are larger than a T-hangar and are often standalone buildings. Corporate hangars are the largest type of hangar. These typically will accommodate multiple aircraft and often have an office or lounge area built on the side of the building.

In Chapter 2, Aviation Demand Forecasts, it was determined that based aircraft would increase by nine aircraft during the planning period. Based on current economics and trends, it is estimated these aircraft will be stored in future built box hangars. As such, only box hangars were approximated in the facility requirements analysis. **Table 3-10** summarizes the amount of existing hangar space compared to forecast hangar demand. It should be noted that hangar construction is entirely dependent on demand, and the actual hangar product implemented could materialize in any of the three types of hangars. Additionally, demand could exceed the forecast depending on local and regional business economics. For this reason, a future hangar layout for FMM must be flexible and ready to accommodate t-hangars, box hangars, and/or corporate hangars depending on demand.

TABLE 3-10
AIRCRAFT HANGAR AND TIE-DOWN STORAGE

Aircraft Stroage Type	2016	Planning Activity Level		
		PAL 1	PAL 2	PAL 3
T-Hangars				
Count	15	15	15	15
Square Footage	15,000	15,000	15,000	15,000
Surplus/(Deficiency)		0	0	0
Box Hangars				
Count	9	12	14	18
Square Footage	22,500	30,000	35,000	45,000
Surplus/(Deficiency)		(7,500)	(12,500)	(22,500)
Aircraft Tie-Downs				
Count	13	13	13	13
Surplus/(Deficiency)		0	0	0

Source: Airport records, RS&H Analysis, 2017
Note: Square footage is approximated using standard dimensions. T-Hangars calculated as nested 1,000 square feet each. Box Hangars calculated as 50'x50'. Corporate Hangars calculated as 100' x 100'.

3.5.3 Aircraft Apron and Tie-Downs

The aircraft apron at FMM is used primarily by transient aircraft requiring parking when pilots and passengers are visiting Fort Morgan. Additionally, local tenants may use the apron for temporary parking when waiting for passengers or using the FBO facilities. The apron accommodates 12 tie-down positions and a circulation corridor ending at the self-serve fuel tanks. Aircraft requiring parking on the apron are all placed on the existing tie-downs whether they use the tie-down inlets or not, as that area is the only area on the apron outside of the circulation corridor.

In discussions with Scott Aviation management, it was learned that the 12 tie-downs today are adequate for anticipated needs in the near term. However, the circulation required on the apron, specifically for larger turbo-prop and jet aircraft, requires a majority of apron which greatly reduces the usable apron. Therefore, parking larger aircraft on the apron is challenging in that they block access to the fuel pumps.

Additionally, the entrance to the "Runway 35 Access" taxiway adds additional circulation needs, further reducing usable apron.

An analysis was completed to determine the apron requirements based on circulation needed for the critical aircraft, the Dassault Falcon 20, and for the requirements for a full ADG II taxilane. The analysis was based on the assumption that the apron provides enough parking for aircraft today, but does not have adequate circulation. Measurements were based on the required depth to park the Falcon 20 in an east/west configuration. The results of the analysis are detailed in **Table 3-11** below. Overall, it was determined that roughly 1,900 square yards of additional apron is needed for the circulation of the Falcon 20, and 3,400 square yards for full ADG II circulation.

These measurements provide a baseline requirement. The next chapter of this study, *Identification and Evaluation of Alternatives*, will examine different configurations of apron expansion to determine the most efficient layout considering both circulation and aircraft parking needs.

TABLE 3-11
AIRCRAFT APRON

Apron Area (SqYd)	Total Existing Apron (SqYd)	Usable Apron (SqYd)	Total Required (SqYd)	Surplus (Deficit) (SqYd)
Design for Dassault Falcon 20 Circulation	7,600	2,900	9,500	(1,900)
Design for Full ADG II Circulation	7,600	1,240	11,000	(3,400)

Source: AC 150/5300-13A, FAA 5010, RS&H Analysis, 2017

It should be noted that in determining future apron requirements through the planning period, typical analysis methods that correlate apron size to transient aircraft operations are not applicable at FMM. This is because no empirical data is available for historical transient aircraft operations, as there would be if the airport had an air traffic control tower. However, for the size and complexity of FMM, this circumstance is typical. Instead of complex analysis, qualitative measures, such as the opinions of the FBO operator and local tenants is the best way to determine the amount of apron required today. Industry experience and prudent planning will be incorporated in determining future land reservations for apron expansion needs.

3.5.4 Airport Access and Vehicle Parking

The Airport access roadway that stems off of Highway 52 was found to be sufficient through the planning period. The roadway is in good condition and provides adequate access for private vehicle and truck traffic. It was found that today, with the types of businesses and hangar tenants at the Airport, no additional vehicle roadway is needed. Today, the only people driving into the hangar area are those who own and/or operate aircraft. At FMM, as common at most general aviation airports, drivers of vehicles use the taxilane network to get to and from their hangars. Vehicles are typically stored inside the hangar while the aircraft is in use. It is recommended that some designated paved areas, or areas made of materials that will not get muddy when wet, be added in the future to provide guest parking and vehicle and equipment turn around areas in the hangar area.

When a business is established in the terminal area that brings in people who are not familiar with the airport environment, an additional roadway will be needed to separate those people from areas where aircraft operate. Previously at FMM, a dirt road to the south and west of the hangar area was used by patrons of a parachute tourist company operating in the northwest corner of the terminal area. That company is no longer operating. However, its previous existence illustrates the need to have a plan in place to provide locations for businesses that may increase roadway needs.

In regard to vehicle parking, discussions with Airport Management and Scott Aviation indicated that current parking at the FBO at times reaches capacity. It is recommended that stripping be installed on the existing pavement and an additional five spaces be added to provide for spill over parking.

In summary, the current vehicle access at FMM is adequate. A small paved parking area for five vehicles is recommended adjacent to the FBO. Additionally, a small gravel parking lot(s) with the capacity for up to four vehicles is recommended to be added in the hangar area to provide a supportable parking surface for guests and equipment turn around. This area(s) should be sited to ensure wingtip clearance for taxiing aircraft. Additionally, a roadway and associated parking area should be planned with consideration to the needs of a future aviation company that serves the public.

3.6 UTILITIES

Existing availability and capacity of utilities serving the airport were analyzed for their ability to accommodate future development. This section discusses each utility at the Airport, and provides a description of its configuration and recommended upgrades to support for future development.

3.6.1.1 Electrical Systems

The electrical supply at the airport is provided by Morgan County Rural Electric Association (REA). REA supplies and maintains all electrical infrastructure provided to buildings and hangars at the airport, and manages all building related electrical installations.

The airport is served via a main electrical corridor which runs along the east side of the Highway 52 right-of-way. The electrical line connects into a 50 kVA transformer located on the northeast corner of the intersection of Highway 52 and the airport access road. From this transformer, the electrical line runs under the highway and follows the access road to another 50 kVA transformer in the airport's hangar area. This second 50 kVA transformer is located adjacent to the FBO building. The existing trunk line that feeds the airport infrastructure was found to be sufficient through the planning period.

From the transformer adjacent to the FBO building, buried electrical lines run to the north and provide power to box hangars. Hangars with power are supported by a 15 kVA transformers, which can support roughly three hangars depending upon the electrical load. REA is considering phasing out 15 kVA transformers with 50 kVA transformers. A 50kVA transformer can support approximately ten hangars depending upon the electrical load of each hangar. In discussions with REA, it was noted that they are

considering the use of new 50 kVA transformers instead of 15 kVA transformers for new hangar development. Additionally, REA is considering switching existing 15kVA transformers with 50kVA transformers once the transformer has exceeded its useful life. When the Airport is ready for additional transformers or needs to replace existing ones, a cost benefit analysis and discussions with REA should be conducted in order to determine the appropriate strategy. The Airport should continue to work with REA and existing and future tenants to aid in developing financially efficient solutions.

3.6.1.2 Natural Gas

A select number of hangars are supplied with natural gas. Natural gas is provided in the form of independent propane tanks, typically located on the back side of hangars. Analysis determined that a direct natural gas line to the airport is not warranted, and the use of independent propane tanks is satisfactory within the planning period. It is recommended that future development of hangars and buildings plan for propane tanks to be located in the back, and that a corridor be provided to allow access for refueling trucks.

3.6.1.3 Sewer Systems

Sewage service at the airport is currently limited to septic systems. The only building with a septic system in place currently is the city owned FBO building. The septic tank for that system has a 1,000 gallon capacity. This size of tank is required for residential houses of 1-3 bedrooms[7], which on average will use 300 gallons per day (based on 75 gallons per day per person for a single-family dwelling[8]). At the Airport FBO, it is reasonable to assume that on average, a person may use about 20 gallons per day for restroom, hygiene, and drinking purposes. Using water utility data provided by Quality Water, it was estimated that on average during the busiest summer months, 120 gallons of grey and black water per day is put into the FBO septic system. This usage is related to sinks and toilets within the building. Thus, the tank's daily capacity (which is around 300 gallons per day) is roughly half used, which may allow for additional sewer lines to connect to the existing system.

Assuming connections could be made to the existing tank, new hangar tenants that desire sewer service could potentially tie into the existing system. If each hangar had a toilet and sink, it is reasonable to expect that peak demand per day would be within the range of 10 gallons to 30 gallons. This assumes that the bathrooms would not have a shower, and that the facilities would be used for only a couple of hours during the day. At 30 gallons per day per hangar, five additional hangars could be tied into the existing system. However, water usage can be highly variable, and these estimates may represent demand far higher, or lower than a future airport tenant would require.

Overall, it appears that the existing system could provide sewer service to one or more hangars. It is recommended that further analysis be conducted on the existing system to determine what daily peaks are and how much capacity remains. Future hangar development should be planned to accommodate

[7] Northwest Colorado Health Department, Basic Onsite Wastewater Treatment System (Septic) Requirements, 2017

[8] Colorado Department of Public Health and Environment, Regulation No. 43 – On-Site Wastewater Treatment System Regulation, 2017

sewer services, and the Alternatives Analysis chapter of this study will consider utility corridors for future septic systems. If a new septic system is implemented in the future, consideration should be given on how to integrate multiple hangars into one tank. Doing so is cost effective and more practical then attempting to implement an independent system for each hangar.

3.6.1.4 Water Utility

The water line that supplies the Airport extends from a 6 inch main line at W Road up to the airport access road. That line runs north along Highway 52 via a 2 inch pipe. From the intersection of the airport access road and Highway 52, a 4 inch pipe runs adjacent to the access road to the airport's hangar area. Two water taps have been made off the 4 inch service line; one 2 inch line which is used to fill agricultural aerial application tanks, and a ¾ inch line that serves the airport FBO building and is used to supply water to the bathrooms and kitchen.

Morgan County Quality Water District manages the water infrastructure serving the airport. Quality Water staff was consulted to determine the capacity of the existing service line, and identify if additional taps could be accommodated. Of the two taps, the 2 inch line that is used to fill aerial application tanks puts the most demand on the system. Initial calculations indicated that the peak flow rate at the airport was 11.5 gallons per minute with a pressure range of 71-86 pounds per square inch (PSI). A total peak flow rate of 21.5 gallons per minute with 47 PSI was estimated. This data indicates during times of peak demand, the line has excess capacity and could supply another 10 gallons per minute at 47 PSI. This excess capacity is enough for 4 hangars assuming they have bathrooms with showers that require water flows of 2.5 gallons per minute.

However, the model used is based on an estimate of peak demand, and it is likely that the 2 inch line serving the agricultural application tanks may max out at 20 gallons per minute when completely opened up. If this is correct, then the current service line has no additional capacity during the times when the tanks are being refilled. It is recommended that the 2 inch line that serves the agricultural application tanks be measured with a data logger attached to that tap's flow meter to determine exactly what peak flows are on that line.

The constraining portion of the water supply serving the airport is the 2,600 feet of 2 inch line that runs between the airport access road and W Road along Highway 52. If testing determines that the water supply at the airport has no additional capacity during peak times, that part of the water main can be upgraded to a 4 inch or 6 inch pipe. This upgrade is not highly cost prohibitive, and at the time of this writing, was estimated to cost roughly eleven dollars per linear foot.

In summary, the water supply at the airport may have additional capacity that can be used to provide water service to future hangars. However, testing is needed to confirm this capacity. In the event that additional capacity is needed, the water main between the airport access road and Road W should be upgraded.

3.6.1.5 Communications Systems

All telecommunication service at the airport is provided via satellite based technology. The need for buried phone lines was found to be unnecessary at this time. No fiber optic lines are located on the airfield. If fiber optic becomes essential, a fiber optic corridor could be created from tapping into the fiber optic line running on the east side of Highway 52.

3.6.1.6 Utility Analysis Summary

In summary, the water and sewer services at the airport may potentially have the ability to support new hangars with restrooms and showers. However, some additional testing is required to validate this assumption. Upgrades to the water system that would provide additional capacity is relatively inexpensive. To increase sewer capacity, a new septic tank system is needed. This system should be designed to allow multiple hangars the ability to tie-into the system. All other utilities are adequate at this time.

A summary of each utility located at the Airport along with a brief description capacity and recommendations for enhancements are shown in **Table 3-12**.

TABLE 3-12
UTILITY CAPACITY

Utility	Existing Capacity / Description	Description of Capacity	Recommended Enhancements	Adequate (✓) or Deficient (X), or More Data Needed (MD)
Water	4" Line	Potential existing capacity for small hangar bathrooms.	Upgauge 2" pipe between Road W and Airport Access Road.	**MD**
Electrical Power Lines	50 kVA/15 kVA	2-3 Box Hangars 15 kVA/ Manufacturing Hangars 50 kVA.	Upgrade 15 kVA transformers with 50 kVA.	✓
Natural Gas	Independent Propane Tanks	Small self-contained propane tanks adjacent to each structure using gas	None at this time	✓
Sewage	1,000 Gallon Septic Tank	Potential for 5 additional hangars to tie into existing system	Further study to determine capacity and areas suitable for future systems	**MD**
Telecommunication	Telephone and Satellite Based	Satellite dishes	None unless required for specific business purpose	✓

Source: Morgan County REA, Morgan County Quality Water, Northeast Colorado Health Department, RS&H Analysis, 2017

3.7 LAND USE AND ZONING ORDINANCES

Land use and zoning ordinances were examined as part of this master plan study. Specific elements examined include County zoning ordinances and overlay districts, agricultural land uses surrounding the airport, and runway protection zone land use and ownership. These elements are critical in regard to maintaining airport compliance with grant assurances, and protecting the airport and airspace from development that could interfere with airport operations. Note that on-airport land uses will be studied as part of the alternatives process of this master plan, and denoted on the Airport Layout Plan.

3.7.1 Zoning Ordinances and Airport Overlay District

A thorough assessment of the 2007 Morgan County Zoning Ordinance[9] was completed in regard to zoning ordinances involving aviation related facilities and the unenancted Morgan County Zoning Ordinance Airport Influence Area Overlay District (AOD). The current unadopted language in the zoning ordinance was found in need of revision to incorporate best practices.

Once the language is retooled, it is recommended it be adopted as soon as practical within the Zoning Ordinance. The use of zoning and airport overlay districts are primary tools in ensuring compatible land use surrounding an airport, which is a requirement for airport sponsors to maintain compliance with FAA grant assurances. As such, it is vital that these tools be implemented in the very near term.

3.7.2 Agricultural Land Use

As mentioned in Section 1.6, the Airport is surrounded on all sides by agricultural land. Agricultural crop production on airport property can be wildlife attractants leading to wildlife hazards for the Airport. The FAA has established minimum distances between on-airport agricultural land and certain airport features, which is outlined in **Table 3-13.**

TABLE 3-13
MINIMUM DISTANCES FROM AGRICULTURAL CROPS TO AIRPORT FEATURES

Runway	Aircraft Design Group	Distance from Runway Centerline to Crop (in feet)		Distance from Runway End to Crop (in feet)		Distance from Centerline of Taxiway to Crop (in feet)	Distance from Edge of Apron to Crop (in feet)
		Visual & ≥ ¾ mile	< ¾ mile	Visual & ≥ ¾ mile	< ¾ mile		
Runway 14-32	Group II (1)	250'	400'	400' (3)	600'	66'	53'
Runway 8-26	Group I (2)	200' (4)	400'	300' (3)	600'	45'	40'

Notes: /a/: Wing span 49 feet up to 73 feet.
/b/: Wing span up to 49 feet.
/c/: "These dimensions reflect the TSS as defined in AC 150/5300-13, Appendix 2. The TSS cannot be penetrated by any object. Under these conditions, the TSS is more restrictive than the OFA, and the dimensions shown here are to prevent penetration of the TSS by cops and farm machinery."
/d/: "If the runway will only serve small airplanes (12,500 lb. and under) in Design Group I, this dimension may be reduced to 125 feet; however, this dimension should be increased where necessary to accommodate visual navigational aids that my be installed. For example, farming operation should not be allowed within 25 feet of a PAPI light box."

Source: FAA, 2005; RS&H, 2017.
[Clearly, Edward C., Dolbeer, Richard A. *Wildlife Hazard Management at Airports, A Manual for Airport Personnel*. July 2005. Accessed: https://www.faa.gov/airports/airport_safety/wildlife/resources/media/2005_FAA_Manual_complete.pdf, March 2017.]

In addition to minimum separation standards from agricultural lands on airport property established by the FAA, the FAA has also established types of crops that are not permitted on airport property; specifically, hay crops, cereal grains, and sunflowers. These types of crops are especially high wildlife attractants. Since the Airport is surrounded by agricultural lands on all sides, it is recommended that an

[9] Morgan County Zoning Regulations June, 2007. Amended by Resolution 2014 BCC 26 August 19, 2014

FAA-approved wildlife biologist[10] review the proposed land uses, in consultation with local farmers and Airport personnel, to prevent incompatible land uses and/or unapproved crop production that could affect aviation safety.

3.7.3 Runway Protection Zone Land Use and Ownership

In 2012, FAA updated guidance on the appropriate land uses within an RPZ. This update lists buildings, recreational land use, public roads and rail facilities as incompatible land uses. However, the policy's intention is to address the introduction of new or modified land; because Highway 52 existed prior to the 2012 guidance, it is acceptable and does not require relocation.

The RPZ's for Runway 14-32, except for the right-of-way for Highway 52, are owned in full by the City of Fort Morgan and are within the airport property. The RPZ's for Runway 8-26 are not owned or controlled at all by the City, and the RPZ's for Runway 17-35 are only partially owned. It is recommended that the City of Fort Morgan work to establish easements to protect the RPZ's of these runways, or begin acquiring all the land within the RPZ's.

3.8 ADMINISTRATIVE MANAGEMENT AND COMPLIANCE

Various administrative tools are typically used by airport management in effort to ensure compliance with FAA grant assurances. FAA Order 5190.6B *Airport Compliance Requirements*, details the elements required for airports to maintain compliance. Multiple tools are available for airport management to ensure compliance. Those relevant to FMM are listed below in **Table 3-14**. FAA Order 5190.6B provides example minimum standards and rules and regulations that can be used by airport sponsors in drafting these documents. It was found that the Airport's current minimum standards are not sufficient, and do not include the type of information that must be provided in such a document. While development guidelines are less useful in maintaining grant assurance compliance, they are a useful tool in encouraging development that is consistent with the Airport's and City's vision. The airport currently has development guidelines, but these are outdated and are recommended for overhaul.

[10] FAA. Advisory Circular (AC) 150/5200-36A, Change 1, Q*ualifications for Wildlife Biologist Conducting Wildlife Hazard Assessments and Training Curriculums for Airport Personnel Involved in Controlling Wildlife Hazards on Airports*. Accessed: https://www.faa.gov/documentLibrary/media/150_5200_36a_chg1.pdf, March 2017.

TABLE 3-14
ADMINISTRATIVE AND FINANCIAL TOOLS

Administrative and Financial Tools	Description of The Tool	Adequate (✓) Enhancements Recommended (X)
Minimum Standards	Minimum standards is the document of an airport that outlines the minimum level of service that must be provided for any commercial aeronautical activity at the airport. Per FAA AC 150/5190-7 *Minimum Standards for Commercial Aeronautical Activiti* es, these standards are to be "ensure a safe, efficient and adequate level of operation and services," and must be reasonable and not unjustly discriminatory.	**X** - The current minimum standards are not detailed or specific enough to act as a controlling document.
Airport Rules and Regulations	Rules and regulations cover the general use and allowable operations at the airport. This document is often referenced in airport lease agreements, and typically covers issues such as aircraft rules, animals, smoking, waste storage, vehicles on the airport, parking, fueling safety, fire safety, hangar construction, etc.	✓ **-** Airport has current rules and regulations
Leasing Documents	Applicable lease documents include Land Leases, FBO Leases, and other leases for property and land owned by the airport. ACRP Report 47 *Guidebook for Developing and Leasing Airport Property* provides guidance on elements to include within these lease documents.	✓- Lease documents exist for hangars and FBO.
Development Guidelines	Development guidelines provide guidance for on-airport development in regard to building requirements, setbacks, signage, lighting, parking, and other elements related to new construction. These can be helpful in setting a consistent airport-wide standard of development.	**X** - The current development guidelines are outdated and need to be refreshed.

Source: Airport Records, RS&H Analysis, 2017

3.9 REQUIREMENTS SUMMARY

Table 3-15 is a summary of the requirements determined in this study for Fort Morgan Municipal Airport. The next chapter of the master plan details the alternatives analysis conducted for those facilities that needed further study, indicated with a blue box in the table below. The alternatives chapter details the conclusions of the alternatives analysis, and provides a comprehensive concept that integrates all chosen preferred alternatives.

TABLE 3-15
SUMMARY OF FACILITY REQUIREMENTS

Elements	Description of Need and/or Recommendation
Runways	
Runway Protection Zone	Alternatives will examine how best to provide adequate runway protection zones for Runway 17-35 and Runway 8-26
Runway Length	Alternatives will examine runway extensions for Runway 8-26
Runway Safety Area, Object Free Area, Obstacle Free Zone	Alternatives will examine how to bring Runway 17-35 and Runway 8-26 safety areas, object free areas, obstacle free zones up to FAA standards.
Taxiways and Taxilanes	
Parallel Taxiways	Plan for a future parallel taxiway system for the primary and crosswind runways.
Transitional Taxiways	Alternatives will examine how the "Runway 35 Access" taxiway should be adjusted to reduce confusion and enhance safety.
Taxilane T1	Additional pavement is needed on the north side of the entrance to T1 to allow a perpendicular taxi configuration with the apron/Taxiway A.
Taxilane T4	Recommended to have greater separation between buildings if/when hangars are replaced or repositioned. Stored items and equipment should be kept out of the taxilane object free area to ensure wing tip separation.
Navigation Aids and Lighting	
Supplemental Wind Cone	Recommended that supplemental lighted wind cones be added to each end of Runway 14-32.
Facilities and Apron	
Snow Removal Equipment (SRE) storage facility	Reserve land for a new snow removal equpmioent storage facilitiy. This facility can be combined with a new FBO and/or hangar structure.
Hangar Storage	Reserve land for 9 box hangars. Alternatives will examine configurations of various sized hangars with the ability to accommodate B-II aircraft.
Aircraft Apron	Reserve a minimum of 3,400 additional square yards of apron. Alternatives will examine configurations that will best accommodate future expansion.
Vehicle Access and Parking	
Vehicle Roads	Plan for future on-airport vehicle roadway in the hangar area.
Vehicle Parking	Stripe FBO parking lot. Reserve space for additional 5-10 spaces adjacent to FBO. Reserve space for 5-10 spaces within the hangar area.
Land Use and Zoning Ordinances	
Zoning Ordinance/Airport Overlay District	Recommended that the un-adopted airport overlay district language be revised, and then adopted by Morgan County within their Zoning Ordinance.
Administrative Management and Financial Tools	
Minimum Standards	Develop comprehensive and specific minimum standards
Development Guidelines	Modernize and overhaul current development guidelines

Elements that will be carried forward in the alternatives analysis

CHAPTER 4

ALTERNATIVES ANALYSIS

4.1 INTRODUCTION

This chapter outlines the alternatives and design changes considered for FMM to meet the facility requirements outlined previously in Chapter 3. Those requirements were developed based on the expected aviation demand over the next 20 years, as indicated in the forecast. The main purpose of this chapter is to discuss and document the alternatives that were developed to meet the projected demand. The following airport components are addressed in this chapter.

- Runways and Taxiways
- Aircraft Apron
- Aircraft Hangar Storage

Alternatives were developed for each of these airport components through meetings and discussions with City of Fort Morgan staff. The alternatives were refined, and then evaluated based on a set of defined parameters. Finally, the alternatives and the evaluation determinations were discussed and vetted with the Master Plan Advisory Committee (MPAC). The result of the analyses conducted in this study is a cohesive plan for airport development that functionally combines all recommended improvements. This plan will enable the City of Fort Morgan to effectively develop airport facilities through the planning period.

The elements examined are divided into two groups: leading elements and trailing elements. Leading elements are primary facilities that require significant amounts of land and/or capital investment to implement, and whose placement and configuration must take precedence when formulating alternatives. At FMM, these facilities include airfield elements related to runways and taxiways. Trailing elements are those whose placement and configuration are typically influenced by, and dependent on, the decisions made for primary facilities. These elements were identified as aviation support items including aircraft hangars and apron. **Table 4-1** includes those items that were identified in the facility requirements for further study within the alternatives phase of the master plan.

TABLE 4-1
LEADING AND TRAILING ELEMENTS

Element	Description
Leading Elements	
Runway Protection Zone	Alternatives will examine how best to provide adequate runway protection zones for Runway 17-35 and Runway 8-26.
Runway Length	Alternatives will examine runway extensions for Runway 8-26.
Runway Safety Area/Object Free Area/Object Free Zone	Alternatives will examine how to bring Runway 17-35 and Runway 8-26 safety areas, object free areas, and object free zones up to FAA standards.
Transitional Taxiway	Alternatives will examine how the "Runway 35 Access" taxiway should be adjusted to reduce confusion and enhance safety.
Trailing Elements	
Aircraft Hangar Storage	Reserve land for 9 box hangars. Alternatives will examine configurations of various sized hangars with the ability to accommodate B-II aircraft.
Aircraft Apron	Reserve a minimum of 3,400 additional square yards of apron. Alternatives will examine configurations that will best accommodate future expansion.

Elements studied in the alternatives analysis

4.1.1 Alternatives Development and Evaluation

The process of determining viable alternatives, and ultimately selecting the alternatives that will make up the preferred development plan, was performed in a series of interrelated steps. The first step included the creation of preliminary alternative concepts for each element. The concepts were designed to meet the facility requirements defined in Chapter 3, Facility Requirements. The preliminary alternatives were then evaluated based on a set of parameters outlined below in **Section 4.1.1.1**. The evaluation process included stakeholder input, which guided the refinement of each element of study. The result was a preferred alternative that was carried forward into the implementation chapter for phasing and further cost requirements.

4.1.1.1 Evaluation of Alternatives

The evaluation of alternatives was guided by a combination of general planning criteria and City of Fort Morgan goals established during the pre-planning phase of this master plan effort. These collectively were distilled into the following set of evaluation parameters.

- FAA Airport Design Standards
  - *Conforms to best practices for safety and security*
  - *Conforms to the FAA design standards and other appropriate planning guidelines*
- Operational Performance
  - *Functions well as part of the existing Airport system*
  - *Appropriately accommodates forecasted demand*
- Supports Immediate Needs and Long Term Goals
  - *Doesn't prohibit future long term development*

Solution works in alignment with long term vision

- Fiscal Considerations

  Is fiscally realistic and can fit into FMM's budget

  If possible, maintains or enhances overall fiscal performance

- Land Development Strategies

  Provides for the highest and best on- and off-airport land use

4.2 RUNWAY AND TAXIWAY ALTERNATIVES

The runway alternatives developed in this study address the deficiencies found with Runway 8-26 and Runway 17-35. The taxiway alternatives developed are related to the issues identified with the partially paved "Runway 35 Access" taxiway.

Primary issues related to Runway 8-26 and Runway 17-35 include insufficient runway safety areas (RSA), runway obstacle free zones (OFZ), runway object free areas (OFA), and runway protection zones (RPZ) (Note that the OFA and OFZ area requirements for the turf runways are dimensionally the same). Additionally, the facility requirements found that the crosswind runway for ADG I (small piston) aircraft, Runway 8-26, was too short. This is partially because the runway intersects the primary paved runway. The mix of turf and pavement is not ideal, and pilots typically avoid the portion of the runway that crosses the paved runway, which essentially shortens the effective length. The intersecting runways were also noted to be a less than ideal configuration, as fully independent runway systems have been proven to be the safest and most efficient design possible.

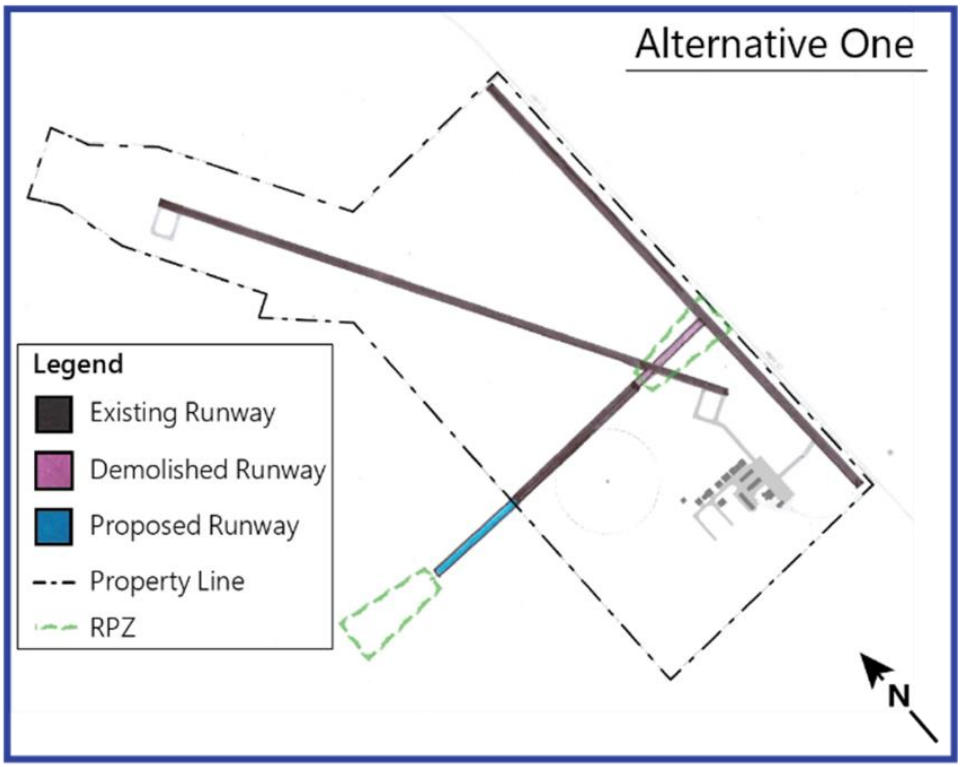
During meetings with the Master Plan Advisory Committee (MPAC), is was validated that a longer crosswind runway would be useful. Additionally, it was recognized that ultimately, beyond the planning period, Runway 8-26 may eventually benefit from being converted to a paved runway to provide more flexibility and wind coverage for larger aircraft if wind patterns change.

4.2.1 Runway 8-26 Alternatives

Multiple alternatives were initially developed for Runway 8-26, and were condensed to three. All three examined ways to fix the current RSA, OFA, OFZ, and RPZ deficiencies. The following options were examined and evaluated to determine a preferred option. A graphical depiction of each of the alternatives along with a summary of benefits and concerns with each alternative are provided below.

Alternative 1 – This alternative, shown in **Figure 4-1**, proposes the runway be shifted to the west, as currently shown on the 2003 Airport Layout Plan. The shift allows for an adequate RSA, OFA, and OFZ on the Runway 26 threshold. Additionally, it eliminates the intersection with the primary runway and brings the Runway 26 RPZ entirely into airport property. However, the shift requires land acquisition on the west side to accommodate the runway, RSA, OFA, OFZ, and RPZ. Additionally, the option maintains the runway at 2,470 feet. Overall, though the option meets FAA design standards, it fails to increase operational performance because it is too short for ADG I aircraft (small pistons), and does not meet the long term goals of the Airport.

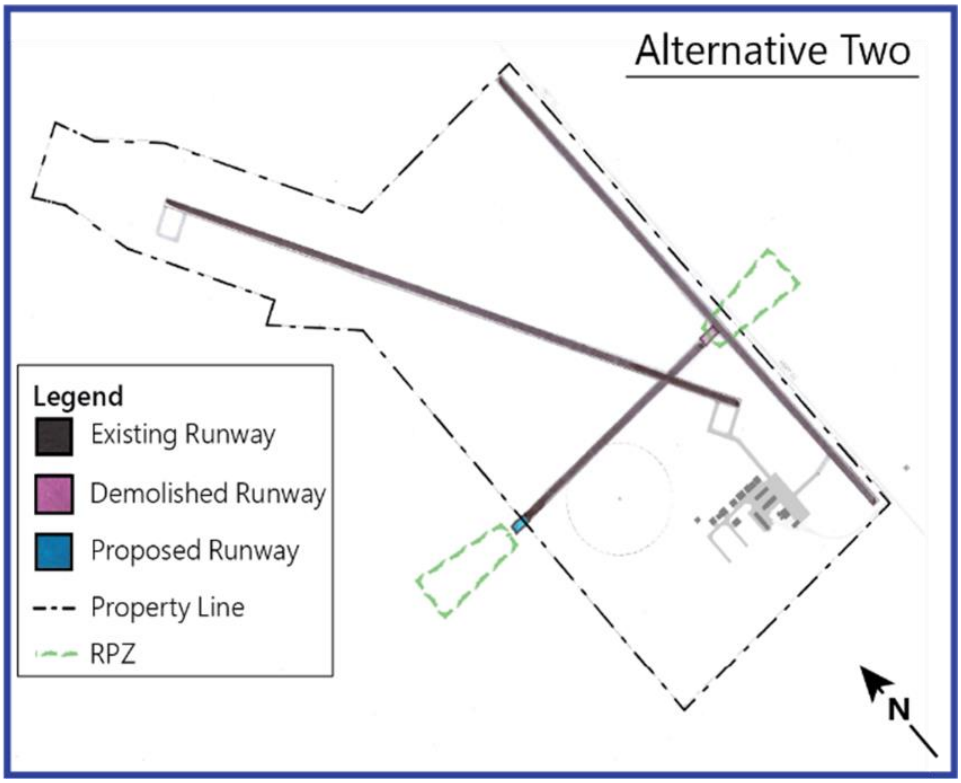
FIGURE 4-1
RUNWAY 8-26 ALTERNATIVE ONE



Source: RS&H Analysis, 2017

Alternative 2 – This alternative, shown in **Figure 4-2,** proposes the runway be shifted slightly to the west enough to provide an adequate RSA, OFA, and OFZ on the Runway 26 threshold. The shift would require that the runway be slightly extended on the Runway 8 end. To provide for this extension, and for the RSA, OFA, OFZ, and RPZ to meet standards, land acquisition would be required. The option maintains the intersection with Runway 14-32, which creates challenges related to transitions between turf and paved surfaces. Runway intersections are not a preferred design as it has been found that runway systems with no runway intersections are the safest and most efficient. The keeping of the runway intersection in this alternative is highly unfavorable. Additionally, the alternative maintains the runway's current length, which was deemed insufficient as noted in Alternative 1. Overall, this alterative requires the least amount of land acquisition to fix its design deficiencies, however, it does not perform well operationally nor does it meet near term or future goals related to runway length.

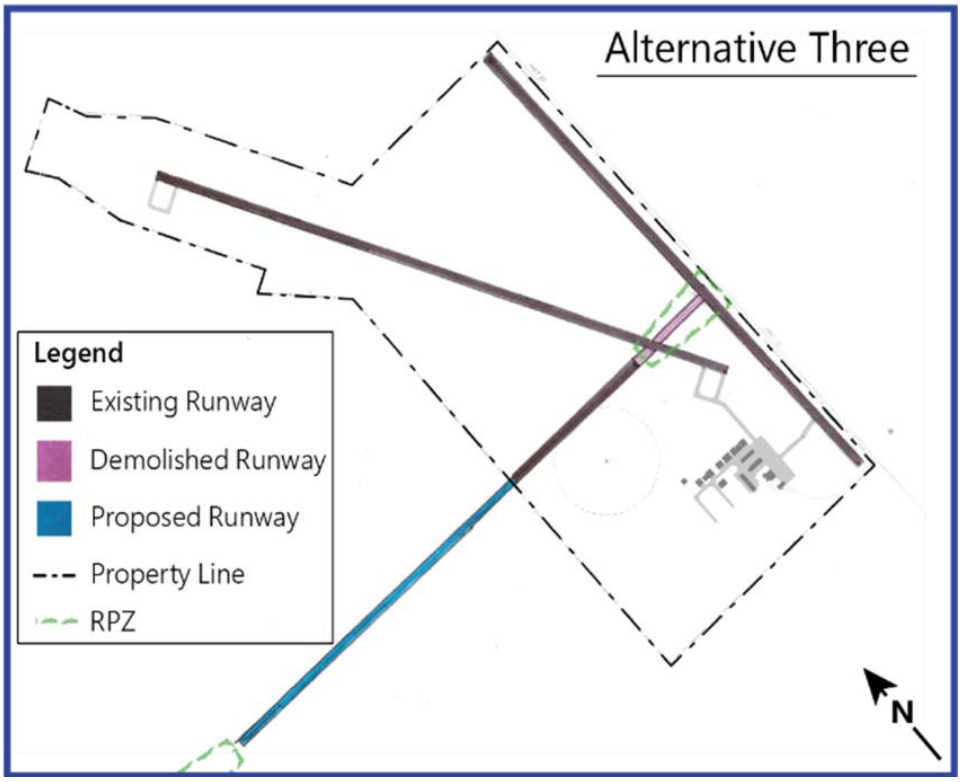
FIGURE 4-2
RUNWAY 8-26 ALTERNATIVE TWO



Source: RS&H Analysis, 2017

Alternative 3 – This alternative, shown in **Figure 4-3**, proposes the runway be shifted to the west, similar to Alternative 1, but with an extension of the runway to 4,320 feet (determined to be the length required for a paved runway to service 75 percent of small aircraft greater than 12,500 pounds with less than 10 seats). Similar to Alterative 1, all design deficiencies are remedied and the runway is decoupled from the primary runway. Essentially, this alternative builds upon Alternative 1 and better provides for the future beyond the 20 year planning horizon of this study. At full build out, the paved 4,320 foot runway could be used to provide wind coverage for larger aircraft if wind patterns change in the region. In the near term, the runway is proposed to be extended as a turf runway to a length of 3,000 to 3,500 feet depending on funding and land available. It is estimated that 3,000 to 3,500 feet of turf runway is adequate to serve the aircraft fleet that will most use the runway in the near term. Prior to implementation, a more detailed runway length analysis is recommended.

FIGURE 4-3
RUNWAY 8-26 ALTERNATIVE THREE



Source: RS&H Analysis, 2017

4.2.1.1 Runway 8-26 Alternative Evaluation Summary

Overall, Alternative 3 was found to best meet the established planning parameters used for evaluation, as illustrated in **Table 4-2**. Full implementation of Alternative 3 will entail the greatest amount of land acquisition to accommodate the extension to the west, but the associated costs were deemed worth the added investment as the land will provide near-term and long-term flexibility. The option provides flexibility and increased operational performance and safety. By using a phased approach, the alternative will not commit financial resources for additional extension until they are needed and/or available.

TABLE 4-2
RUNWAY 8-26 EVALUATION MATRIX

Runway 8-26 Evaluation Parameters	Alt One	Alt Two	Alt Three
FAA Airport Design Standards			
Operational Performance			
Supports Immediate Needs and Long Term Goals			
Fiscal Considerations			
Land Development Strategies			

Notes: Green indicates strong performance | Yellow indicates fair performance | Red indicates poor performance
Source: RS&H Analysis, 2017

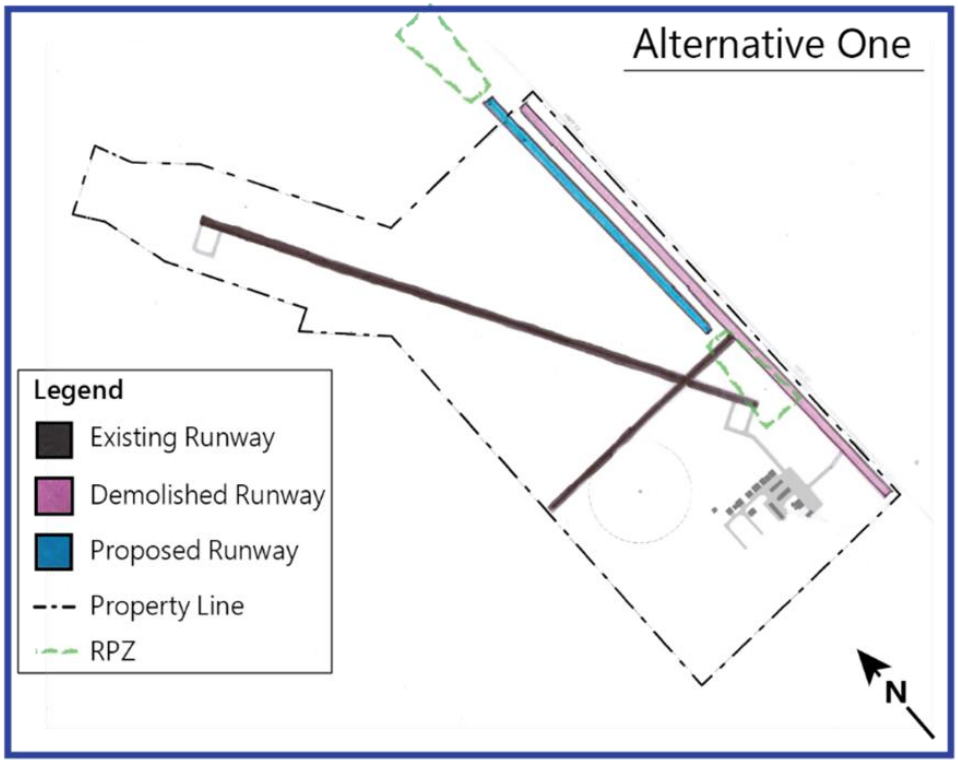
4.2.2 Runway 17-35 Alternatives

The Facility Requirements found that Runway 17-35 has a substandard RSA, OFA, OFZ, and RPZ. Additionally, the analysis conducted as part of this study found that the runway is not needed within the runway system to provide FAA required wind coverage, or to provide capacity. During MPAC meetings, the local FAA Planner for FMM noted that this runway is not eligible for FAA funding because it is not required for wind or capacity. If the Airport desires to keep the runway, improvements are necessary to bring it into standard. The cost of those improvements would need to be funded entirely by the Airport.

Three alternatives were developed for Runway 17-35 to examine the ways to fix the current deficiencies related to the substandard RSA, OFA, OFZ, and RPZ. The following describes each alternative and the evaluation conducted to determine the preferred option. A graphical depiction of each of the alternatives along with a summary of benefits and concerns with each alternative is provided below.

Alternative 1 – This alternative, shown in **Figure 4-4**, proposes the runway be relocated to the west and shortened from the existing length of 5,216 feet to 3,000 feet. The configuration is based on the preferred long term plan included in the 2003 Airport Layout Plan. The option complies with all FAA design standards, allows for an adequate RSA, OFA, and OFZ, and prevents the runway from intersecting with the other runways. The configuration requires land acquisition on the north side for the runway and further land acquisition or an easement for the RPZ.

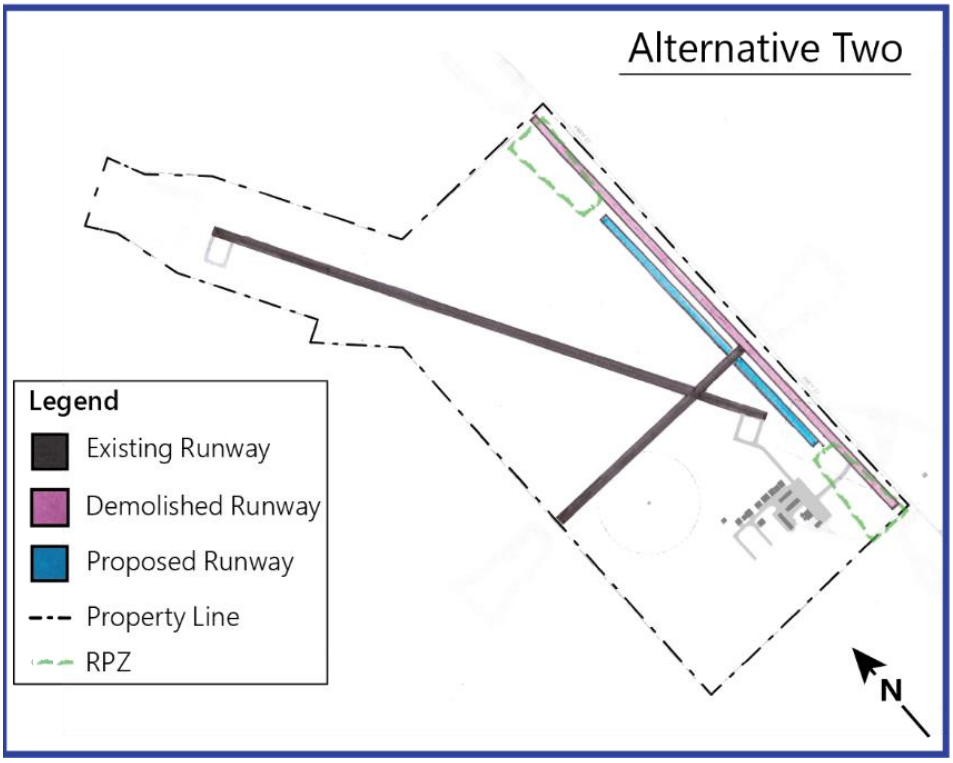
FIGURE 4-4
RUNWAY 17-35 ALTERNATIVE ONE



Source: RS&H Analysis, 2017

Alternative 2 – This alternative, shown in **Figure 4-5**, proposes the runway be relocated to the west, shortened from the existing length of 5,216 feet to 2,910 feet, and positioned entirely within the airport property. At the shortened length, the runway RPZ for both ends of the runway will remain inside the airport property, eliminating the need for any land acquisition. In the proposed configuration, the runway will intersect Runway 8-26 until the preferred alternative for Runway 8-26 is implemented. Overall, this alternative requires no land acquisition or easements, and sufficiently separates the runway from Highway 52 to provide an adequate OFA, OFZ, and RSA.

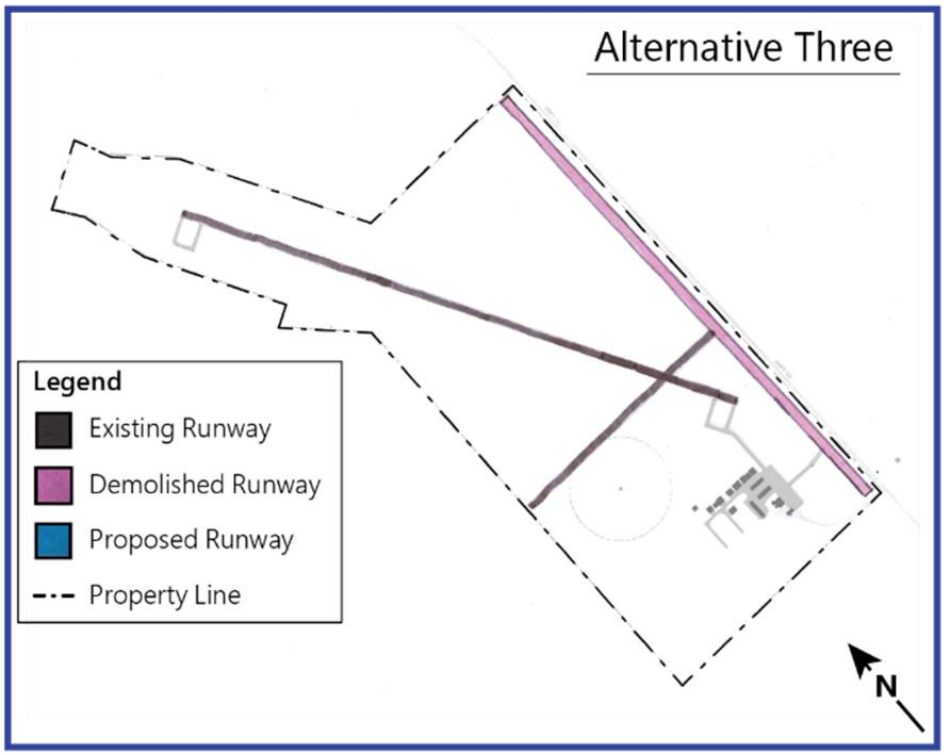
FIGURE 4-5
RUNWAY 17-35 ALTERNATIVE TWO



Source: RS&H Analysis, 2017

Alternative 3 – The facility requirements determined that Runway 17-35 is not required to provide wind coverage or capacity for the Airport, and is technically not needed within the runway system. As such, this option proposes that the runway be decommissioned and removed from service. As can be seen in **Figure 4-6**, removing the runway opens the northeast corner of airport property, adjacent to Highway 52, to the potential of new land uses. Because that land can be directly connected to the highway, aeronautical facility development and non-aeronautical land uses are feasible if the runway is removed.

FIGURE 4-6
RUNWAY 17-35 ALTERNATIVE THREE



Source: RS&H Analysis, 2017

4.2.2.1 Runway 17-35 Alternative Evaluation Summary

As shown in **Table 4-3**, Alternative 3 was found to best meet the evaluation parameters and was chosen as the preferred alternative for Runway 17-35. Overall, because the runway is not required for wind coverage or capacity, the monetary commitment to obtain land, relocate, and maintain the runway was determined to be in conflict with enhancing the fiscal performance of the Airport. Additionally, with the runway removed, the northeast portion of the airport becomes open for other uses and development that can provide new revenue streams for the Airport. Overall, the alternative was found to best meet the planning parameters as it provides for the highest and best land use, reduces operating costs, and allows associated future investment to be redirected to more critical facilities.

TABLE 4-3
RUNWAY 17-35 EVALUATION MATRIX

Runway 17-35 Evaluation Parameters	Alt One	Alt Two	Alt Three
FAA Airport Design Standards			
Operational Performance			
Supports Immediate Needs and Long Term Goals			
Fiscal Considerations			
Land Development Strategies			

Notes: Green indicates strong performance | Yellow indicates fair performance | Red indicates poor performance
Source: RS&H Analysis, 2017

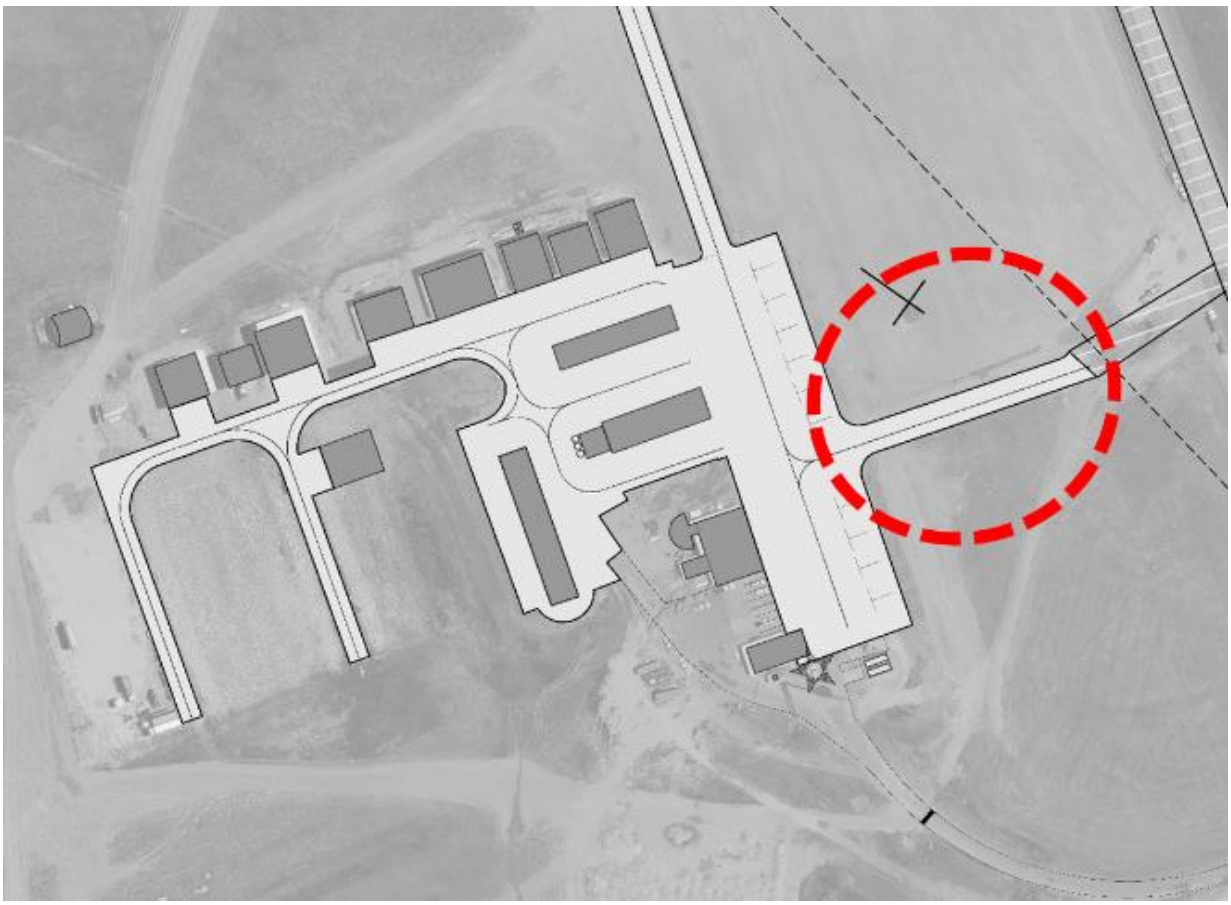
4.2.3 Runway 35 Access Taxiway Alternative

The "Runway 35 Access" is a remnant taxiway that once connected with the old primary paved runway, Runway 14-32. Since the construction of the new Runway 14-32, this taxiway now only connects to the turf runway, Runway 17-35. As can be seen in **Figure 4-7**, the taxiway connects to the apron as a hard surface, and then turns to turf as it meets Runway 14-32. Because of this configuration, pilots sometimes confuse this taxiway as the access to the primary runway. A solution is needed to prevent pilots from using this taxiway by mistake.

It was determined that the taxiway will eventually not be needed because the preferred alternative chosen for Runway 17-35 is to remove the runway, Based on this, two alternatives for the taxiway were initially developed: remove the taxiway, or maintain the taxiway and integrate it into an apron expansion. Further study of the site revealed that the grades of the area will prevent the taxiway from being efficiently integrated into an apron expansion. Thus, the taxiway is recommended to be removed when Runway 17-35 is decommissioned and/or when the apron is expanded.

In the immediate term, signage and markings are recommended to prevent aircraft from inadvertently taxiing onto the pavement surface.

FIGURE 4-7
RUNWAY 35 ACCESS TAXIWAY



Source: RS&H Analysis, 2017

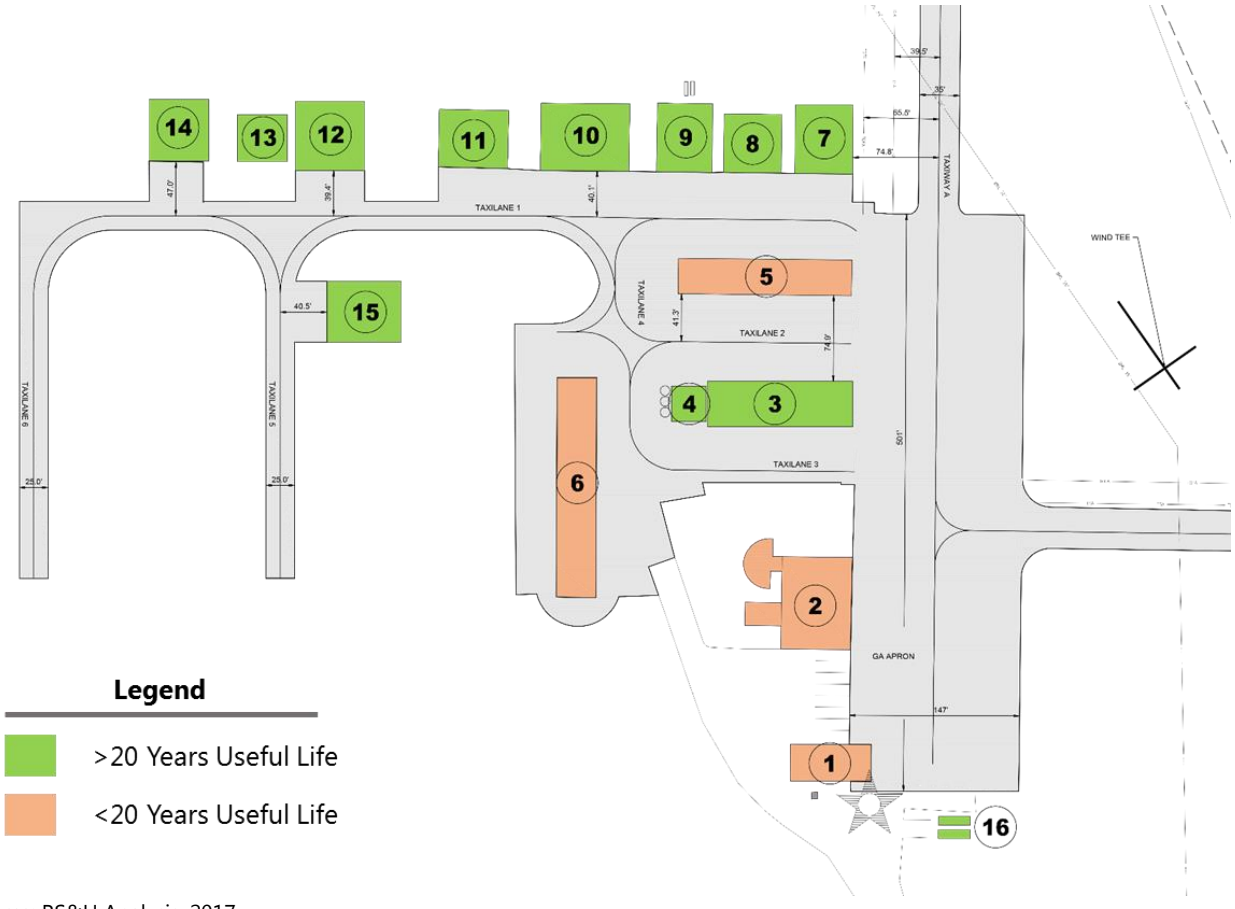
4.3 TERMINAL AREA ALTERNATIVES

This section discusses alternatives generated for aircraft hangar and apron expansion and development. Prior to the initial creation of the alternative concepts, a set of parameters was defined that guided the concept development. These included the following:

Consider Useful Life of Existing Buildings

The objective of the alternative process was to develop cost efficient solutions that capitalize on existing infrastructure, and allow the Airport to grow in small, incremental steps. To achieve cost efficiency, it was determined that existing buildings and pavement infrastructure in good condition should be left un-tampered. **Figure 4-8** illustrates the assumptions made regarding the existing hangar and building useful life left for each building in the terminal area of the Airport. Those buildings assumed to have less than a 20-year useful life remaining were treated in the alternatives process as buildings that can be removed for new development. Buildings estimated to have 20 or more year's useful life remaining were left un-touched in the alternative concepts.

FIGURE 4-8
EXISTING TERMINAL AREA



Source: RS&H Analysis, 2017

Maintain Current Storm Water and Utility Corridors

In effort to develop highly cost efficient solutions, it was determined that the Airport's current storm water and utility corridors should be maintained in the alternative concepts. The primary corridor identified in the hangar area is east of the T-Hangar labeled as #6 and runs north/south between Hangar #11 and #12. This corridor is proposed to be left unencumbered in the alternative concepts.

Consider Fiscal Impacts

The need to consider fiscal impacts related to development alternatives is paramount for all airports in today's environment. FAA entitlement funding is limited to $150,000 annually for FMM. FAA discretionary funding for airports is becoming increasingly limited due to the needs of the national system's aging infrastructure. As such, development costs were heavily weighted in the evaluation of the options created in this study. Preferred solutions chosen for the final development plan were required to be fiscally attainable and reasonable based on current funding levels.

Integrate with Existing and Future Infrastructure

Overall, to maintain alignment with these planning parameters, it is necessary that all proposed concepts are designed to integrate with both existing and future infrastructure. For instance, new proposed buildings or hangars must allow for easy and efficient connection with existing electrical services. They also must not preclude or make more difficult future infrastructure or utility development. By developing concepts in accordance with this philosophy, cost efficiencies are naturally built into the concepts.

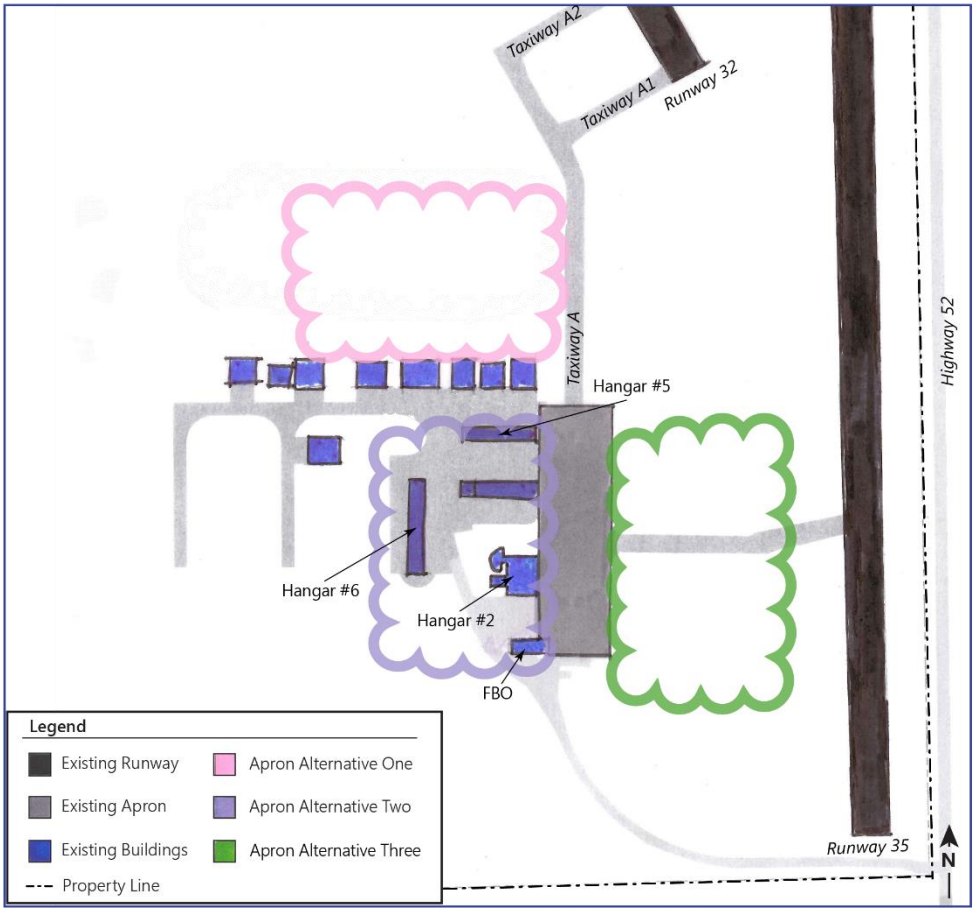
The development process for future apron and hangar expansion began with an examination of the apron. The current taxilane infrastructure provides enough room to accommodate the projected amount of additional hangar space, but the existing apron is undersized and requires near-term expansion. Thus, an apron expansion solution that could be immediately implemented was needed. The following narrative outlines the alternatives developed for the aircraft apron and the hangars.

4.3.1 Aircraft Apron Alternatives

Three alternatives were developed for future apron expansion. Because the aircraft apron can be expanded in phases, the apron alternatives were based on general areas where new apron development could occur. **Figure 4-9** illustrates the generalized areas of potential expansion, as well as the hangars that were identified to reach their useful life within the planning period. The following describes each alternative, the advantages and disadvantages of each, and the evaluation that lead to the preferred option.

Apron Alternative 1 – This alternative is based on the proposed apron development shown on the 2003 Airport Layout Plan (ALP). The proposed apron increases the total amount of apron area at the Airport, but does not expand the existing apron. Instead, the proposed apron is in a greenfield site north of the exiting hangars. The apron would tie into Taxiway A, and could tie into Taxilane A1 as proposed on the previous ALP. The alternative on the ALP is proposed as a long term solution that would include a new and/or relocated FBO building placed adjacent to the apron. This is a viable solution, however, it does not meet the near-term needs of the Airport. Expansion of apron space is needed in the very near term, and it will not be feasible to relocate the FBO, develop a roadway system, and move utilities to the new site.

FIGURE 4-9
APRON EXPANSION ALTERNATIVES



Source: RS&H Analysis, 2017

Additionally, the land to be used for the proposed apron was found in this study to be better suited for future hangar development. As such, this alternative was discarded from consideration.

Apron Alternative 2 – Considering the Airport requires additional apron space be constructed in the very near-term, solutions were developed that build upon the existing apron. Alternative 2 proposes an expansion to the west, which would displace Hangar #2. The FBO could remain in place until the building required full replacement. The alternative meets the planning parameters in that it integrates with the existing airport infrastructure. However, the solution was not chosen as the preferred alternative because it requires the displacement of Hangar #2 and is more difficult and costly to begin implementation in the near-term.

Apron Alternative 3 – This alternative is akin to Alternative 2 in that it expands the existing apron, albeit to the east instead of west. The expansion requires no relocation of hangars or buildings, and was found to best fit with existing infrastructure. Because there are no hangars surrounding the expansion area, flexibility is provided in regard to future apron configurations and expansion limits.

4.3.1.1 Apron Expansion Alternative Evaluation Summary

In examining Alternative 2 and Alternative 3, it was found that Alternative 3 best meets both immediate needs and long term goals, as is depicted in **Table 4-4**. As such, Alternative 3 was found to be the preferred alternative. For the long-term development of the airport, it was determined that Alternative 2 compliments the preferred alternative, and provides a long-term infill solution that capitalizes on underutilized areas within the hangar area. These factors led Alternative 2 to also be brought into the development plan, but as a long-term solution.

TABLE 4-4
APRON EXPANSION EVALUATION MATRIX

Evaluation Parameters	Alt One	Alt Two	Alt Three
FAA Airport Design Standards			
Operational Performance			
Supports Immediate Needs and Long Term Goals			
Fiscal Considerations			
Land Development Strategies			

Notes: Green indicates strong performance | Yellow indicates fair performance | Red indicates poor performance
Source: RS&H Analysis, 2017

4.3.2 Aircraft Hangar Layout

The Airport currently has two taxilanes that offer build ready sites for future hangar development. The area has room to accommodate more box hangars than was determined in the facility requirements to be needed in the planning period. However, the taxilanes, and the access into these areas are designed for ADG I aircraft. To accommodate the critical aircraft, and any other ADG II aircraft, new solutions are needed. It was determined that two areas can be developed to accommodate up to ADG II aircraft; the area north of the existing hangar development and the area east of the FBO, adjacent to the exiting apron. As shown in **Figure 4-10**, the area adjacent to the FBO is recommended to be developed first, as it is the least costly area to tie apron and utility infrastructure into. FAR Part 77 and TERPS airspace clearance requirements guided the proposed development's proximity to the runway. It should be noted that this area sits underneath the TERPS departure surface for Runway 14, which will limit building height to a maximum of 25 to 35 feet depending on grades.

The site of building #38 is proposed to be reserved for the development of a new facility that can include space for snow removal equipment storage, as well as FBO and general aviation terminal functionality. Building's #39 and #40 are sized to be representative of 100x100 foot corporate hangars capable housing ADG II aircraft.

In the near- and mid-term, it is expected that hangar development continue to occur around Taxilane 5 and 6. The future hangars shown on these taxilanes are representative of 50x50 foot standard box hangars with 15 feet separation between them. Actual development will likely vary based on demand. However, hangar depth should be sized appropriately to ensure a 25 foot corridor behind the hangars is preserved for utilities.

FIGURE 4-10
ULTIMATE HANGAR LAYOUT

Source: RS&H Analysis, 2017

The next chapters include *Implementation* and *Airport Layout Plan*. The implementation chapter will detail how and when each element discussed in this chapter will be brought into the Airport's capital improvement program. Each element will be designated for immediate, near term, long term, or ultimate implementation. Implementation will be based upon the need, cost, and funding feasibility of each element. Finally, in the Airport Layout Plan chapter, each element from the development plan will be brought together a final Airport Development Plan based on the determined implementation time frame.

CHAPTER 5

IMPLEMENTATION PLAN

5.1 INTRODUCTION

Using stakeholder input, the *Alternatives* chapter of this Master Plan Update selected and refined potential airport development paths into a preferred option. The *Implementation Plan* chapter identifies a strategic and financially feasible phased approach to implement the components of the preferred development plan. Implementation of that plan seeks to attain flexibility in mitigating uncertainties and direct development in a responsible way that makes the highest and best use of all available airport land. The implementation plan is guided by three critical airport development goals: 1) meet FAA design standards, 2) maximize available land, and 3) meet projected demand. The final goal of this implementation plan is to provide an updated Capital Improvement Program (CIP) which FMM can draw from when making future development decisions and seeking financial assistance to implement those projects.

5.2 IMPLEMENTATION PROCESS

To implement each capital project, a number of specific steps are necessary, many beginning up to four years before the facility is needed. This time is necessary in order to coordinate the funding, environmental documentation, and design, as well as complete the actual construction. **Figure 5-1** shows the sequence of events necessary to complete a complex airport project per FAA guidance.

FIGURE 5-1
TYPICAL STEPS TO COMPLETE COMPLEX AIP FUNDED AIRPORT PROJECT

Typical Steps Four Years Prior to Construction

- ❑ Identify the project in the approved Airport Layout Plan
- ❑ Validate project justification and funding eligibility
- ❑ Determine probable level of environmental review *(planning may need to begin much earlier if EIS required)*
- ❑ Identify if in-flight procedure modifications will be required
- ❑ Coordinate with local officials and airport users

Typical Steps Three Years Prior to Construction

- ❑ Identify funding sources
- ❑ Determine if a Benefit/Cost Analysis is necessary
- ❑ Determine if a reimbursable agreement is necessary for affected NAVAIDs
- ❑ Begin purchase or assembly of all necessary land for the project

Typical Steps Two Years Prior to Construction

- ❑ Refine project scope
- ❑ Solicit professional design services
- ❑ Prepare preliminary design, site plan and cost estimates
- ❑ Initiate reimbursable agreements and coordinate any NAVAID requirements with the FAA
- ❑ Submit requests for new/modified flight procedures with the FAA
- ❑ Submit a request for airspace review of projects under non-rulemaking authority (NRA)
- ❑ Begin Benefit/Cost Analysis if determined to be necessary
- ❑ Submit environmental assessment or categorical exclusion documentation for FAA review and funding
- ❑ Coordinate with local officials and airport users on refined project scope and schedule

(Figure continued on next page)

Typical Steps One Year Prior to Construction

- ❑ Complete airspace study
- ❑ Complete significant environmental documentation
- ❑ Complete 90 percent design, plans, and specifications after FAA environmental findings are made
- ❑ Execute reimbursable agreements to support NAVAIDs, if relevant
- ❑ Prepare and coordinate Construction Safety Phasing Plan
- ❑ Secure all necessary local funding
- ❑ Secure environmental and other necessary permits
- ❑ Submit Benefit/Cost Analysis *(by March 1st)*
- ❑ Coordinate Safety Risk Management Panel with FAA-ATO or FAA-ARP, as necessary
- ❑ Finalize construction bidding, grant application and acceptance schedules

Year of Construction

- ❑ Complete 100 percent design, plans, and specifications
- ❑ Complete FAA environmental documentation for current fiscal year *(by January 15th)*
- ❑ Advertise and secure bids according to acceptance schedules
- ❑ Submit grant applications *(by May 1st, if discretionary funds expected bid by April 1st)*
- ❑ Accept federal grants
- ❑ Coordinate with local officials and airport users on the progress and schedule
- ❑ Issue notice-to-proceed
- ❑ Monitor environmental mitigation requirements during construction

After Construction

- ❑ Submit final report and close any accepted federal grants
- ❑ Monitor environmental mitigation measures
- ❑ Update Airport Layout Plan drawing set

Source: Federal Aviation Administration - "Steps to AIP Funding for Your Airport Project: Quick Reference Guide", March 2016

5.2.1 Environmental Considerations

The environmental processing for projects within each development phase will need to be completed in advance of the design and construction to allow for project completion in accordance with applicable federal rules and regulations.

FAA Order 1050.1F, *Policies and Procedures for Considering Environmental Impacts*, and 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airports*, require the evaluation of airport development projects as they relate to specific environmental impact categories. A complete evaluation of the impact categories identified in FAA Orders 1050.1F and 5050.4B is required during an environmental assessment (EA) or environmental impact statement (EIS). Categorical exclusions (CATEX) require evaluations of extraordinary circumstances to ensure that projects, typically causing minimal environmental effects, would not cause effects requiring more analyses in an EA, or possibly, an EIS.

In preparing for implementation of CIP projects, discussion with FAA environmental staff should take place to determine the best course of action for environmental processing. Due to the type and number of future capital projects that will likely require environmental documentation, it is recommended that FMM consider developing an overall strategic environmental plan. This effort should determine the scale of environmental compliance needed for each future project, and examine opportunities to group environmental projects together to minimize project costs and maximize efficiency.

5.3 AIRPORT DEVELOPMENT PHASING PLAN

The following sections outline airport development over the short-, mid-, and long-term phases. Each phase represents a timeline of strategic development actions, improvement rationale, and their associated expenditures, along with additional project implementation considerations. The Short-Term Development Phase recommends projects over the first five years of the twenty-year master planning horizon (FY 2018-2022) and the Mid-Term Development Phase completes years six through ten of the planning horizon (FY 2023-2027). Long-term capital improvement projects include those which are expected to occur within the last ten years (FY 2028-2037) of the master planning horizon. All recommendations are based on the following factors:

- Facilities should be updated to meet current FAA design standards
- Solutions must be financially feasible and address geographic limitations
- Logical sequencing of projects based on triggering events that optimize operational efficiency
- Make highest and best use of land to meet airport facility needs with an understanding of airport development beyond 20-year planning period
- Identify, eliminate, or mitigate environmental and community impacts as practical

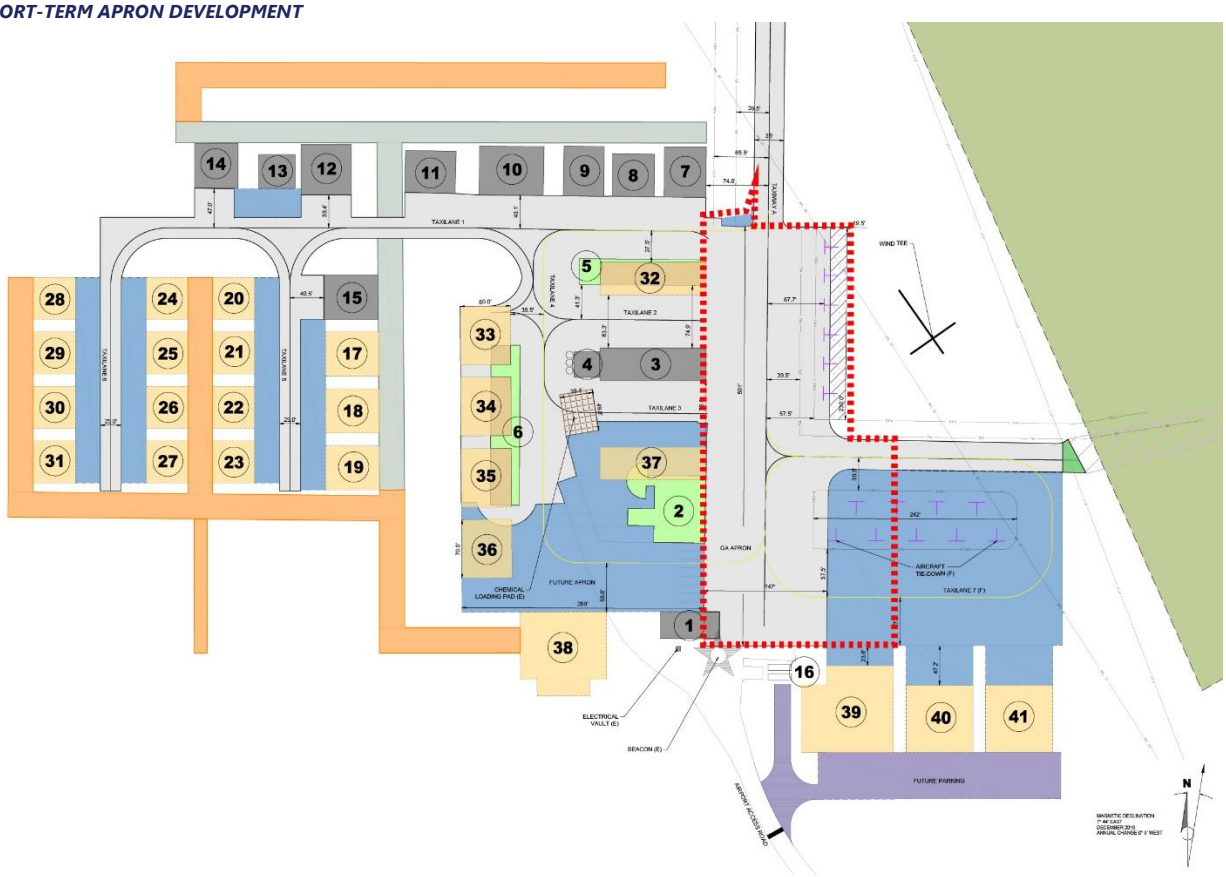
Planning level cost estimates[1] are provided for each project. Planning-level for this purpose is a rough order-of-magnitude cost estimate that considers gross areas multiplied by a realistic unit cost factor, plus contingencies and design. The intent is to provide more realistic cost estimates in order to budget enough funding for each CIP project and to evaluate the feasibility of each project within the planning period. It should be noted that recurring pavement maintenance for Runway 14-32 is programmed into the CIP at approximately five-year intervals beginning in FY 2020 under the guidance of the Colorado Division of Aeronautics.

5.3.1 Short-Term Development

Short-term capital improvement projects include those which are expected to begin within the next five years (FY 2018-2022). These improvements, shown in **Figure 5-2**, are achieved first through the rehabilitation and expansion of the existing apron. This project will provide additional apron space to park aircraft, which will ensure adequate north/south circulation from Taxiway A down to the fuel facility. Another element of this apron project is the addition of fillet pavement connecting Taxiway A to Taxilane 1, which begins between hangar 7 and 5. This project will require an environmental CATEX conducted prior to beginning construction.

[1] All project cost values are in 2017 dollars.

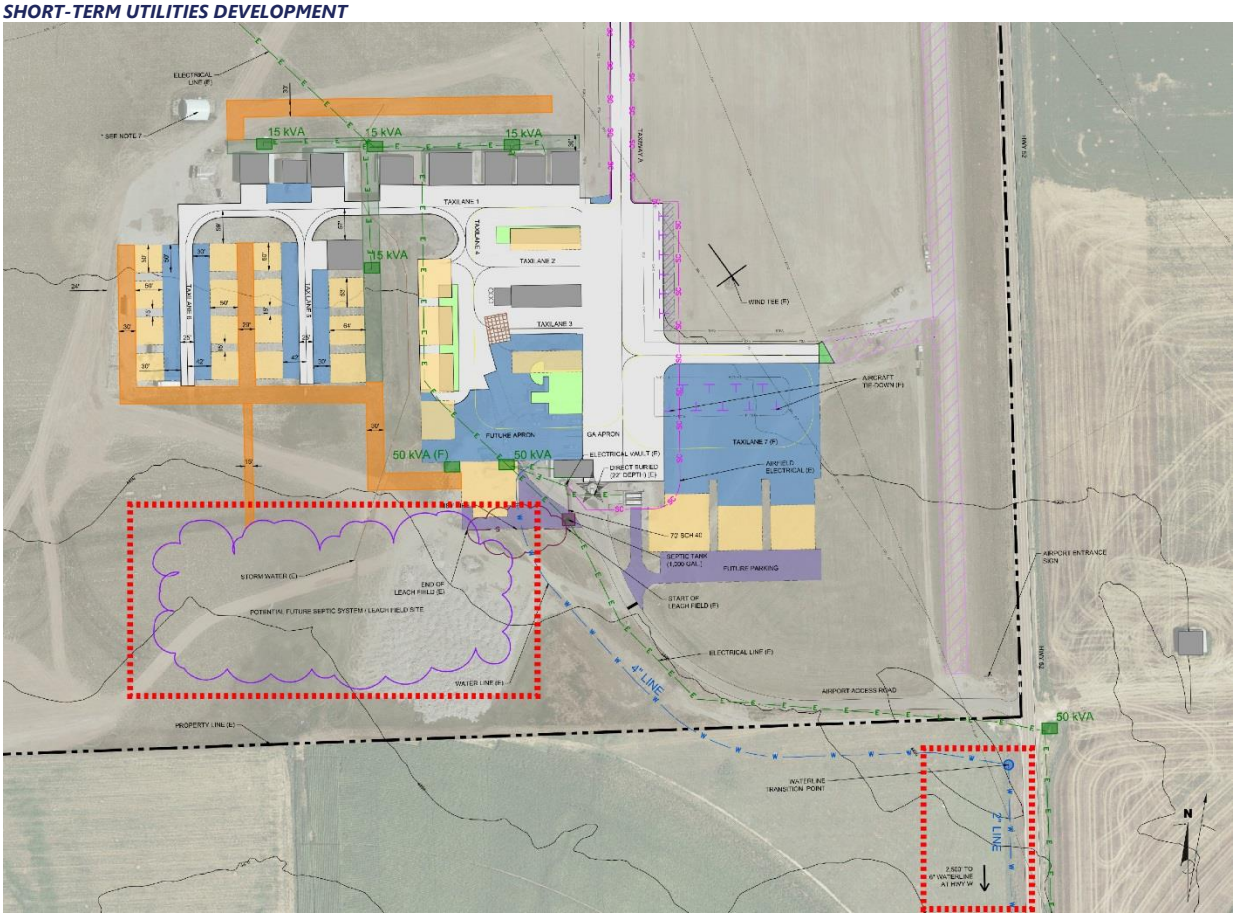
FIGURE 5-2
SHORT-TERM APRON DEVELOPMENT



Source: RS&H, 2017

The capacity of existing utilities serving FMM is another focus area of this implementation plan. Utility availability and "development ready" sites are often key determining factors as to whether airfield development occurs at all. With these factors in mind, it is recommended that the airport make strategic utility investments to catalyze airport development and meet short-term airport user demand. The first step in upgrading airport utility infrastructure is to increase capacity of the 2 inch water line extending south from the Highway 52 and Airport Access Road intersection to a 4 inch water line. This water line feeds the existing 4 inch water line serving all airport development. The upgrade would provide adequate water service capacity to existing airport users and programmed development areas throughout the 20-year master planning period. The portion of the water line that extends up to the Airport Access road is shown in **Figure 5-3**, outlined in a dashed red line. **Figure 5-3** also shows the next step in utility development, which is the construction of an adequately sized septic system for airport development through the planning period. The size and configuration of the new septic system will depend on airport management decisions and tenant requirements, and will require study and analysis by a civil engineer with expertise with on-site wastewater systems. For the purposes of project cost estimation in this study, the septic tank capacity was assumed at 2,000 gallons. New development may be able to tap into the existing FBO septic system, but this would depend on expected usage and the physical feasibility of tying into the system.

FIGURE 5-3
SHORT-TERM UTILITIES DEVELOPMENT



Source: RS&H, 2017

As interest increases in developing hangars, the airport can direct this growth to specific areas where water and septic services are initially provided. In consideration of bringing utilities out to the furthest development area, this plan shows that the first phase of utility development be established to serve the area labeled Hangars 24-31, as shown in **Figure 5-4**. Each new hangar in the proposed hangar rows can be connected to the new septic system, piped for water, and connected to electrical service. Natural gas for each hangar can continue to be provided by independent propane tanks installed adjacent to each structure. Development in the Phase 1 and Phase 2 areas requires extending electrical service lines and installing 50kVA transformer boxes to serve those hangar rows. The orange areas in **Figure 5-4** show space preserved for utilities serving the new hangar developments. With infrastructure in place, these sites will be development ready and much more appealing to potential hangar developers. Having expended the capital on infrastructure upgrades up-front, the Airport can transfer these costs into lease rates and recoup them as new hangars are constructed and lease agreements are contracted. A market rate assessment and subsequent pro forma analysis is recommended to determine the lease rates that must be set to reasonably recoup and maintain the utility investment.

FIGURE 5-4
SHORT-TERM HANGAR DEVELOPMENT PHASES

Source: RS&H, 2017

5.3.2 Mid-Term Development

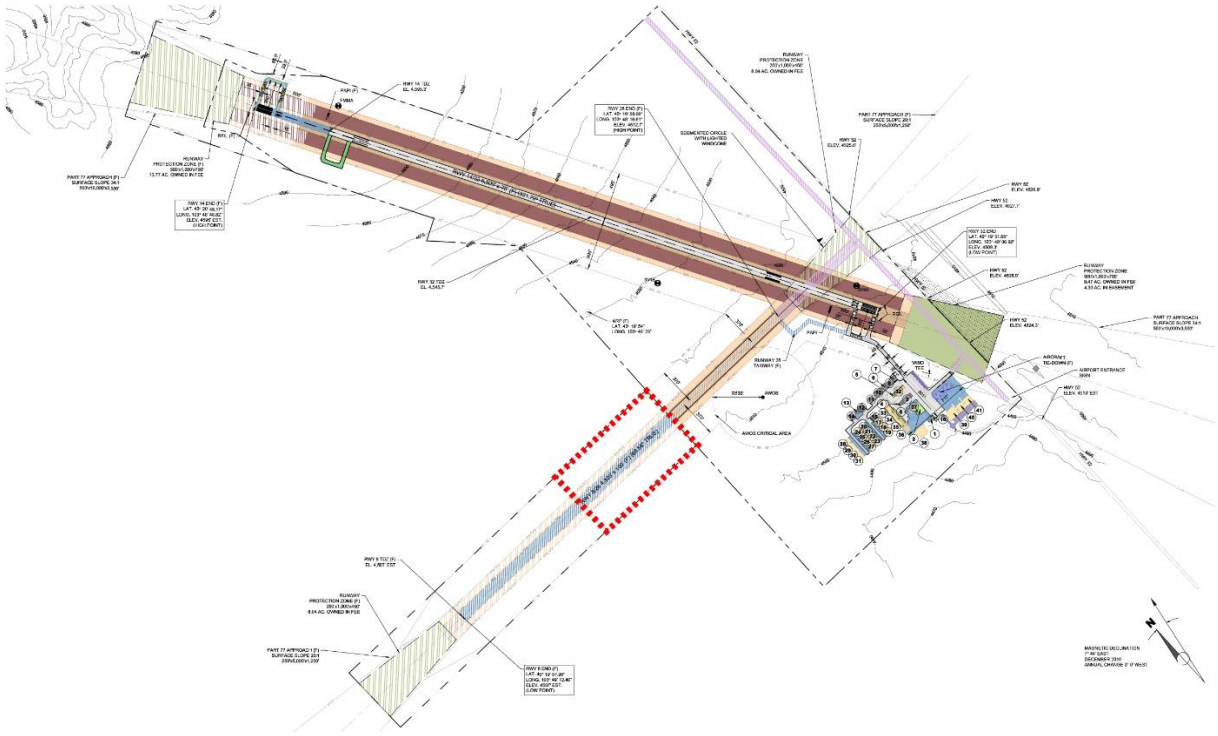
Mid-term capital improvement projects include those which are expected to occur within years five-to-ten (FY 2023-2027) of the master planning horizon. Mid-term development begins with the Runway 14-32 Safety Project which "decouples" the turf Runway 8-26 from Runway 14-32. This project begins with land acquisition for the relocation of turf Runway 8-26, as shown in **Figure 5-5** outlined in red[2]. Facility requirements determined the runway was necessary for crosswind operations and that its configuration with Runway 14-32 is less than ideal for safety and operations. Programming the relocation of this runway into the CIP is the direct result of FAA AC 150/5300-13A guidance, which recommends avoiding overlapping runways, particularly at unconstrained airports, where "decoupling" runways is much more practical. Therefore, it is recommended that the portion of turf runway 8-26 which overlaps the main paved runway (14-32) be eliminated by relocating the Runway 26 end west of Runway 14-32. This project decouples the runways, but in-turn shortens Runway 8-26 by 1,040 feet, therefore requiring an extension to the Runway 8 approach end in order to meet fleet landing and takeoff length requirements. Analysis shows that a length of 2,700 feet is the fiscally realistic length that will meet fleet performance needs.

[2] Figure 5-5 shows the ultimate build-out potential of Runway 8-26 at 4,320 foot length. Chapter 6, Airport Layout Plan includes a description of the potential phased developments for this runway beyond the 2,700 planned for in the CIP.

Despite the safety critical nature of this project, the strategy behind placing the project in the mid-term is to account for time needed to program in federal discretionary funding and acquire needed land. It should be noted that historically projects of this scale fall lower on the FAA National Priority List than larger projects. If federal discretionary funding is not provided, it is likely funding will need to be sought from the Colorado Division of Aeronautics (CDOA). Additionally, the timing of the Runway 14-32 safety project is entirely dependent upon the acquisition of land to allow for the relocation of turf Runway 8-26.

Since the purchase of land is a requirement to complete this project and the acreage depends on airport funding availability as well as land preservation goals, this project may shift in the CIP if land purchase is not feasible within the programmed year. It is recommended that the City of Fort Morgan purchase the required land with City funds whenever it becomes available. So long as the purchase of the land adheres to the FAA process for land acquisition, the investment can be used as the City's match on future AIP funded projects. A full land acquisition for future runway needs would require a minimum of 75.9 acres. However, it is possible to break land acquisition and subsequent runway extensions into phases, so long as the first phase purchases a minimum of 44.5 acres to achieve a 2,700 foot runway with a protected RPZ area. Along with the purchase of the land, an environmental CATEX analysis must be completed prior to relocating the turf runway.

FIGURE 5-5
MID-TERM LAND ACQUISITION AND RUNWAY 8-26 RELOCATION/EXTENSION

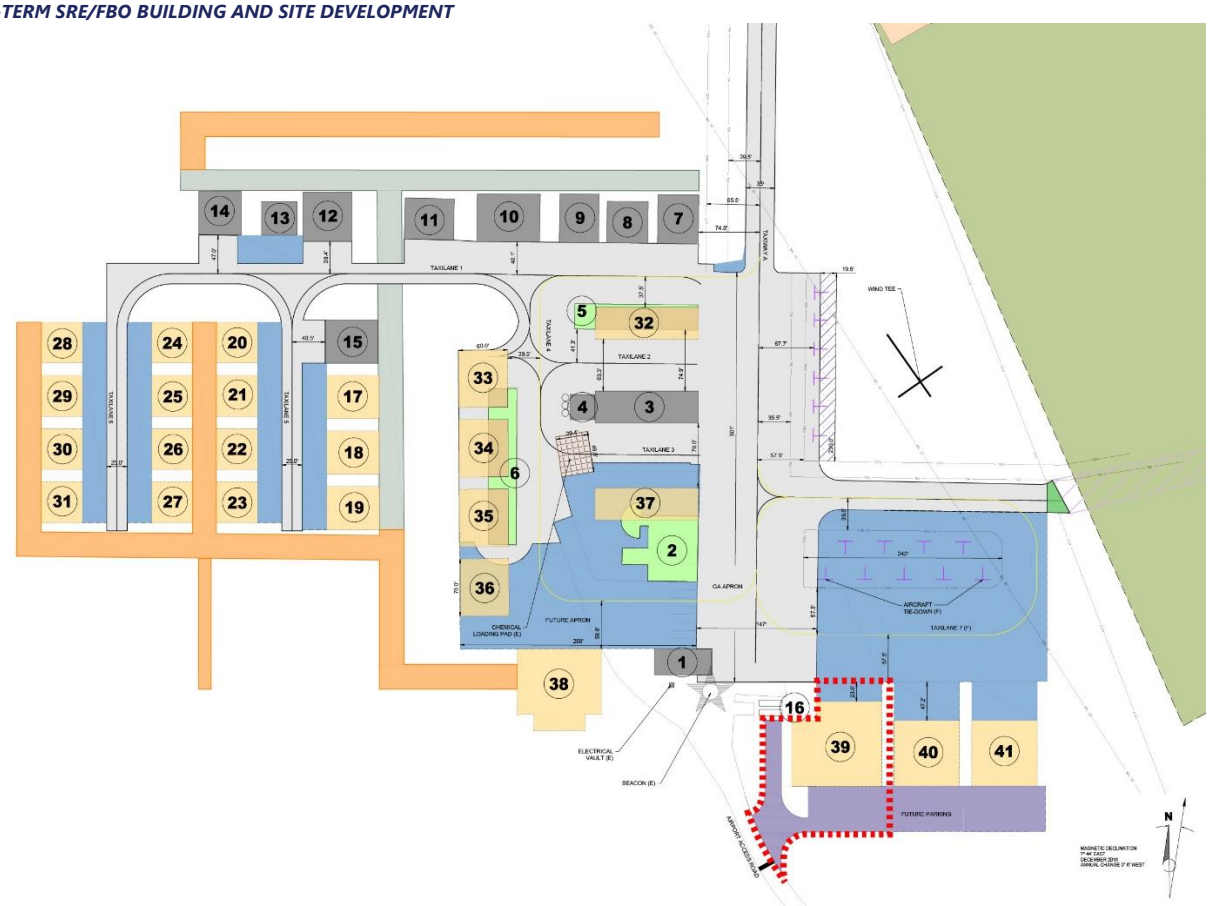


Source: RS&H, 2017

The next mid-term CIP project is the construction of a new co-located Snow Removal Equipment (SRE) and Fixed Base Operator (FBO) building, outlined in dashed red in **Figure 5-6**. This project begins with an environmental CATEX study and requires a parking lot, utilities, and a new section of airside apron to complete the site development. The premise of the joint SRE/FBO complex is to provide space for the following functions: snow removal equipment storage; FBO offices and lobby; and a hangar for use by the FBO. The actual configuration and design of this complex will be dependent on a variety of factors, including the amount of local capital available, business economics and decisions related to the operation of the FBO, and Airport needs and desires at the time of implementation. The amount of FAA funding that can be applied to this project will vary based on the design as not all of the space will be eligible for AIP funding. For the sake of simplicity, the CIP has been programmed under the assumption that design will be roughly 60 percent eligible for AIP funding, and that State and local funding would be used for remaining costs. One potential funding source for this project is the State Infrastructure Bank (SIB), described further in **Section 5.4.2, State Funding**, of this chapter.

The final mid-term project is the repurposing of the old FBO building (building #1) with modest interior and exterior upgrades as needed. This can be completed any time after the construction of a new FBO facility.

FIGURE 5-6
MID-TERM SRE/FBO BUILDING AND SITE DEVELOPMENT



Source: RS&H, 2017

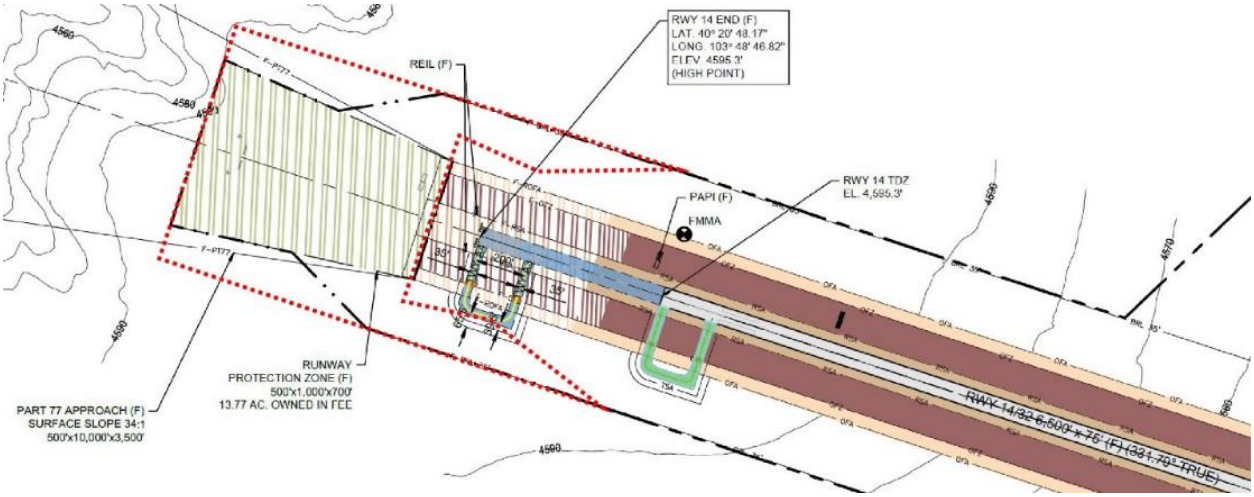
5.3.3 Long-Term Development

Long-term capital improvement projects include those which are expected to occur within the last ten years (FY 2028-2037) of the master planning horizon. The first long-term project is the decommissioning of Runway 17-35. This runway was determined to provide no wind coverage or capacity to the airport, and is not necessary to meet future demand on the runway system. Thus the runway is ineligible for AIP funding. This project can easily be moved forward or back in the CIP without impacting overall Master Plan goals as the Airport requires. If maintenance and capital investment become burdensome prior to the year this project is programed, the Airport may choose to move forward with the project sooner.

After Runway 17-35 is decommissioned, the next project in the long-term CIP can be completed. This project is the release of some land occupied by Runway 17-35 for non-aeronautical use. The FAA requires land dedicated to aeronautical use as defined on an existing Airport Layout Plan (ALP) to be "released" through formal written authorization by the FAA relinquishing the FAA's right to enforce an airport's contractual obligations (grant assurances 5b and 29). Releasing this land for non-aeronautical use meets all FAA consideration criteria in way of reasonableness and practicality, effect on aeronautical facilities, net benefit to civil aviation, and compatibility with civil aviation needs.

The next project programmed during long-term development is the acquisition of land at the north end of Runway 14-32. This land acquisition allows for future extensions to the runway beyond the 20-year planning period and ensures airport control over land within the Runway Protection Zone (RPZ). A total of 22.9 acres of land must be acquired to control the land within the future recommended runway extension and the associated RPZ. The amount of land shown in the red dashed boundary on **Figure 5-7** shows the amount of land required to be acquired by the airport to control the RPZ. Purchasing more land in this area, as it proves financially feasible, is good practice for any airport. Similar to the land acquisition related to Runway 8-26, this land acquisition can be accomplished as soon (or as late) as practical using local funds while following the federal process for reimbursement.

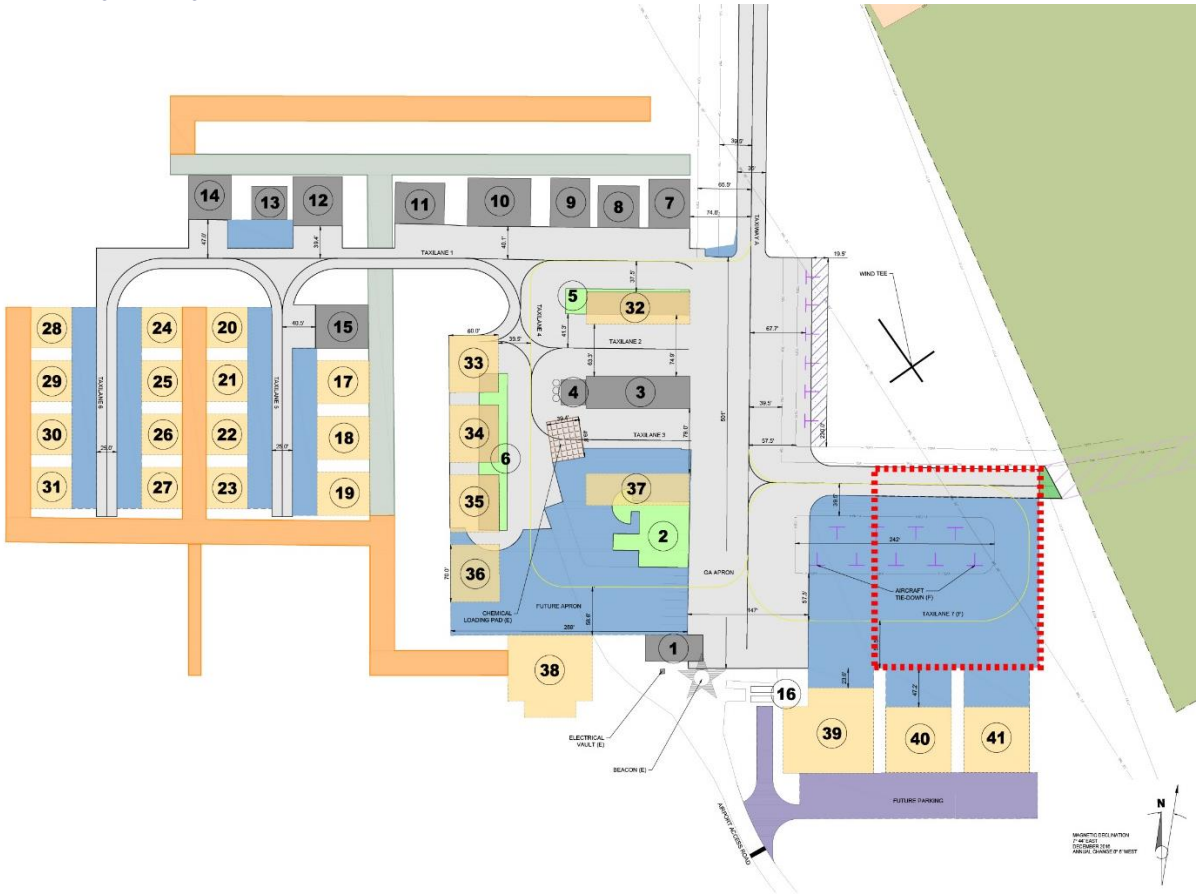
FIGURE 5-7
LONG-TERM LAND AQUISITION



Source: RS&H, 2017

The next long-term CIP project is additional apron expansion, outlined with a dashed red line in **Figure 5-8**. This project creates additional space for aircraft parking, circulation, and ultimately provides apron frontage for future hangar development.

FIGURE 5-8
LONG-TERM APRON DEVELOPMENT



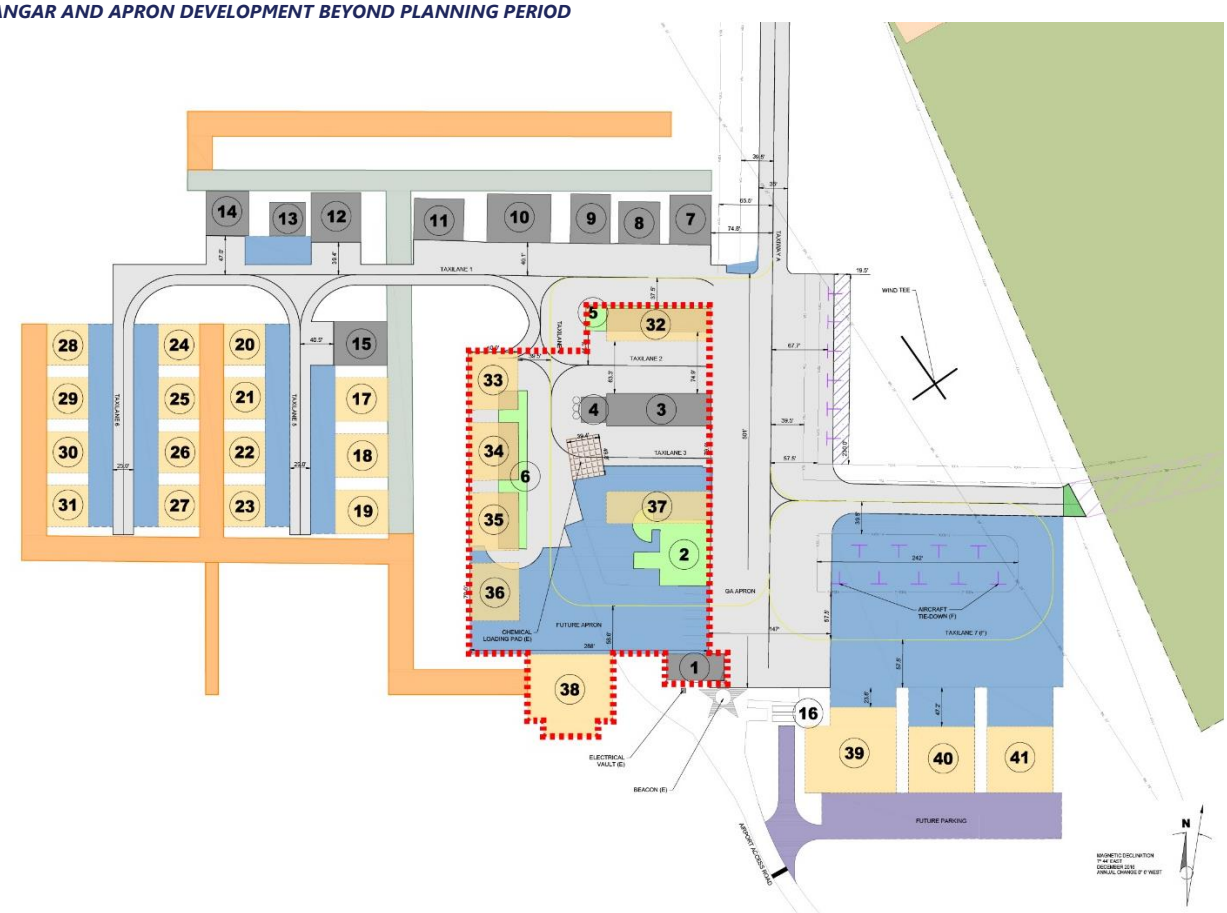
Source: RS&H, 2017

For large airports, Airport Master Plans should be updated every 5 to 10 years. For smaller airports like Fort Morgan Airport, growth and factors which impact facility needs tend to occur more slowly, justifying longer periods between Airport Master Plan updates. With this in mind, an Airport Master Plan Update has been programmed nearly 20 years after this update. Assuming growth and demand for facilities materializes as projected, this may be perfectly acceptable. Under the assumptions within this master plan, the critical triggering event justifying a future Master Plan update is when fleet mix and demand levels require an extension to Runway 14-32 within an upcoming 5 years.

The final long-term development project listed on the FMM CIP is an Environmental Assessment for a runway extension of Runway 14-32 and associated parallel taxiway. Actual construction is anticipated to occur beyond the 20-year planning period, but the nature of the project will likely require an Environmental Assessment with a wetlands survey, biological survey, cultural resources survey, and minor noise analysis regarding potential new noise impacts from taxiing aircraft.

Two projects are projected beyond the planning period. These include further apron and hangar development and the construction of the Runway 14-32 extension. Although this final apron expansion project occurs beyond the planning period, it is important to note because it resumes infrastructure improvements which accommodate and stimulate hangar development, including Hangars 32 through 38, as shown on **Figure 5-9**. The development area is outlined in a red dashed line. Hangars labeled 1, 3, and 4 are existing buildings programmed to remain in their existing locations. Buildings labeled 2, 5, and 6 are older buildings requiring demolition to reorganize the site more efficiently for development. Hangars labeled 32 through 36 represent potential future hangar locations, pending market demand. Apron development is shown in blue. The first step in this project is the demolition of the city-owned hangar (labeled as 2), which makes new hangar construction (labeled 37) ripe as well opening the possibility to construct the new apron area. Upon completing those projects, Buildings 5 and 6 can be demolished and replaced with new Hangars 32-36 as market demand materializes.

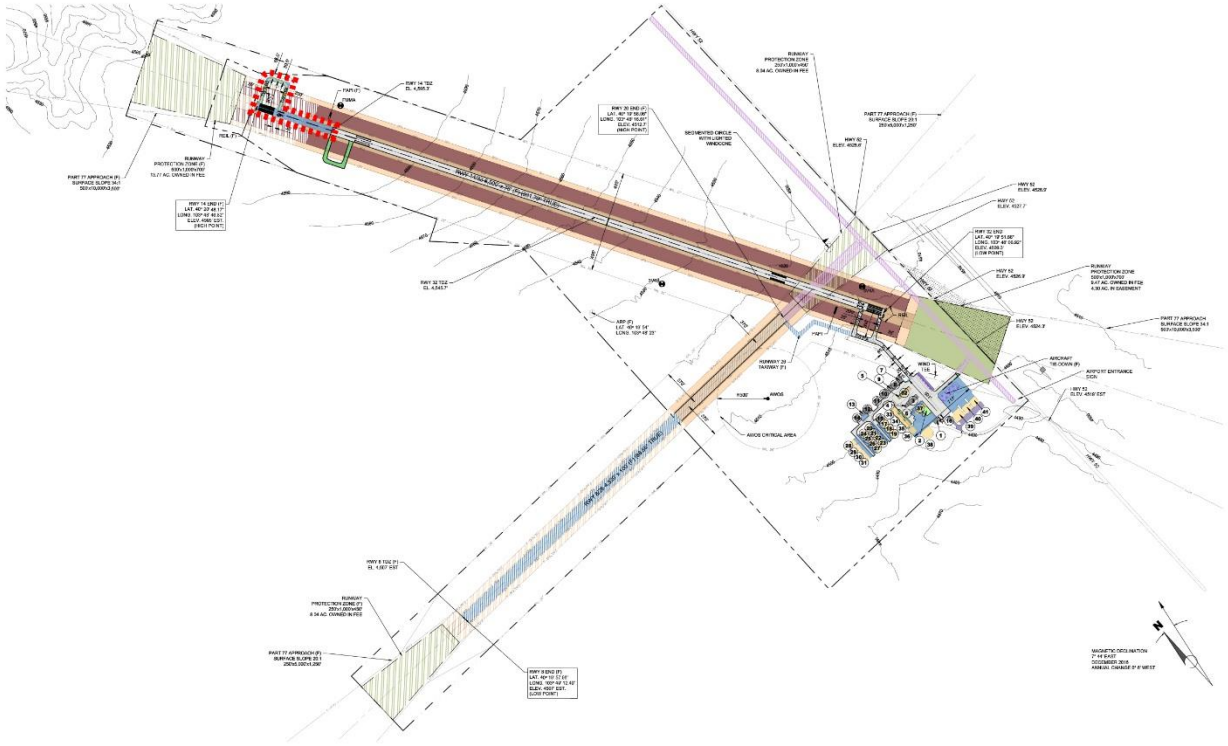
FIGURE 5-9
HANGAR AND APRON DEVELOPMENT BEYOND PLANNING PERIOD



Source: RS&H, 2017

In regard to the extension of Runway 14-32, the previous long-term land acquisition project will have been needed to be completed to allow this project to be carried forward. The runway extension planned is for a final length of 6,500 feet. It should be noted that the actual length implemented will be dependent on the findings of the future master plan, or other study designed to determine current and future fleet requirements. **Figure 5-10** shows the location of the runway extension and associated end-of-runway taxiway improvements.

FIGURE 5-10
RUNWAY 14-32 EXTENSION BEYOND PLANNING PERIOD



Source: RS&H, 2017

5.4 SOURCES OF CAPITAL FUNDING

Airports can be funded in multiple ways including federal, state and local government grants, revenue generated by the airport itself, municipal bonding, and private contributions. The following section describes the sequence of CIP project implementation and each potential funding source. Specific project eligibility criteria vary dependent upon the funding source. This section concludes with **Table 5-1** which summarizes the CIP project list, programmed year, and eligible funding sources for each project.

5.4.1 Federal Funding

Federal funding is available to airports through the FAA Airport Improvement Program (AIP) dependent upon the airport category, the role filled within the National Plan of Integrated Airport Systems (NPIAS), and the priority of the improvement as determined within the national priority ranking system. Entitlement grants are offered annually based on the number of passenger enplanements and the amount of enplaned cargo. Large and medium primary hub airports can receive 75-80 percent of eligible project

costs and small primary, reliever, and general aviation airports can receive 90-95 percent of eligible costs. FMM federal funding is budgeted based on the expectation of 90 percent funding for AIP eligible projects, meaning 10 percent of total project costs must be matched at the state and/or local level. FAA Order 5100.38D *Airport Improvement Program Handbook* details the grant process, project eligibility, allowable costs, and other information relevant to grant acceptance. Discretionary grants are offered depending on the availability of funds and the FAA's assessment of need and priority ranking. When the AIP has more than $3.2 billion available in a fiscal year, additional discretionary funding may be available.

Without commercial air service, FMM operates as a general aviation airport, thereby reducing the eligibility for AIP Entitlement funds. However, general aviation airports, such as FMM, are eligible for $150,000 annually under the AIR-21[3] grant program so long as $3.2 billion or more AIP funding is available in the Fiscal Year. Additionally, federal discretionary funding can be difficult to secure for small airports like FMM with projects that typically fall lower on the National Priority List. The CIP developed for FMM does include discretionary funding for some projects. If that funding is not available at the time of project implementation, other sources (such as state funding) may be able to substitute the difference.

5.4.2 State Funding

The State of Colorado funds airports in two ways: the Colorado Discretionary Aviation Grant (CDAG) Program and airport fuel tax disbursements. This funding is generated through two different types of aviation fuel tax: sales tax and excise tax[4]. Airport fuel tax disbursements are simply the direct reimbursement of a portion of the fuel taxes collected by the specific airport based on the quantity and type of fuel sold. The complete portion (i.e. 100 percent) of all state taxes collected on avgas fuel sales at Fort Morgan Municipal Airport is reimbursed and 65 percent of jet fuel sales collected at FMM is reimbursed. The remaining portion of the aviation fuel sales tax and the excise tax funds are dedicated to the CDAG Program. CDAG funding is predominantly used for airfield capital improvements, airfield maintenance, capital equipment investment, local match for federal projects, and other various programs. This money, less administrative costs, is distributed to select aviation projects which are prioritized based upon how they meet established Colorado Division of Aeronautics (CDOA) goals under the Colorado Aviation System Plan (CASP). CASP objectives include the following:

- Support a system that is adequate to meet current and projected demand.
- Provide a system that meets future demand while considering community and environmental compatibility.
- Have a system of airports that supports economic growth and diversification.
- Provide a system of airports that is convenient and one that supports emergency services.
- Support a system that maximizes historic investment by optimizing the useful life of existing facilities.
- Encourage a general aviation system that is secure.

[3] AIR-21 is the common name for the federal grant program established under the Wendell H. Ford Aviation Investment and Reform Act of 2000.
[4] Commercial airlines are exempt from paying the Colorado state excise tax on aviation fuel.

For federal AIP funded projects, the State of Colorado typically assists airports by providing up to half of the required 5 percent local match, as long as the cap set by the Colorado Aeronautics Board (CAB) is not exceeded. For state and local projects, CDAG funding traditionally includes a local contribution in one of two ways: money or in-kind work. Typical grants are issued at an 80/20 match, meaning 80 percent of the cost is paid by the state and the remaining 20 percent is covered locally by the grantee.

In addition to the normal CDAG Program, CDOA offers grants under a "Tier Two Request"[5]. This type of grant request is available for projects that do not fit within the framework of the traditional grant program, although the application and review process is the same. Projects fitting within a Tier Two Request are large-scale, high priority projects listed on an airport's CIP that provide necessary benefits to the Colorado state aviation system. The requests can be made anytime throughout the year only for projects deemed to be the airport's highest priority, but in most cases, eliminates the airport from consideration for any additional funding through the traditional grant program for that fiscal year. All requests are reviewed by the CAB and funding is not guaranteed on an annual basis.

The final option for State funding is through the State Infrastructure Bank Loan Program (SIB). The SIB provides low-interest loans to Colorado airports in support of funding CIP projects such as snow removal equipment, airport pavement reconstruction, land acquisition, and various other aviation supportive projects. Specific rules and regulations regarding eligibility, disbursement process, interest rates and fees, and loan repayment can be found in Colorado Code of Regulations (CCR) 605-1.

5.4.3 Local and Private Funding

Fort Morgan Municipal Airport has many resources available to remain self-sustaining and generate revenue. Operating solely as a general aviation airport, FMM produces revenue from fuel sales, aircraft parking fees, line services, land/hangar leases, and land/hangar sales.

Private funding is another avenue for FMM to pursue when seeking assistance in implementing projects found within the CIP. Local businesses may see the benefit in helping to develop and grow the ability of the Airport to accommodate more potential customers. Airport tenants, users, and investors may also find value in contributing to the airport's development.

Without airline and passenger generated revenue, general aviation airports often rely on supplemental funding from local city or county governments to assist with funding their capital needs. Within the public sector, sustaining positive intergovernmental relationships with Morgan County is important because many airport/city goals overlap with those of the county. These shared goals are likely to overlap in areas such as planning and land management, transportation, public works, public health, economic development, and parks and recreation. Identifying and building key partnerships with local businesses and departments within Morgan County government is an important element in identifying mutually beneficial opportunities and securing funding for the airport and related development projects. Pairing local funds with loans or bonds could be a vital component in completing projects found within the CIP.

[5] As of December 2017, Tier Two requests are unavailable due to a Treasury Loan Agreement allowing the Aviation Fund balance to run negative until recovery which is estimated to be no sooner than early 2020.

5.5 CAPITAL IMPROVEMENT PROGRAM SUMMARY

The Capital Improvement Program begins with ongoing and planned projects carried over from the FMM Master Plan Update CIP. **Table 5-1** shows the summary CIP project list by programmed term and budget year along with estimated costs.

TABLE 5-1
CIP PROJECT COSTS AND FUNDING PLAN

Year	Project	Project Cost	Cash Flow Management			
			Local	FAA Entitlement	FAA Discretionary	State Aeronautics
Short-Term (2018-2022)						
2018	Apron Rehabilitation/Expansion Phase 1 Design and CATEX[3]	$100,000	$5,000	$90,000	$0	$5,000
2019	Apron Rehabilitation/Expansion Phase 1 Construction[3]	$900,000	$45,000	$810,000	$0	$45,000
2019	Runway 14-32 Pavement Preservation	$183,000	$18,300	$0	$0	$164,700
2022	Airport Water Utility Upgrades	$33,000	$3,300	$0	$0	$29,700
2022	Airport Septic System Upgrade	$25,000	$2,500	$0	$0	$22,500
Short-Term Total		**$1,241,000**	**$74,100**	**$900,000**	**$0**	**$266,900**
Mid-Term (2023-2027)						
2023	Airport Electrical Utilities Upgrade	$97,000	$9,700	$0	$0	$87,300
2024	Runway 14-32 Safety Project - Land Acquisition to Decouple Runway 8-26	$110,000	$5,500	$0	$99,000	$5,500
2024	Runway 14-32 Safety Project - CATEX to Decouple Runway 8-26	$45,000	$2,250	$0	$40,500	$2,250
2025	Runway 14-32 Safety Project - Decouple Runway 8-26 Phase I	$65,000	$3,250	$0	$58,500	$3,250
2025	Runway 14-32 Pavement Preservation	$183,000	$18,300	$0	$0	$164,700
2026	SRE/FBO CATEX	$25,000	$2,500	$0	$0	$22,500
2026	SRE/FBO Design	$212,000	$10,600	$190,800	$0	$10,600
2027	Construct SRE/FBO Building and Site	$1,908,000	$95,400	$1,009,200	$0	$803,400
2027	Repurpose Old FBO Building	$10,000	$10,000	$0	$0	$0
Mid-Term Total		**$2,655,000**	**$157,500**	**$1,200,000**	**$198,000**	**$1,099,500**
Long-Term (2028-2037)						
2028	Decommission Runway 17-35	$25,000	$2,500	$0	$0	$22,500
2028	Land Release for Non-Aeronautical Use	$20,000	$20,000	$0	$0	$0
2030	Runway 14-32 Pavement Preservation	$183,000	$18,300	$0	$0	$164,700
2033	Land Acquisition for Runway 14-32	$40,000	$2,000	$0	$36,000	$2,000
2034	Apron Expansion Phase II - CATEX	$35,000	$1,750	$31,500	$0	$1,750
2035	Runway 14-32 Pavement Preservation	$183,000	$18,300	$0	$0	$164,700
2035	Apron Expansion Phase II - Design and Construction	$1,060,000	$53,000	$954,000	$0	$107,000
2036	Airport Master Plan Update	$350,000	$17,500	$315,000	$0	$64,000
2037	EA for Runway 14-32 Extension and New Taxiway	$125,000	$6,250	$0	$112,500	$6,250
Long-Term Total		**$2,021,000**	**$139,600**	**$1,300,500**	**$148,500**	**$532,900**
TOTAL CIP 2018-2037		**$5,917,000**	**$371,200**	**$3,400,500**	**$346,500**	**$1,899,300**

Source: RS&H, 2017

Notes: [1]All costs in 2017 dollars. [2]All project costs rounded up to the nearest thousand.

[3]2018 and 2019 "Apron Rehabilitation/Expansion Phase 1 Design, CATEX, and Construction" projects are rough order-of-magnitude planning level cost estimates. As of December 2017, this project is entering the initial stages of development and as the project progresses, cost estimates will be further refined.

[4]All land acquisition cost assumptions based upon previous land purchase cost per acre.

RS&H

CHAPTER 6

AIRPORT LAYOUT PLAN

6.1 INTRODUCTION

This chapter presents the Airport Layout Plan (ALP) drawing set, which has been produced as part of this Airport Master Plan Update process. Additional sheets were added compared to the previous ALP set either because ALP requirements have changed since the previous ALP was submitted to FAA for approval, or to show additional detail. The components of this chapter include description of the revisions to the ALP since the previous ALP, the purpose of each of the ALP sheets, compliance with FAA design standards, and reduced-sized inserts of the preliminary ALP drawing set approved by FMM.

The ALP drawing set serves as a visual representation of the Airport's existing facilities and planned future development. The preferred alternatives and the overall development plan that was derived in the Alternatives Chapter is included in the ALP, along with any other facility changes that have taken place since the last ALP was created. The drawing set was prepared using several FAA guidelines and checklists, which included the following:

- FAA ARP SOP 2.00, Standard Procedure for FAA Review and Approval of Airport Layout Plans (ALPs).
- Advisory Circulars 150/5300-13A Change 1, *Airport Design*
- Advisory Circular 150/5070-6B, Change 2, *Airport Master Plans*
  - Chapter 10, Airport Layout Plans
  - Appendix F, Airport Layout Plan Drawing Set
- 14 CFR Part 77, *Objects Affecting Navigable Airspace*
- FAA Order 8260.3B, *United States Standards for Terminal Instrument Procedures (TERPS)*
- FAA Order 5200.8, *Runway Safety Area Program*

The ALP requires FAA approval independent of the Master Plan. As such, review of the ALP drawing set is accomplished through several intermediate steps, including reviews by the Airport, the FAA Airports District Office (ADO), and several other FAA offices involved in the associated airspace review.

The ALP drawing set serves several needs for the Airport, the City of Fort Morgan, Colorado Division of Aeronautics, and the FAA. As presented in the FAA Advisory Circular 150/5070-6B, *Airport Master Plans*, there are five primary functions of the Airport Layout Plan (ALP) that define its purpose:

- FAA-approved ALPs are necessary in order to receive financial assistance under the terms of the Airport and Airway Improvement Act of 1982 (AIP), and specific passenger facility charge actions. The maintenance of, and conformity to the plan is a grant assurance requirement upon which Federal funds have been provided to CPR under the AIP program and previous programs. Previous programs include the 1970 Airport Development Aid Program (ADAP) and Federal Aid Airports Program (FAAP) of 1946.
- The ALP creates a blueprint for airport development by depicting proposed facility improvements that are consistent with the strategic vision of the Airport management. They also provide a guideline by

which Airport management can assure that development maintains Airport design standards and safety requirements, and is consistent with airport and community land use plans.

- The ALP serves as a public document that is a record of aeronautical requirements, both present and future, and as a reference for community deliberations on land use proposals and budget resource planning.
- The approved ALP provides the FAA with a plan for airport development. This will allow compatible planning for FAA-owned facility improvements at the Airport, and help FAA to anticipate budgetary and procedural needs. The approved ALP will also give the FAA the information it needs to ensure airspace is protected for planned facility or approach procedure improvements.
- The ALP provides a working tool for use by the Airport sponsor.

6.2 MODIFICATION TO FAA STANDARDS

There are no current modifications to FAA standards at the Airport. Additionally, the Master Plan process did not identify any noncompliance issues that would require a Modification to Standard.

6.3 LAND USE AND ZONING ORDINANCES

Protecting the airspace surrounding the Airport is critically important to the future success of FMM, and is required by FAA as part of the federal grant assurances for all FAA funding projects. During the master plan study, the consultant planning team, in conjunction with City of Fort Morgan Airport management, meet with Morgan County commissioners and planning staff to discuss airport overlays, zoning and land use, and airspace requirements. The intent of that meeting was to aid all parties in understanding the Airport's airspace, and best practices for protecting that airspace. At the time of this writing, the City of Fort Morgan has been in continuing conversations with Morgan County in regard to establishing zoning ordinances that will protect the Airport's airspace.

It is worth noting that in addition to local zoning ordinances, the State of Colorado Revised Statute 43-10-113, *Safe Operating Areas Around Airports*, designates public airports to be a matter of state interest and notes that 14 CFR Part 77 must be enforced.

Numerous sheets within the Airport Layout Plan depict the 14 CFR Part 77 imaginary surfaces that must remain clear of obstructions. The sheets provide a visual aid for understanding height limitations surrounding the airport, and the specific locations and areas that are the most critical.

6.4 AIRPORT LAYOUT PLAN HIGHLIGHTS AND MODIFICATIONS

This section highlights the key elements and modifications that have been made since the Airport's last ALP update. The modifications to the plan are based either on the Master Plan's analyses of identified future needs, changes related to the vision of the Airport, a change in FAA design criteria, or a combination of all these factors. Enhancements and changes to the ALP set are detailed within this section as related to the future and ultimate time horizons (and correlated Future and Ultimate sheets within the ALP). The future time horizon is within the master plan 20-year planning period. The ultimate time horizon

is outside of the master plan's 20-year planning period. As such, enhancements within the Sheet 5, *Airport Layout Plan Drawing (Ultimate)*, are not definitive and may or may not come to fruition.

6.4.1 Ultimate Design Vision

The goal of this master plan study was to establish a plan for development over the next 20 years to serve the growth forecasted over that time period. In creating solutions for future development concepts, a very long-term outlook is required to establish a vision of what the Airport will look like if it was fully developed. Without having a vision outlined, future development runs the risk of being misaligned, inefficient, and in the worst case precluding growth. Thus, for this study, the planning team and Airport management examined all alternatives for development with consideration to the very-long term future. A result of this process is the development proposed within Sheet 5, *Airport Layout Drawing (Ultimate)*, which depicts a long term vision of the Airport well beyond the 20-year planning period. All development concepts depicted in Sheet 4, *Airport Layout Drawing (Future)*, were designed to build into and integrate with the ultimate vision.

6.4.2 Runway/Taxiway Enhancements

Future runway improvements for both the future and ultimate time horizons for Runway 14-32 and Runway 8-26 were developed within this master plan study. These enhancements are detailed below.

Runway 14-32 Enhancements:

Within Sheet 4, *Airport Layout Drawing (Future)*, Runway 14-32 is shown to have an extension to the north to make a total length of 6,500 feet. Sheet 5, *Airport Layout Drawing (Ultimate)*, shows an additional extension of the runway to the north for an ultimate length of 7,500 feet. These runway lengths are based on the facility requirements analysis, which carried forward the recommended runway length analysis completed in the Environmental Assessment for the new runway. Note that prior to implementation of any runway extension, a planning study should be conducted to determine if the fleet mix and associated runway length requirements have changed. Additionally, future decisions will be required in regard to how best mitigate the Part 77 penetrations of Highway 52 to the Runway 32 Approach and Transition Surfaces. These do not impact the daily operations of the airport, but will need to be remediated in the future. Options exist for the runway to be shifted, or the roadway regraded and lowered. During the implementation planning phase of this study, a cursory examination estimated it would be less costly to regrade and lower the road as opposed to shifting the runway. Further analysis of this issue is recommended prior to any major highway or runway rehabilitation.

On the ultimate sheet, there is also a full length parallel taxiway shown for Runway 14-32. This taxiway is proposed to be located on the east side of the runway, opening opportunity for additional aeronautical growth on the north side of the airport.

In regard to the airport reference code, the current Category B runway design is carried forward in the ALP future and ultimate sheets. The previous ALP had indicated that the airport be a Category B in the future and then move to a Category C ultimately. This study found no indication that Category C aircraft would be operating at FMM in the future, or ultimately, to the extent that would justify an upgrade to a Category C runway. To upgrade Runway 14-32 to Category C standards, the runway would need to be

relocated/shifted to the north away from the existing terminal area to provide adequate spacing between the runway and fixed objects. Additionally, a large amount of earth would be required to be cut to comply with Category C runway gradients, which have less allowed gradient than Category B runways. Because of the large impacts to Category C runway, and the fact that the upgrade is not anticipated to be ultimately needed, all future planning was based around the existing Category B runway.

Finally, it should be noted that the building restriction line (BRL) planned for in the future, and ultimately, was based on an allowable structure height of 35 feet. Dimensional offsets for each runway centerline can be found on the Airport Layout Plan Drawing. Note that the BRL for Runway 14-32 is based on the runway having approaches with greater than ¾ mile visibility minimums.

Runway 8-26 Enhancements:
Runway 8-26 is needed to provide adequate wind coverage during crosswind conditions for smaller piston aircraft that are based at the Airport. The turf runway is shown on the future sheet shifted to the west, decoupled from the primary runway, and extended to 4,320 feet. An extension to this length is based on the runway length analysis conducted in the facility requirements, which found that 4,320 feet of paved runway is needed to provide enough length for 75 percent of the small airplane fleet (less than 12,500 pounds and less than 10 seats). For the fleet using the turf runway at FMM, 4,320 feet is greater than required. Thus, a phased approach is recommended when extending the runway.

On the ultimate sheet, the runway is shown at 4,320 feet, paved, and connected with a parallel taxiway. This configuration will provide flexibility for the Airport if wind patterns shift and the crosswind runway becomes required for B-II aircraft. The configuration is also part of a long term vision of full build out of the Airport beyond the 20-year planning period.

6.4.3 Future Land Uses

Sheet 15, *Future Airport Land Use Plan*, shows a revised land use then currently exists today. The largest change stems from the change of land use in the north-east quadrant of the Airport. Once Runway 17-35 is decommissioned, an area in the north-east quadrant adjacent to Highway 52 is proposed to be released for non-aeronautical use. At that time, the area will be available for both non-aeronautical and aeronautical development. Additional changes to land use include the denotation of aeronautical land use areas adjacent to Runway 14-32, Runway 8-26, the existing hangar area, and the future hangar/terminal area. Agricultural land use is denoted only in portions of the airport that will not serve as, or benefit from being used now or in the future as aeronautical or non-aeronautical land.

6.4.4 Snow Removal Equipment / Fixed Based Operator Facility

The facility requirements portion of this study identified the need for the Airport to build a snow removal equipment (SRE) facility and eventually replace the existing fixed based operator (FBO) building. Sheet 4, *Airport Layout Drawing (Future)*, depicts a joint use facility (#39) that will house snow removal equipment and the FBO functions. This area is envisioned to include a parking lot and roadway enhancement. The location of the building is envisioned to serve as part of the Airport entrance facade, and thus upgrades to landscaping and roadway features are recommended. Enhanced esthetics to the entire area adjacent to the FBO and fuel farm will aid in providing a favorable first impression to visitors of the Airport.

6.4.5 Terminal Area Development – Notable Attributes

The alternatives analysis of this study concluded with a preferred development concept that focuses on building-out and infilling the existing terminal area. The preferred concept included the development of large corporate hangars and a new SRE/FBO facility, as described above, adjacent to the airport access road. The area where future buildings #39, #40, and #41, are proposed sits underneath the departure surface listed in AC 150/5300-13A, *Airport Design* for Runway 14. This factor is estimated to limit building height to a maximum of 25 to 35 feet depending on grades. If taller structures are desired, they may need to be shifted to the south to provide further distance away from the runway threshold. The FAA obstruction evaluation process related to Form 7460-1 will further determine allowable impacts within this area, as some penetration to the departure surface may be allowable and not cause a hazard to air navigation. Coordination with FAA during pre-design in this area is recommended.

6.5 AIRPORT LAYOUT PLAN DRAWING SET

The ALP drawing set graphically illustrates the development of the Airport over the 20-year planning period. An ALP set is required by the FAA to be considered for future funding and to be compliant with the Airport's Federal Grant Assurances. The complete set for the Fort Morgan Municipal Airport consists of the following drawings:

- Sheet 1 Cover Sheet
- Sheet 2 Airport Data Sheet
- Sheet 3 Airport Layout Plan (Existing)
- Sheet 4 Airport Layout Plan (Future)
- Sheet 5 Airport Layout Plan (Ultimate)
- Sheet 6 Terminal Area Plan
- Sheet 7 Utility Plan Drawing
- Sheet 8 14 CFR Part 77 Airspace Drawing
- Sheet 9 Runway Centerline and Approach Profiles
- Sheet 10 Existing Runway 14 Inner Approach Plan and Profile
- Sheet 11 Future Runway 14 Inner Approach Plan and Profile
- Sheet 12 Existing/Future Runway 32 Inner Approach Plan and Profile
- Sheet 13 Runway 17-35 Inner Approach Plan and Profile
- Sheet 14 Existing Runway 8-26 Inner Approach Plan and Profile
- Sheet 15 Future Runway 8-26 Inner Approach Plan and Profile
- Sheet 16 Airport Land Use Plan
- Sheet 17 Exhibit 'A' Airport Property Inventory Map
- Sheet 18 Airport Development Phasing Plan

6.5.1 Sheet 1 – Cover Sheet

This sheet denotes the Airport name and an index chronicling the ALP drawing sheets contained in the drawing set. This sheet also provides an Airport location and vicinity map, as well as a revised title block.

6.5.2 Sheet 2 – Airport Data Sheet

This sheet provides detailed information in tabular form about the Airport's existing and anticipated conditions. This sheet also provides critical information about the Airport's runways and safety area dimensions. Major components on this sheet include:

- **Airport Data Table** – This table denotes items related to the airport system as a whole. It is within this table that the critical aircraft for the Airport is denoted.
- **Runway Data Table** – This table denotes information specific to each runway at the Airport. The runway design code, length, width, gradient, pavement strength, and multiple other design related items are listed within this table.
- **NGS Monument Data Table** – This table denotes where the Airport's primary and secondary control points for survey use are located. This is helpful information for surveyors conducting work at the Airport.
- **Declared Distance Table** – This table denotes the distances for takeoff and landing available to pilots for each runway. At FMM, there are no special circumstances or obstructions on runway ends that require distances to be different from one-another. As such, all components for each runway are the same distance as the runway length itself.
- **Wind Rose Data** - A wind rose and corresponding table is shown for all-weather, IFR, and VFR weather conditions. This data was determined in the Facility Requirements chapter of this study. The rose and the table show the wind coverage provided for each runway based on 10.5 and 13 knot crosswind components.

6.5.3 Sheet 3 – Airport Layout Plan (Existing)

This sheet is the document which serves as a graphic representation of existing Airport facilities. For ease of viewing, the existing facilities and future facilities were separated into different sheets.

6.5.4 Sheet 4 – Airport Layout Plan (Future)

This sheet is the key document which serves as a graphic representation of future Airport facilities. The future Airport facilities include those that are scheduled to be completed during the 20-year planning period. One of the primary purposes of this drawing is to depict those areas that future facilities are planned to be constructed upon so that the associated land can be reserved for future use.

The drawing also reflects changes to physical features on and in the vicinity of the Airport that may affect navigable airspace or the ability of the Airport to operate. Development shown on the ALP corresponds to the Airport's Capital Improvement Program (CIP) for the 20-year period. Specifically, the sheet depicts the limits of the Airport property interests and configuration of facilities in compliance with geometric design separation and clearance standards. It also includes airspace and navigational aid (NAVAID) facilities.

Additionally, the ALP includes the dimensional information in order for recommended development to be designed in accordance with FAA planning and design specifications outlined in FAA Advisory Circular 150/5300-13A – Change 1 *Airport Design* and 150/5070-6B - Change 2, *Airport Master Plans*. Dimensional information aids users of the ALP to determine and plan for adequate separation between future development and existing and future runways, taxiways, taxilanes, and associated airspace. Lastly, the sheet provides a location to chronicle the ALP reviewer and approval stamps/letter(s).

6.5.5 Sheet 5 – Airport Layout Plan (Ultimate)

This sheet depicts those Airport facilities that are scheduled to be completed outside of the 20-year planning period, and which make up the Airport's ultimate development. The drawing is intended to illustrate the long term vision of the Airport, and to aid in ensuring future development works to build toward the vision. Additionally, this sheet is intended to aid in preserving land for future growth and development.

This sheet does not require approval by FAA, and was created solely to depict the ultimate vision of the Airport. As such, if and when development portrayed within this sheet becomes viable and/or practical for implementation, it should be vetted with FAA and be moved to the future sheet.

6.5.6 Sheet 6 – Terminal Area Plan

The Terminal Area Plan is a view centered on the area surrounding the fixed based operator (FBO) building and adjacent hangars. The sheet depicts existing and future facilities as well as dimensional criteria involving taxiway and taxilane surfaces. Additionally, existing and future utility corridors are depicted. Key facilities shown on the Terminal Area Plan include:

- Apron configuration and aircraft parking positions
- Existing FBO building and future buildings
- Terminal roadway circulation and vehicle parking
- General aviation aircraft hangars

6.5.7 Sheet 7 – Utility Plan Drawing

Utility infrastructure was a focus element within this study, and the Utility Plan Drawing sheet is the culmination of that effort. This sheet depicts existing utilities and outlines existing and future utility corridors that are intended to be preserved through the future. The utility corridors and all future development have been specifically integrated with the goal of maximizing existing utility infrastructure, thereby reducing costs of future development.

6.5.8 Sheet 8 – 14 CFR Part 77 Airspace Drawing

These scaled drawings identify obstacle identification surfaces for the full extent of all Airport development. The surfaces define the limits of recommended land use control for the height of objects surrounding the Airport's CFR 14 Part 77, Imaginary Surfaces. Airspace features corresponding with the runway dimensions are depicted on the ALP Drawing. A digital USGS map is used as the base map for the drawings in which each of the Federal Aviation Regulations (FAR) Part 77, Subpart C, Imaginary Surfaces

(Primary, Approach, Transitional, Horizontal, and Conical) are depicted. These drawings depict the existing airspace configuration for the Airport.

These sheets also provide numerical data for all obstructions visually depicted in plain view of the airspace surface drawing. Each obstruction is identified with a description, a top elevation, the surface the object is penetrating and that surfaces' elevation at the penetrating point, the amount of penetration and a recommended disposition. Obstructions vary from vegetation to manmade objects. Some objects are defined as fixed by function, such as NAVAIDS, because of current sitting requirements and the role they play in ensuring the safe navigation of flight. Any potential obstructions are identified by a negative number in the "Part 77 Surface Penetration (+)" column.

6.5.9 Sheet 9 – Runway Centerline and Approach Profiles

This sheet depicts the full extent of each runway's existing Part 77 Approach Surfaces in a profile view. The approach surfaces shown extend out to 10,000 feet beyond the runway threshold for Runway 14-32, and 5,000 feet beyond the threshold of turf Runways 8-26 and 17-35. Additionally, the sheet provides a longitudinal view of the Runway 14-32 centerline profile. The centerline profile illustrates runway elevation, change in surface gradient and Runway Safety Area gradients, vertical curves, and runway line of sight requirements.

6.5.10 Sheet 10 through 15 – Runway Inner Approach Plan and Profile

Sheets 10 through 15 provide a plan and profile view of each of the Airport's existing and future runway imaginary surfaces. Future runway shifts and extensions are detailed for Runway 14, Runway 8, and Runway 26, which are runway ends that are proposed to be moved in the future. These sheets provide a more detailed view of the first 4,200 feet off of each runway end where manmade penetrating obstructions are typically found. Any penetrating obstruction is depicted in blue and identified with its top elevation. Additionally, the runway protection zone, navigational aids, and roadways are identified, and applicable data is provided. Roadways depicted with a solid line intersect the extended runway centerline and dashed lines represent the edge of the FAR Part 77 approach surface intersecting the roadway. Roadways intersecting the edge of the Part 77 surface may be above or below the grade of the extended centerline.

6.5.11 Sheet 16 – Airport Land Use Plan

This sheet depicts the existing airport land use, and the proposed future land use subsequent to the decommissioning of Runway 17-35. Once that runway is decommissioned, land in the north-west corner of the airport's property may be requested for release by FAA for non-aeronautical use. Additionally, an area for on-airport agriculture production is proposed west of Runway 14-32. Note that the Airport sponsor must coordinate all non-aeronautical activity with FAA as it may require approval as a concurrent use. Until such coordination is conducted and a land release is completed, the existing land use plan as approved in the previous ALP, and shown in this drawing, remains valid. The future airport land use plan serves as a guide for future development in-line with the overall vision of the airport.

6.5.12 Sheet 17 – Exhibit 'A' Airport Property Inventory Map

This sheet depicts the airport property interests consistent with the existing and future Airport Layout Plan drawing. This drawing documents past airport land acquisition, including fee-simple and easement tracts. The scope of this master plan was developed to include an airport property map that would be submitted upon the standards specified to comply with the FAA ARP SOP 2.0 Appendix A ALP Review Checklist. However, since the introduction of FAA ARP SOP 3.00 Standard Operating Procedures for FAA review of Exhibit 'A' Airport Property Maps in 2013, FAA Airport District Offices have been under continuing pressure from FAA headquarters to ensure airports have Exhibit 'A' to meet the SOP 3.00 standards before issuing grants. Thus, this sheet was revised to meet the standards outlined in FAA ARP SOP 3.00. All parcel data were provided by Airport management as no survey or title searches were conducted as part of this study. Those parcels whose deeds could not be obtained were graphically represented but will require title searches and/or survey to provide the required detailed accuracy.

6.5.13 Sheet 18 – Airport Development Phasing Plan

The Airport Development Phasing Plan provides a visual depiction of the phasing of enhancements and additions over the course of the planning period. The phasing plan directly correlates with the implementation plan provided in the next chapter. The sheet helps to visibly tie together the Airport's CIP to the timing and location of future projects and enhancements.

6.6 AIRPORT LAYOUT PLAN DRAWING SET

The Airport Layout Plan drawing set inserted as part of this report is a reduced-size version of the 24-inch by 36-inch drawings pending final review, approval, and signature by the FAA. The inserted ALP drawings are subject to revision until formally accepted by FAA, and may vary from the final ALP drawing set on file with the FAA.

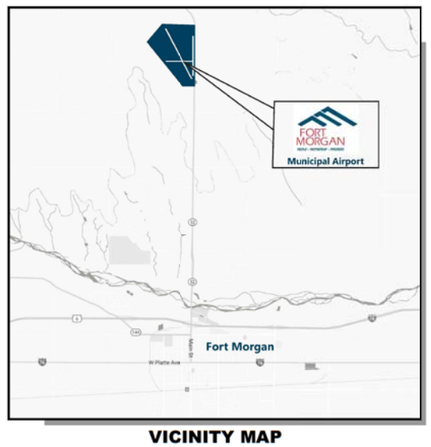
AIRPORT LAYOUT PLAN
FOR
FORT MORGAN MUNICIPAL AIRPORT (FMM)
FORT MORGAN, COLORADO

FORT MORGAN
PEOPLE • PARTNERSHIP • PROGRESS

JULY 2018

DRAFT DOCUMENTS

LOCATION MAP
SCALE: NTS



VICINITY MAP
SCALE: NTS

INDEX TO SHEETS		
SHEET NUMBER	DRAWING TITLE	REVISION DATE
1	COVER SHEET	
2	AIRPORT DATA SHEET	
3	AIRPORT LAYOUT PLAN (EXISTING)	
4	AIRPORT LAYOUT PLAN (FUTURE)	
5	AIRPORT LAYOUT PLAN (ULTIMATE)	
6	TERMINAL AREA PLAN	
7	UTILITY PLAN DRAWING	
8	14 CFR PART 77 AIRSPACE DRAWING	
9	RUNWAY CENTERLINE AND APPROACH PROFILES	
10	EXISTING RUNWAY 14 INNER APPROACH PLAN AND PROFILE	
11	FUTURE RUNWAY 14 INNER APPROACH PLAN AND PROFILE	
12	EXISTING / FUTURE RUNWAY 32 INNER APPROACH PLAN AND PROFILE	
13	RUNWAY 17 - 35 INNER APPROACH PLAN AND PROFILE	
14	EXISTING RUNWAY 8 - 26 INNER APPROACH PLAN AND PROFILE	
15	FUTURE RUNWAY 8 - 26 INNER APPROACH PLAN AND PROFILE	
16	AIRPORT LAND USE PLAN	
17	EXHIBIT 'A' AIRPORT PROPERTY INVENTORY MAP	
18	AIRPORT DEVELOPMENT PHASING PLAN	

PLANS PREPARED BY:

RS&H

RS&H, Inc.
7800 E. Union Ave., Suite 700
Denver, CO 80237
303-409-9700 FAX 303-409-9701
www.rsandh.com

APPROVED _____ DATE
PETER MAIMAN, C.M.

FORT MORGAN MUNICIPAL AIRPORT

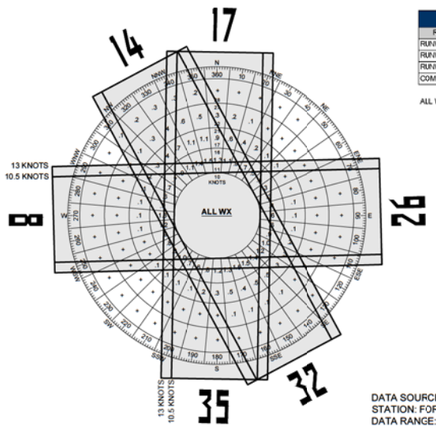
APPROVED _____ DATE
STEVE GLAMMEYER / AIRPORT MANAGER

REVISIONS		
NO.	DESCRIPTION	DATE

Drawing: T:\P\224.0013.001 Fort Morgan MPU\CAD\C\FMM_01_Cover.dwg Plotted on: 6/29/2018 1:00 PMPlotted by: Derengowski, Steven

ALL WEATHER WIND DATA		
RUNWAY	10.5 KNOTS	13 KNOTS
RUNWAY 14-32	93.36%	96.59%
RUNWAY 17-35	92.09%	95.53%
RUNWAY 8-26	86.65%	90.93%
COMBINED	99.49%	99.87%

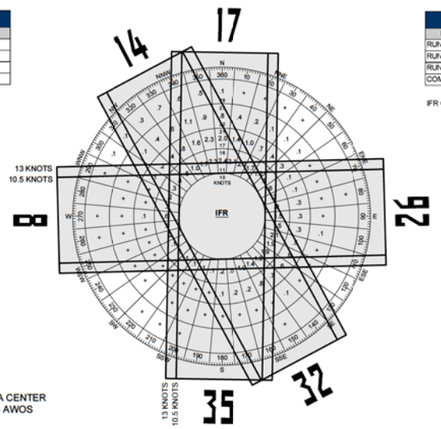
ALL WEATHER OBSERVATIONS: 86,838



ALL WEATHER WIND ROSE

IFR WIND DATA		
RUNWAY	10.5 KNOTS	13 KNOTS
RUNWAY 14-32	79.98%	88.93%
RUNWAY 17-35	85.93%	92.77%
RUNWAY 8-26	81.24%	86.70%
COMBINED	98.37%	99.56%

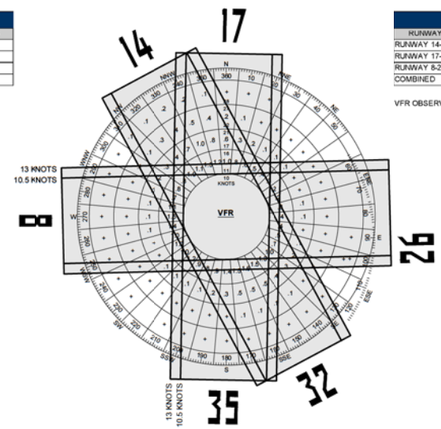
IFR OBSERVATIONS: 4,291



IFR WIND ROSE

VFR WIND DATA		
RUNWAY	10.5 KNOTS	13 KNOTS
RUNWAY 14-32	94.08%	97.00%
RUNWAY 17-35	92.50%	95.76%
RUNWAY 8-26	87.21%	91.36%
COMBINED	99.56%	99.89%

VFR OBSERVATIONS: 81,248



VFR WIND ROSE

DATA SOURCE: NOAA NATIONAL CLIMATIC DATA CENTER
STATION: FORT MORGAN MUNICIPAL AIRPORT - AWOS
DATA RANGE: 2012 - 2016

ABBREVIATIONS:

AGL	ABOVE GROUND LEVEL
ARP	AIRPORT REFERENCE POINT
ASDA	ACCELERATE STOP DISTANCE AVAILABLE
AWOS	AUTOMATED WEATHER OBSERVING SYSTEM
DME	DISTANCE MEASURING EQUIPMENT
E	EXISTING CONDITIONS
F	FUTURE CONDITIONS (1-20 YEARS)
IFR	INSTRUMENT FLIGHT RULES
ILS	INSTRUMENT LANDING SYSTEM
LDA	LANDING DISTANCE AVAILABLE
MIRL	MEDIUM INTENSITY RUNWAY LIGHTS
MITL	MEDIUM INTENSITY TAXIWAY LIGHTS
MSL	MEAN SEA LEVEL
NGS	NATIONAL GEODETIC SURVEY
NPI	NON-PRECISION INSTRUMENT
PAPI	PRECISION APPROACH PATH INDICATOR
REIL	RUNWAY END IDENTIFIER LIGHTING
SW	SINGLE WHEEL GEAR AIRCRAFT
TODA	TAKEOFF DISTANCE AVAILABLE
TORA	TAKEOFF RUN AVAILABLE
TSS	THRESHOLD SITING SURFACE
U	ULTIMATE
VFR	VISUAL FLIGHT RULES

RUNWAY DATA TABLE

	RUNWAY 14			RUNWAY 32			RUNWAY 17		RUNWAY 35		RUNWAY 8			RUNWAY 26		
	EXISTING	FUTURE	ULTIMATE	EXISTING	FUTURE	ULTIMATE	EXISTING	FUTURE	EXISTING	FUTURE	EXISTING	FUTURE	ULTIMATE	EXISTING	FUTURE	ULTIMATE
RUNWAY DESIGN CODE (RDC)	B-II-5000			B-II-5000			B-I(U)-VIS		B-I(U)-VIS		B-I(U)-VIS	B-I(U)-VIS		B-I(U)-VIS	B-I(U)-VIS	
APPROACH REFERENCE CODE (APRC)	B-III-5000 D-II-5000			B-III-5000 D-II-5000			N/A		N/A		N/A	N/A		N/A	N/A	
DEPARTURE REFERENCE CODE (DPRC)	B-III D-II			B-III D-II			N/A		N/A		N/A	N/A		N/A	N/A	
PAVEMENT SURFACE	ASPHALT			ASPHALT			TURF		TURF		TURF/DIRT	TURF	ASPHALT	TURF/DIRT	TURF	ASPHALT
SURFACE TREATMENT	NONE			NONE			NONE		NONE		NONE	NONE	FELXIBLE	NONE	NONE	FELXIBLE
PAVEMENT STRENGTH - WHEEL LOADING (POUNDS) SW	30,000			30,000			N/A		N/A		N/A	N/A	TBD	N/A	N/A	TBD
PAVEMENT STRENGTH - PCN	N/A			N/A			N/A		N/A		N/A	N/A	TBD	N/A	N/A	TBD
RUNWAY GRADIENT	1.50%			1.50%			0.56%		0.56%		C 12%	2.00% (4)	TBD	0.12%	2.00% (4)	TBD
PERCENT WIND COVERAGE (ALL WEATHER) 10.5 KNOTS	93.36%			93.36%			92.09%		92.09%		86.65%	SAME	SAME	86.65%	SAME	SAME
13 KNOTS	96.59%			96.59%			95.53%		95.53%		90.93%			90.93%		
RUNWAY LENGTH	5,731'	6,500'	7,500'	5,731'	6,500'	7,500'	5,216'		5,216'		2,468'	4,320'	SAME	2,468'	4,320'	SAME
RUNWAY WIDTH	75'	SAME	SAME	75'			80'		80'		100'	SAME	75	100'	SAME	75'
RUNWAY END - COORDINATES (NAD 83) LAT.	40° 20' 41.46"	40° 20' 48.17"	40° 20' 56.86"	40° 19' 51.66"			40° 20' 20.15"		40° 19' 42.60"		40° 19' 58.04"	40° 19' 57.96"		40° 19' 58.09"	40° 19' 58.06"	
LONG.	103° 46' 42.09"	103° 46' 46.82"	103° 46' 42.96"	103° 46' 06.92"			103° 46' 02.82"		103° 46' 03.83"		103° 46' 35.06"	103° 46' 12.40"		103° 46' 03.16"	103° 46' 16.61"	
RUNWAY END - ELEVATION (NAVD 88)	4,595.3'	4,596' EST		4,509.3'			4,528.0'		4,502.8'		4,513.8'	4,507' EST		4,510.2'	4,512.7'	
DISPLACED THRESHOLD - LENGTH	N/A			N/A			N/A		N/A		N/A	N/A		N/A	N/A	
DISPLACED THRESHOLD - COORDINATES (NAD 83) LAT.	N/A			N/A			N/A		N/A		N/A	N/A		N/A	N/A	
LONG.																
DISPLACED THRESHOLD - ELEVATION (NAVD 88)	N/A			N/A			N/A		N/A		N/A	N/A		N/A	N/A	
RUNWAY LIGHTING	MIRL			MIRL			N/A		N/A		N/A	N/A		N/A	N/A	
RUNWAY PROTECTION ZONE (RPZ)	500'x1,000'x700'			500'x1,000'x700'			250'x1,000'x450'		250'x1,000'x450'		250'x1,000'x450'	SAME		250'x1,000'x450'	SAME	
RUNWAY MARKING	NONPRECISION			NONPRECISION			N/A		N/A		N/A	N/A		N/A	N/A	
14 CFR PART 77 APPROACH CATEGORY	34:1			34:1			20:1		20:1		20:1	SAME		20:1	SAME	
APPROACH TYPE	NONPRECISION			NONPRECISION			VISUAL		VISUAL		VISUAL	SAME		VISUAL	SAME	
VISIBILITY MINIMUMS	1 MILE			1 MILE			VISUAL		VISUAL		VISUAL	SAME		VISUAL	SAME	
AERONAUTICAL SURVEY	VERTICALLY GUIDED			VERTICALLY GUIDED			NON-VERTICALLY GUIDED		NON-VERTICALLY GUIDED		NON-VERTICALLY GUIDED	SAME		NON-VERTICALLY GUIDED	SAME	
RUNWAY DEPARTURE SURFACE	YES			YES			N/A		N/A		N/A	N/A		N/A	N/A	
RUNWAY SAFETY AREA (RSA) WIDTH	150'			150'			120' (2)		120' (2)		120' (2)	SAME		120' (2)	SAME	
LENGTH BEYOND DEPARTURE END	300'			300'			240' (2)		240' (2)		240' (2)			240' (2)		
RUNWAY OBJECT FREE AREA (ROFA) WIDTH	500'			500'			250' (2)		250' (2)		250' (2)	SAME		250' (2)	SAME	
LENGTH BEYOND RWY END	300'			300'			240' (2)		240' (2)		240' (2)			240' (2)		
RUNWAY OBSTACLE FREE ZONE (ROFZ) WIDTH	400'			400'			250' (2)		250' (2)		250' (2)	SAME		250' (2)	SAME	
LENGTH BEYOND RWY END	200'			200'			200' (2)		200' (2)		200' (2)			200' (2)		
PRECISION OBSTACLE FREE ZONE (POFZ) WIDTH	N/A			N/A			N/A		N/A		N/A	N/A		N/A	N/A	
LENGTH BEYOND RWY END																
THRESHOLD SITING SURFACE (TSS)	20:1 (TYPE 4) (3)			20:1 (TYPE 4) (3)			20:1 (TYPE 2) (3)		20:1 (TYPE 2) (3)		20:1 (TYPE 2) (3)	SAME		20:1 (TYPE 2) (3)	SAME	
VISUAL AND INSTRUMENT NAVAIDS	REIL, PAPI			REIL, PAPI			NONE		NONE		NONE	SAME		NONE	SAME	
TOUCHDOWN ZONE ELEVATION (NAVD 88)	4,595.3'			4,545.7'			4,530.7'		4,503.9'		4,513.2'	4,507' EST		N/A	SAME	

(U) DENOTES UTILITY/SMALL AIRCRAFT.
1. RSA, ROFA, AND ROFZ DIMINSIONS SHOWN ARE STANADARD.
2. PORTIONS OF RSA, ROFA, AND ROFZ ARE NOT CONTROLLED BY EASEMENT OR UNDER FEE SIMPLE.
3. AC 150/5300-13A, AIRPORT DESIGN, CHANGE 1, TABLE 3-2
4. 2.00% IS MAX GRADE ALLOWED FOR TURF RUNWAY.
5. ALL COORDINATES ARE IN NORTH AMERICAN DATUM OF 1983 (NAD 83).
6. ALL ELEVATIONS ARE IN NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
7. RUNWAY MEETS LINE OF SIGHT REQUIREMENT.

AIRPORT DATA TABLE

		EXISTING	FUTURE / ULTIMATE
AIRPORT REFERENCE CODE		B-II	SAME
MEAN MAXIMUM TEMPERATURE / HOTTEST MONTH		89° / JULY	SAME
AIRPORT ELEVATION (NAVD 88)		4,595.3'	SAME
AIRPORT NAVIGATIONAL AIDS (FMM)		BEACON	SAME
AIRPORT REFERENCE POINT (NAD 83)	LAT.	40° 20' 06"	40° 19' 54" / 40° 20' 14"
	LONG.	103° 48' 15"	103° 48' 23" / 103° 48' 32"
MISCELLANEOUS FACILITIES (FMM)		SEGMENTED CIRCLE W/ LIGHTED WINDCONE, AWOS	SAME
AIRPORT REFERENCE CODE AND CRITICAL AIRCRAFT		B-II / KING AIR 90 & DASSAULT FALCON 20	SAME
MAGNETIC VARIATION		7° 44' EAST + 0° 21' DECEMBER 2016	SAME
NPIAS SERVICE LEVEL		NON-PRIMARY/GENERAL AVIATION	SAME
STATE EQUIVALENT SERVICE ROLE		INTERMEDIATE	SAME

1. ALL COORDINATES ARE IN NORTH AMERICAN DATUM OF 1983 (NAD 83)
2. ALL ELEVATIONS / VERTICAL CONTROL DATUM ARE IN NAVD 88 AND EXPRESSED IN FEET ABOVE MEAN SEA LEVEL (MSL).
3. MAGNETIC VARIATION SOURCE: NOAA NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION, WORLD MAGNETIC MODEL (WMM) (2014-2019)

DECLARED DISTANCES

RUNWAY END		TORA	TODA	ASDA	LDA
RUNWAY 8	EXISTING	2,468'	2,468'	2,468'	2,468'
	FUTURE	4,320'	4,320'	4,320'	4,320'
	ULTIMATE	4,320'	4,320'	4,320'	4,320'
RUNWAY 14	EXISTING	5,731'	5,731'	5,731'	5,731'
	FUTURE	6,500'	6,500'	6,500'	6,500'
	ULTIMATE	7,500'	7,500'	7,500'	7,500'
RUNWAY 17	EXISTING	5,216'	5,216'	5,216'	5,216'
	FUTURE	N/A	N/A	N/A	N/A
RUNWAY 26	EXISTING	2,468'	2,468'	2,468'	2,468'
	FUTURE	4,320'	4,320'	4,320'	4,320'
	ULTIMATE	4,320'	4,320'	4,320'	7,000'
RUNWAY 32	EXISTING	5,731'	5,731'	5,731'	5,731'
	FUTURE	6,500'	6,500'	6,500'	6,500'
	ULTIMATE	7,500'	7,500'	7,500'	7,500'
RUNWAY 35	EXISTING	5,216'	5,216'	5,216'	5,216'
	FUTURE	N/A	N/A	N/A	N/A

SURVEY MONUMENTS

IDENTIFIER	NGS PID	PACS OR SACS	LATITUDE	LONGITUDE	ELEVATION
3VAA	AG0951	PACS	40° 19' 54.06"	103° 48' 06.59"	4,506.6'
3V4C	AI5925	SACS	40° 20' 08.53"	103° 48' 24.92"	4,526.8'
FMMA	DQ3253	SACS	40° 20' 42.65"	103° 48' 39.67"	4,594.9'

SOURCE: NATIONAL GEODETIC SURVEY, NAD 83 (2011), NAVD 88

MODIFICATION TO STANDARDS

APPROVAL DATE	AIRSPACE CASE NO.	STANDARD TO BE MODIFIED	DESCRIPTION
NONE REQUIRED			

TAXIWAY / TAXILANE DATA TABLE

	TWY A	TWY A1	TWY A2	TWY A3	TWY A4	TWY B	TWY B1	TWY B2	TWY B3	TWY B4	TWY B5	TWY C	TWY C1	TWY C2	TWY C3	TWY C4	RWY 26 TAXIWAY	RWY 35 TAXIWAY/ TAXILANE 8 (F)	TAXILANE 1	TAXILANE 2	TAXILANE 3	TAXILANE 4	TAXILANE 5	TAXILANE 6	TAXILANE 7	TAXILANE 9
TAXIWAY / TAXILANE WIDTH	35' (TDG 2)	35' (TDG 2)	35' (TDG 2)	35' (TDG 2)	35' (TDG 2)	35' (TDG 2)	35' (TDG 2)	35' (TDG 2)	35' (TDG 2)	35' (TDG 2)	35' (TDG 2)	35' (TDG 2)	35' (TDG 2)	35' (TDG 2)	35' (TDG 2)	35' (TDG 2)	35' (TDG 2)	35' (TDG 2)	25' (TDG 1A/1B)	25' (TDG 1A/1B)	25' (TDG 1A/1B)	25' (TDG 1A/1B)	25' (TDG 1A/1B)	25' (TDG 1A/1B)	35' (TDG 2)	35 (TDG 2)
TAXIWAY EDGE SAFETY MARGIN	7.5'	7.5'	7.5'	7.5'	7.5'	7.5'	7.5'	7.5'	7.5'	7.5'	7.5'	7.5'	7.5'	7.5'	7.5'	7.5'	7.5'	7.5'	5'	5'	5'	5'	5'	5'	5'	7.5'
TAXIWAY / TAXILANE SAFETY AREA	79' (ADG II)	79' (ADG II)	79' (ADG II)	79' (ADG II)	79' (ADG II)	79' (ADG II)	79' (ADG II)	79' (ADG II)	79' (ADG II)	79' (ADG II)	79' (ADG II)	79' (ADG II)	79' (ADG II)	79' (ADG II)	79' (ADG II)	79' (ADG II)	49' (ADG I)	49' (ADG I)	79' (ADG II)	49' (ADG I)	49' (ADG I)	49' (ADG I)	79' (ADG II)	79' (ADG II)	79' (ADG II)	79 (ADG II)
TAXIWAY / TAXILANE SEPARATION (OBJECTS WITHIN TSA)	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT"	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT
TAXIWAY / TAXILANE OBJECT FREE AREA	131' (ADG II)	131' (ADG II)	131' (ADG II)	131' (ADG II)	131' (ADG II)	131' (ADG II)	131' (ADG II)	131' (ADG II)	131' (ADG II)	131' (ADG II)	131' (ADG II)	131' (ADG II)	131' (ADG II)	131' (ADG II)	131' (ADG II)	131' (ADG II)"	89' (ADG I)	79' (ADG I)	115' (ADG II)	79' (ADG I)	79' (ADG I)	79' (ADG I)	115' (ADG II)	115' (ADG II)	115' (ADG II)	115' (ADG II)
TAXIWAY / TAXILANE SEPARATION (OBJECTS WITHIN TOFA)	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT"	NO OBJECT	NO OBJECT	HANGAR 39' NORTH	HANGAR 33' SOUTH	HANGAR 33' NORTH	TANKS 25' EAST	NO OBJECT	NO OBJECT	NO OBJECT	NO OBJECT
RUNWAY HOLDING POSTION	N/A	200'	200'	200'	N/A	200'	200'	200'	200'	200'	200'	N/A	200'	200'	200'	200'	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TAXIWAY / TAXILANE LIGHTING	MITL	MITL	MITL	MITL	MITL	MITL	MITL	MITL	MITL	MITL	MITL	MITL	MITL	MITL	MITL	MITL	NONE	MITL	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE

FUTURE TAXIWAY/ TAXILANE

ULTIMATE TAXIWAY/TAXILANE

REMOVED TAXIWAY/ TAXILANE

1. TAXIWAY DESIGN GROUP SHOWN IS LARGEST GROUP ALLOWABLE FOR TAXIWAY WIDTH.
2. TAXIWAY B5 WILL BE RELOCATED IN THE ULTIMATE CONFIGURATION TO THE END OF RUNWAY 14.
3. RUNWAY 26 TAXIWAY WILL BE CONSTRUCTED AS A TURF TAXIWAY.
4. RUNWAY 35 TAXIWAY WILL BE REPURPOSED AND DELINEATED AS TAXILANE 8 IN THE FUTURE CONFIGURATION.

RS&H

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FORT MORGAN MUNICIPAL AIRPORT

FORT MORGAN, CO

AIRPORT LAYOUT PLAN

CONSULTANTS

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: JULY 2018
REVIEWED BY: MB/PM/TM
DRAWN BY: SD
DESIGNED BY: SD

PROJECT NUMBER
224-0013-001

SHEET TITLE

AIRPORT DATA SHEET

SHEET NUMBER

2 OF 18

DRAFT

Drawing: T:\P\224.0013.001 Fort Morgan MPU\CAD\C\FMM_02_DATA.dwg Plotted on: 6/29/2018 11:17 AMplotted by: Derengowski, Steven

FAA APPROVAL BLOCK

SURVEY MONUMENTS					
IDENTIFIER	NGS PID	PACS OR SACS	LATITUDE	LONGITUDE	ELEVATION
3V4A	AG9851	PACS	40° 19' 54.95"	103° 48' 06.59"	4,508.6'
3V4C	AI5925	SACS	40° 20' 08.53"	103° 48' 24.92"	4,526.8'
FMMA	DQ3253	SACS	40° 20' 42.65"	103° 48' 39.07"	4,594.9'

SOURCE: NATIONAL GEODETIC SURVEY, NAD 83 (2011), NAVD 88

DESCRIPTION	EXISTING
PROPERTY LINE	
EASEMENT	
RUNWAY SAFETY AREA	RSA
RUNWAY OBJECT FREE AREA	ROFA
RUNWAY OBSTACLE FREE ZONE	ROFZ
RUNWAY VISIBILITY ZONE	RVZ
RUNWAY PROTECTION ZONE	
TAXIWAY SAFETY AREA	TSA
TAXIWAY OBJECT FREE AREA	TOFA
35' BUILDING RESTRICTION LINE	BRL 35'
PART 77 SURFACE	PT77
THRESHOLD SITING SURFACE	TSS
DEPARTURE SURFACE	DEP
AIRFIELD PAVEMENT	
TURF RUNWAY	
BUILDINGS	
ROADWAY/PARKING	
THRESHOLD LIGHT	
REIL	
PAPI	
ARP	
BEACON	
SEGMENTED CIRCLE WITH LIGHTED WINDCONE	
NGS MONUMENT	PACS/SACS
AIRCRAFT HOLDING POSITION	

EXISTING BUILDING/FACILITY LEGEND	
BUILDING/ FACILITY NO.	BUILDING/FACILITY DESCRIPTION
1	FBO
2	CITY HANGAR
3	T-HANGARS
4	CHEMICAL SHED
5	T-HANGARS
6	T-HANGARS
7	BOX HANGAR
8	BOX HANGAR
9	BOX HANGAR
10	BOX HANGAR
11	BOX HANGAR
12	BOX HANGAR
13	BOX HANGAR
14	BOX HANGAR
15	BOX HANGAR
16	FUEL STORAGE FACILITY

NOTES:
1. ALL LATITUDE AND LONGITUDE COORDINATES ARE IN NORTH AMERICAN DATUM OF 1983 (NAD 83).
2. ALL ELEVA"IONS / VERTICAL CONTROL DATUM ARE IN NAVD 88 AND EXPRESSED IN FEET ABOVE MEAN SEA LEVEL (MSL)
3. ROADWAY ELEVATIONS INCLUDE TRAVERSEWAY ADJUSTMENT (23' RAILROADS | 17' HIGHWAYS | 15' PUBLIC ROADS | 10' PRIVATE ROADS).
4. RUNWAY CENTERLINE TO HOLDING POSITION NOT DIMENSIONED. DISTANCE FROM RUNWAY CENTERLINE TO HOLDING POSITION IS 200'.
5. TAXIWAY EDGE SAFETY MARGIN DETAILS ARE SHOWN ON SHEET 6 - TERMINAL AREA DRAWING AND ON SHEET 2 - AIRPORT DATA SHEET.
6. NO SECURITY / WILDLIFE FENCES ARE LOCATED AT THE AIRPORT.

MAGNETIC DECLINATION
7° 44' EAST
DECEMBER 2016
ANNUAL CHANGE 0° 6' WEST

400' 200' 0 400'

RS&H, Inc.
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FORT MORGAN, CO

AIRPORT LAYOUT PLAN

CONSULTANTS

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: JULY 2018
REVIEWED BY: MB/PM/TM
DRAWN BY: SD
DESIGNED BY: SD

PROJECT NUMBER
224-0013-001

SHEET TITLE

AIRPORT LAYOUT DRAWING (EXISTING)

SHEET NUMBER

3 OF 18

DRAFT

Drawing: T:\P\224.0013.001 Fort Morgan MPU\CAD\C\FMM_03_ExALP.dwg Plotted on: 7/12/2018 7:30 AMPlotted by: Derengowski, Steven

FAA APPROVAL BLOCK

SURVEY MONUMENTS					
IDENTIFIER	NGS PID	PACS OR SACS	LATITUDE	LONGITUDE	ELEVATION
3V4A	AG9851	PACS	40° 19' 54.95"	103° 48' 06.59"	4,508.6'
3V4C	AI5925	SACS	40° 20' 08.53"	103° 48' 24.92"	4,526.8'
FMMA	DQ3253	SACS	40° 20' 42.65"	103° 48' 39.07"	4,594.9'

SOURCE: NATIONAL GEODETIC SURVEY, NAD 83 (2011), NAVD 88

DESCRIPTION	EXISTING	FUTURE
PROPERTY LINE		
EASEMENT		N/A
RUNWAY SAFETY AREA		
RUNWAY OBJECT FREE AREA		
RUNWAY OBSTACLE FREE ZONE		
RUNWAY PROTECTION ZONE		
TAXIWAY SAFETY AREA		
TAXIWAY OBJECT FREE AREA		
35' BUILDING RESTRICTION LINE		
PART 77 SURFACE		
THRESHOLD SITING SURFACE		
DEPARTURE SURFACE		
AIRFIELD PAVEMENT		
AIRFIELD PAVEMENT TO BE REMOVED	N/A	
TURF RUNWAY		
TURF RUNWAY TO BE REMOVED	N/A	
GRAVEL/UNPAVED APRON	N/A	
BUILDINGS		
BUILDINGS TO BE REMOVED	N/A	
ROADWAY/PARKING		
THRESHOLD LIGHT		
REIL		
PAPI		
ARP		
BEACON		N/A
SEGMENTED CIRCLE WITH LIGHTED WINDCONE		N/A
NGS MONUMENT	PACS/SACS	N/A
AIRCRAFT HOLDING POSITION		

EXISTING BUILDING/FACILITY LEGEND	
BUILDING/ FACILITY NO.	BUILDING/FACILITY DESCRIPTION
1	FBO
2	CITY HANGAR
3	T-HANGARS
4	CHEMICAL SHED
5	T-HANGARS
6	T-HANGARS
7	BOX HANGAR
8	BOX HANGAR
9	BOX HANGAR
10	BOX HANGAR
11	BOX HANGAR
12	BOX HANGAR
13	BOX HANGAR
14	BOX HANGAR
15	BOX HANGAR
16	FUEL STORAGE FACILITY

FUTURE BUILDING/FACILITY LEGEND	
BUILDING/ FACILITY NO.	BUILDING/FACILITY DESCRIPTION
17	BOX HANGAR
18	BOX HANGAR
19	BOX HANGAR
20	BOX HANGAR
21	BOX HANGAR
22	BOX HANGAR
23	BOX HANGAR
24	BOX HANGAR
25	BOX HANGAR
26	BOX HANGAR
27	BOX HANGAR
28	BOX HANGAR
29	BOX HANGAR
30	BOX HANGAR
31	BOX HANGAR
32	T-HANGARS
33	BOX HANGAR
34	BOX HANGAR
35	BOX HANGAR
36	BOX HANGAR
37	T-HANGARS
38	CORPORATE HANGAR / MRO
39	FBO / SRE / HANGAR
40	CORPORATE HANGAR
41	CORPORATE HANGAR

NOTES:
1. ALL LATITUDE AND LONGITUDE COORDINATES ARE IN NORTH AMERICAN DATUM OF 1983 (NAD 83).
2. ALL ELEVATIONS / VERTICAL CONTROL DATUM ARE IN NAVD 88 AND EXPRESSED IN FEET ABOVE MEAN SEA LEVEL (MSL)
3. ROADWAY ELEVATIONS INCLUDE TRAVERSEWAY ADJUSTMENT (23' RAILROADS | 17' HIGHWAYS | 15' PUBLIC ROADS | 10' PRIVATE ROADS).
4. RUNWAY CENTERLINE TO HOLDING POSITION NOT DIMENSIONED. DISTANCE FROM RUNWAY CENTERLINE TO HOLDING POSITION IS 200'.
5. TAXIWAY EDGE SAFETY MARGIN DETAILS ARE SHOWN ON SHEET 6 - TERMINAL AREA DRAWING AND ON SHEET 2 - AIRPORT DATA SHEET.
6. NO SECURITY / WILDLIFE FENCES ARE LOCATED AT THE AIRPORT.

MAGNETIC DECLINATION
7° 44' EAST
DECEMBER 2016
ANNUAL CHANGE 0° 6' WEST

400' 200' 0 400'

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FORT MORGAN MUNICIPAL AIRPORT

FORT MORGAN, CO

AIRPORT LAYOUT PLAN

CONSULTANTS

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: JULY 2018
REVIEWED BY: MB/PM/TM
DRAWN BY: SD
DESIGNED BY: SD

PROJECT NUMBER
224-0013-001

SHEET TITLE

AIRPORT LAYOUT DRAWING (FUTURE)

SHEET NUMBER

4 OF 18

DRAFT

Drawing: T:\P\224.0013.001 Fort Morgan MPU\CAD\C\FMM_04_FuALP.dwg Plotted on: 7/12/2018 7:32 AM Plotted by: Derengowski, Steven

DESCRIPTION	EXISTING	FUTURE	ULTIMATE
PROPERTY LINE			
EASEMENT		N/A	N/A
RUNWAY SAFETY AREA			
RUNWAY OBJECT FREE AREA			
RUNWAY OBSTACLE FREE ZONE			
RUNWAY PROTECTION ZONE			
TAXIWAY SAFETY AREA			
TAXIWAY OBJECT FREE AREA			
35' BUILDING RESTRICTION LINE			
PART 77 SURFACE			
THRESHOLD SITING SURFACE			
DEPARTURE SURFACE			
AIRFIELD PAVEMENT			
AIRFIELD PAVEMENT TO BE REMOVED	N/A		
TURF RUNWAY			N/A
TURF RUNWAY TO BE REMOVED	N/A		
GRAVEL/UNPAVED APRON	N/A		N/A
BUILDINGS			
BUILDINGS TO BE REMOVED	N/A		N/A
ROADWAY/PARKING			
THRESHOLD LIGHT			
REIL			
PAPI			
ARP			
BEACON		N/A	N/A
SEGMENTED CIRCLE WITH LIGHTED WINDCONE		N/A	N/A
NGS MONUMENT	PACS/SACS	N/A	N/A
AIRCRAFT HOLDING POSITION			

NOTES:
1. ALL LATITUDE AND LONGITUDE COORDINATES ARE IN NORTH AMERICAN DATUM OF 1983 (NAD 83).
2. ALL ELEVATIONS / VERTICAL CONTROL DATUM ARE IN NAVD 88 AND EXPRESSED IN FEET ABOVE MEAN SEA LEVEL (MSL)
3. ROADWAY ELEVATIONS INCLUDE TRAVERSEWAY ADJUSTMENT (23' RAILROADS | 17' HIGHWAYS | 15' PUBLIC ROADS | 10' PRIVATE ROADS).
4. RUNWAY CENTERLINE TO HOLDING POSITION NOT DIMENSIONED. DISTANCE FROM RUNWAY CENTERLINE TO HOLDING POSITION IS 200'.
5. TAXIWAY EDGE SAFETY MARGIN DETAILS ARE SHOWN ON SHEET 6 - TERMINAL AREA DRAWING AND ON SHEET 2 - AIRPORT DATA SHEET.
6. NO SECURITY / WILDLIFE FENCES ARE LOCATED AT THE AIRPORT.
7. ULTIMATE SHEET NOT FOR FAA APPROVAL. TO BE USED FOR PLANNING PURPOSES ONLY.

MAGNETIC DECLINATION
7° 44' EAST
DECEMBER 2016
ANNUAL CHANGE 0° 6' WEST

400' 200' 0 400'

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CONSULTANTS

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: JULY 2018
REVIEWED BY: MB/PM/TM
DRAWN BY: SD
DESIGNED BY: SD

PROJECT NUMBER
224-0013-001

SHEET TITLE

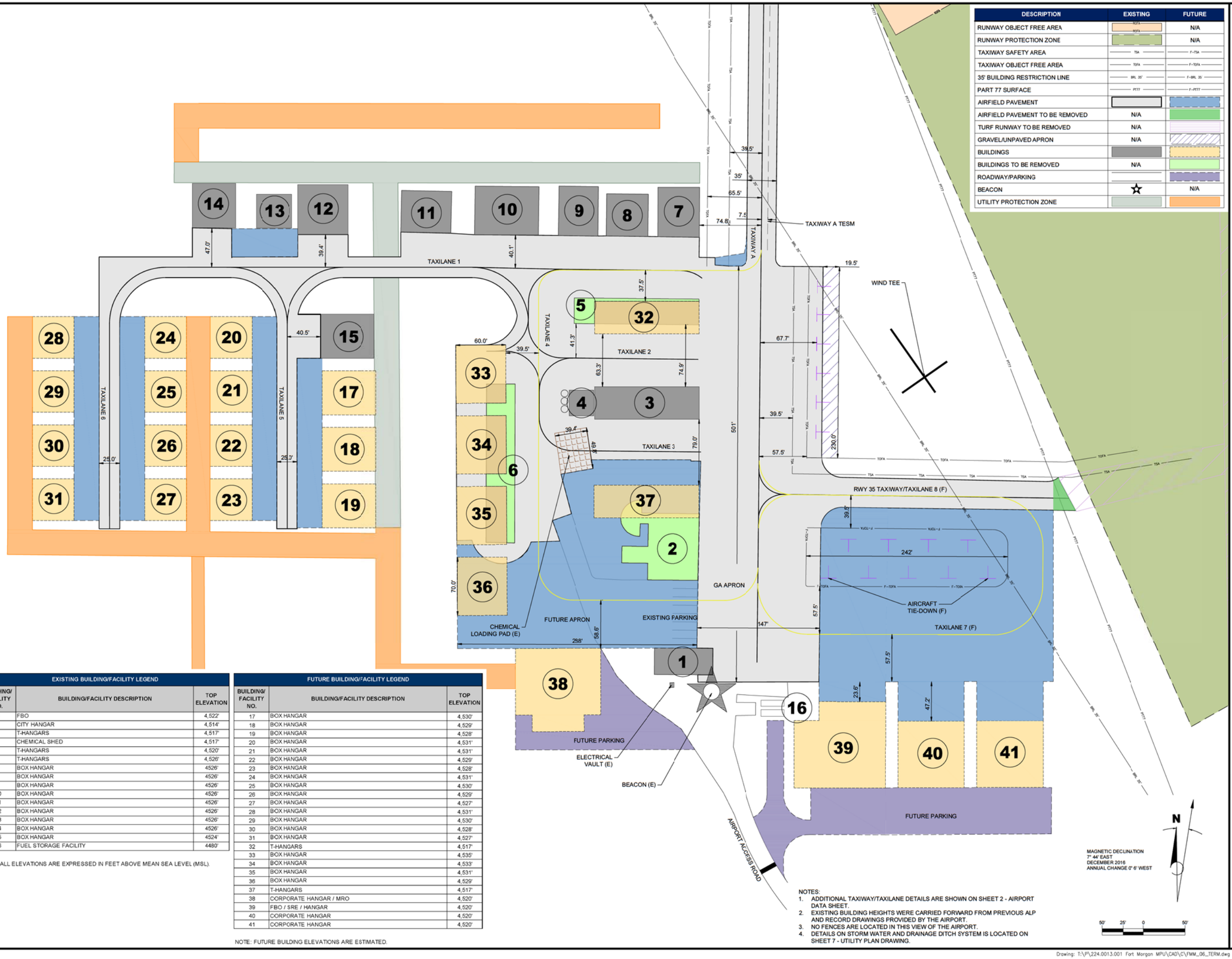
AIRPORT LAYOUT DRAWING (ULTIMATE)

SHEET NUMBER

5 OF 18

DRAFT

Drawing: T:\P\224.0013.001 Fort Morgan MPU\CAD\C\FMM_05_UALP.dwg Plotted on: 7/12/2018 7:39 AMPlotted by: Derengowski, Steven



EXISTING BUILDING/FACILITY LEGEND		
BUILDING/ FACILITY NO.	BUILDING/FACILITY DESCRIPTION	TOP ELEVATION
1	FBO	4,522'
2	CITY HANGAR	4,514'
3	T-HANGARS	4,517'
4	CHEMICAL SHED	4,517'
5	T-HANGARS	4,520'
6	T-HANGARS	4,526'
7	BOX HANGAR	4526'
8	BOX HANGAR	4526'
9	BOX HANGAR	4526'
10	BOX HANGAR	4526'
11	BOX HANGAR	4526'
12	BOX HANGAR	4526'
13	BOX HANGAR	4526'
14	BOX HANGAR	4526'
15	BOX HANGAR	4524'
16	FUEL STORAGE FACILITY	4480'

NOTE: ALL ELEVATIONS ARE EXPRESSED IN FEET ABOVE MEAN SEA LEVEL (MSL).

FUTURE BUILDING/FACILITY LEGEND		
BUILDING/ FACILITY NO.	BUILDING/FACILITY DESCRIPTION	TOP ELEVATION
17	BOX HANGAR	4,530'
18	BOX HANGAR	4,529'
19	BOX HANGAR	4,528'
20	BOX HANGAR	4,531'
21	BOX HANGAR	4,531'
22	BOX HANGAR	4,529'
23	BOX HANGAR	4,528'
24	BOX HANGAR	4,531'
25	BOX HANGAR	4,530'
26	BOX HANGAR	4,529'
27	BOX HANGAR	4,527'
28	BOX HANGAR	4,531'
29	BOX HANGAR	4,530'
30	BOX HANGAR	4,528'
31	BOX HANGAR	4,527'
32	T-HANGARS	4,517'
33	BOX HANGAR	4,535'
34	BOX HANGAR	4,533'
35	BOX HANGAR	4,531'
36	BOX HANGAR	4,529'
37	T-HANGARS	4,517'
38	CORPORATE HANGAR / MRO	4,520'
39	FBO / SRE / HANGAR	4,520'
40	CORPORATE HANGAR	4,520'
41	CORPORATE HANGAR	4,520'

NOTE: FUTURE BUILDING ELEVATIONS ARE ESTIMATED.

NOTES:
1. ADDITIONAL TAXIWAY/TAXILANE DETAILS ARE SHOWN ON SHEET 2 - AIRPORT DATA SHEET.
2. EXISTING BUILDING HEIGHTS WERE CARRIED FORWARD FROM PREVIOUS ALP AND RECORD DRAWINGS PROVIDED BY THE AIRPORT.
3. NO FENCES ARE LOCATED IN THIS VIEW OF THE AIRPORT.
4. DETAILS ON STORM WATER AND DRAINAGE DITCH SYSTEM IS LOCATED ON SHEET 7 - UTILITY PLAN DRAWING.

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REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: JULY 2018
REVIEWED BY: MB/PM/TM
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DESIGNED BY: SD

PROJECT NUMBER
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SHEET TITLE

TERMINAL AREA PLAN

SHEET NUMBER

6 OF 18

DRAFT

Drawing: T:\P\224.0013.001 Fort Morgan MPU\CAD\C\FMM_06_TERM.dwg Plotted on: 6/29/2018 11:31 AMotted by: Derengowski, Steven

DESCRIPTION	SYMBOL
AIRFIELD SERIES CIRCUIT	SC
ELECTRICAL POWER LINES	E
ELECTRICAL TRANSFORMER	
LEACH FIELD	
SEPTIC LINE	S
STORM WATER	
WATER	W
EXISTING UTILITY PROTECTION ZONE	
FUTURE UTILITY PROTECTION ZONE	

DESCRIPTION	EXISTING	FUTURE
PROPERTY LINE		
TAXIWAY SAFETY AREA	TSA	F-TSA
TAXIWAY OBJECT FREE AREA	TOFA	F-TOFA
35' BUILDING RESTRICTION LINE	BR. 35'	F-BRL 35'
PART 77 SURFACE	PT77	F-PT77
AIRFIELD PAVEMENT		
AIRFIELD PAVEMENT TO BE REMOVED	N/A	
TURF RUNWAY		
TURF RUNWAY TO BE REMOVED	N/A	
GRAVEL/UNPAVED RUNWAY	N/A	
BUILDINGS		
BUILDINGS TO BE REMOVED	N/A	
ROADWAY/PARKING		
BEACON		N/A

AWOS CRITICAL AREA
ELECTRICAL LINE (E)
* SEE NOTE 7
15 kVA
15 kVA
15 kVA
15 kVA
TAXILANE 1
TAXILANE 2
TAXILANE 3
TAXILANE 4
TAXILANE 5
TAXILANE 6
TAXIWAY A
WIND TEE (E)
RWY 35 TAXIWAY / TAXILANE 8 (F)
AIRCRAFT TIE-DOWN (F)
TAXILANE 7 (F)
FUTURE APRON
GA APRON
50 kVA (F)
50 kVA
ELECTRICAL VAULT (E)
DIRECT BURIED (22" DEPTH) (E)
AIRFIELD ELECTRICAL (E)
180' PIPE
70' SCH 40
SEPTIC TANK (1,000 GAL.)
FUTURE PARKING
START OF LEACH FIELD (E)
END OF LEACH FIELD (E)
STORM WATER (E)
POTENTIAL FUTURE SEPTIC SYSTEM / LEACH FIELD SITE
ELECTRICAL LINE (E)
WATER LINE (E)
4" LINE
AIRPORT ACCESS ROAD
PROPERTY LINE (E)
WATERLINE TRANSITION POINT
2" LINE
2,500' TO 6" WATERLINE AT HWY W
50 kVA
AIRPORT ENTRANCE SIGN
BARN
HWY 52

NOTES:
1. WIDTH AND SIZE OF UTILITY CORRIDORS AND ELECTRICAL TRANSFORMERS IS GRAPHICALLY DEPICTED.
2. EXISTING SEPTIC TANK SET 20 FEET BELOW GRADE.
3. DEPTH OF LINE FROM SEPTIC LINE TO END OF LEACH FIELD IS 36 FEET BELOW GRADE.
4. SEPTIC SYSTEM IS SHOWN AS OF FEBRUARY 2009.
5. ELECTRICAL AND WATER SYSTEM IS AS OF MARCH 2017.
6. FUTURE HANGAR TO HANGAR SEPARATION IS 15 FEET FROM EXTERIOR WALL TO EXTERIOR WALL.
7. BUILDING WAS REMOVED AFTER AERIAL WAS TAKEN.

N

MAGNETIC DECLINATION
7° 44' EAST
DECEMBER 2016
ANNUAL CHANGE 0° 6' WEST

80' 40' 0 80'

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SHEET TITLE

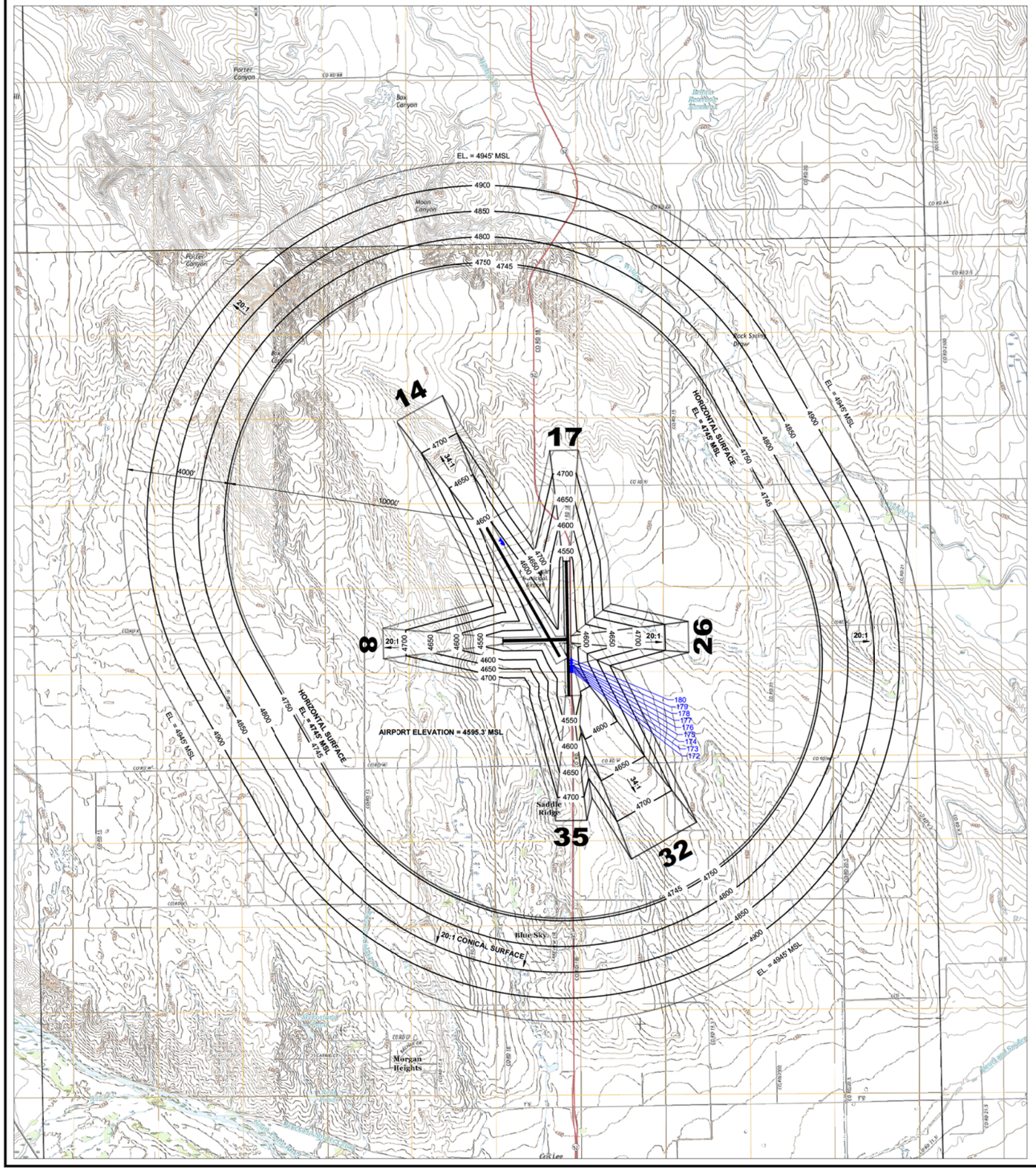
UTILITY PLAN DRAWING

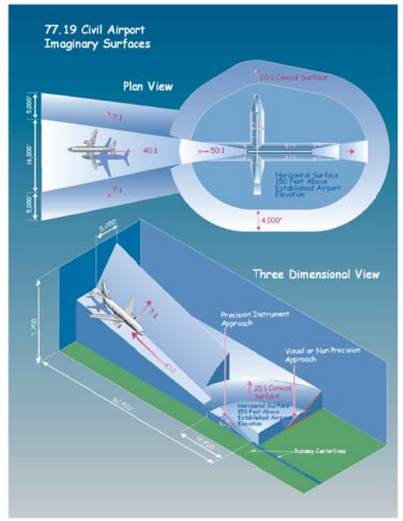
SHEET NUMBER

7 OF 18

DRAFT

Drawing: T:\P\224.0013.001 Fort Morgan MPU\CAD\C\FMM_07_UTIL.dwg Plotted on: 7/12/2018 7:55 AM Plotted by: Derengowski, Steven





DIM	ITEM	DIMENSIONAL STANDARDS (FEET)					
		VISUAL RUNWAY		NON-PRECISION INSTRUMENT RUNWAY			PRECISION INSTRUMENT RUNWAY
		A	B	A	B		
					C	D	
A	WIDTH OF PRIMARY SURFACE AND APPROACH SURFACE AT INNER END	250	500	500	500	1,000	1,000
B	RADIUS OF HORIZONTAL SURFACE	5,000	5,000	5,000	10,000	10,000	10,000
		VISUAL APPROACH		NON-PRECISION INSTRUMENT APPROACH			PRECISION INSTRUMENT RUNWAY
		A	B	A	B		
					C	D	
C	APPROACH SURFACE WIDTH AT END	1,250	1,500	2,000	3,500	4,000	16,000
D	APPROACH SURFACE LENGTH	5,000	5,000	5,000	10,000	10,000	*
E	APPROACH SLOPE	20:1	20:1	20:1	34:1	34:1	*

A - UTILITY RUNWAYS
B - RUNWAYS LARGER THAN UTILITY
C - VISIBILITY MINIMUMS GREATER THAN 3/4 MILE
D - VISIBILITY MINIMUMS AS LOW AS 3/4 MILE
* - PRECISION INSTRUMENT APPROACH SLOPE IS 50:1 FOR INNER 10,000 FEET AND 40:1 FOR AN ADDITIONAL 40,000 FEET

LEGEND	
OBSTRUCTION	▲1000

OBSTRUCTION TABLE

OBJECT NO.	OBJECT DESCRIPTION	GROUND SURFACE ELEVATION (FT.) (Z)	OBJECT TOP ELEVATION (FT.)	PART 77 SURFACE ELEVATION (FT.)	PART 77 CLEARANCE (+ PENETRATE) (- CLEAR)	PART 77 SURFACE VIOLATION	PROPOSED DISPOSITION
172	ROAD	4510.7	4525.7	4525.7	1.3	APPROACH	REGRADE HWY 52
173	ROAD	4510.9	4525.9	4523.2	2.7	APPROACH	REGRADE HWY 52
174	ROAD	4511.3	4526.3	4522.0	4.3	APPROACH	REGRADE HWY 52
175	ROAD	4511.4	4526.4	4520.9	5.5	APPROACH	REGRADE HWY 52
176	ROAD	4511.5	4526.5	4519.7	6.8	APPROACH	REGRADE HWY 52
177	ROAD	4511.7	4526.7	4518.6	8.1	APPROACH	REGRADE HWY 52
178	ROAD	4511.8	4526.8	4518.0	8.8	APPROACH	REGRADE HWY 52
179	ROAD	4512.0	4527.0	4517.4	9.6	TRANSITIONAL	REGRADE HWY 52
180	ROAD	4512.1	4527.1	4523.5	3.6	TRANSITIONAL	REGRADE HWY 52

1. OBSTRUCTION SURVEY COMPLETED BY WOOLPERT JULY 17 2015
2. ELEVATIONS IN TABLE REFLECT THE RECOMMENDED AIRSPACE CLEARANCES:
23' RAILROADS | 17' HIGHWAYS | 15' PUBLIC ROADS | 10' PRIVATE ROADS.

ZONING RESTRICTIONS

CURRENTLY THERE ARE NO LOCALLY ADOPTED ZONING RESTRICTIONS SURROUNDING FORT MORGAN MUNICIPAL AIRPORT. FOR COLORADO STATE STATUTE THAT PROTECT PUBLIC AIRPORTS, SEE COLORADO REVISED STATUTE 43-10-113, SAFE OPERATING AREAS AROUND AIRPORTS - ESTABLISHMENT AND COLORADO REVISED STATUTE 24-65.1-202, CRITERIA FOR ADMINISTRATION OF AREAS OF STATE INTERESTS.

NOTES:
1. SEE INNER APPROACH PLAN AND PROFILE SHEETS FOR CLOSE-IN OBSTRUCTIONS (SHOWN AS SYMBOL ONLY)
2. USGS QUADRANGLE BASE MAPS OBTAINED OCTOBER, 2016.

2,000' 1,000' 0 2,000'

MAGNETIC DECLINATON
7° 44' EAST
DECEMBER 2016
ANNUAL CHANGE 0° 6' WEST

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CONSULTANTS

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: JULY 2018
REVIEWED BY: MB/PM/TM
DRAWN BY: SD
DESIGNED BY: SD

PROJECT NUMBER
224-0013-001

SHEET TITLE

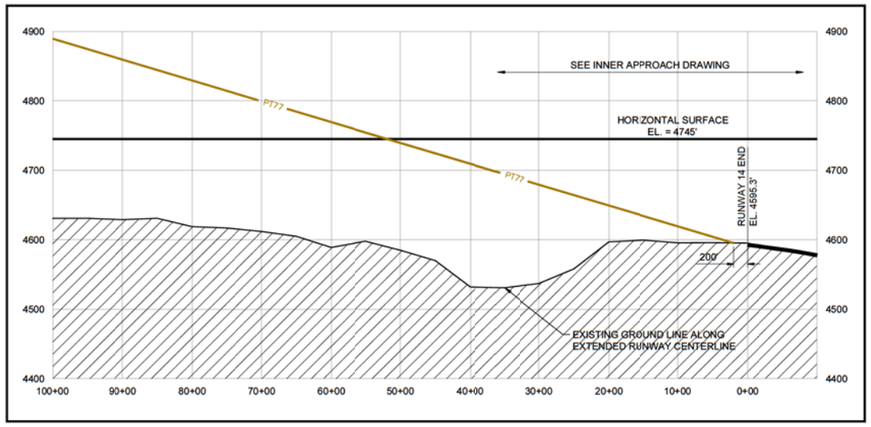
14 CFR PART 77 AIRSPACE DRAWING

SHEET NUMBER

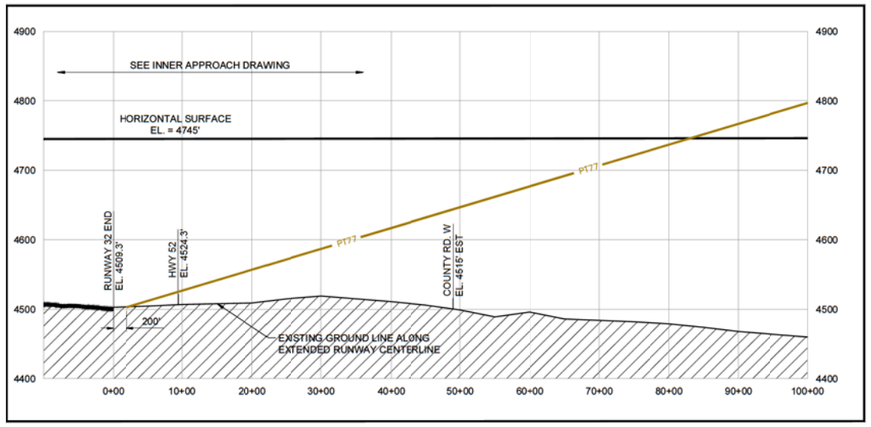
8 OF 18

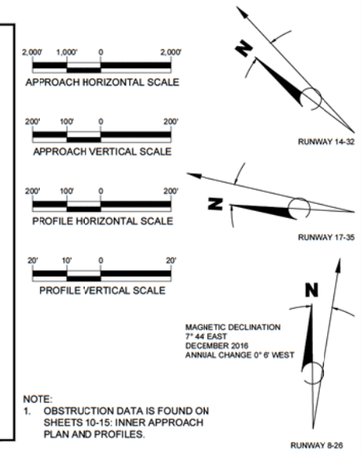
DRAFT

RUNWAY 14 NON-PRECISION APPROACH



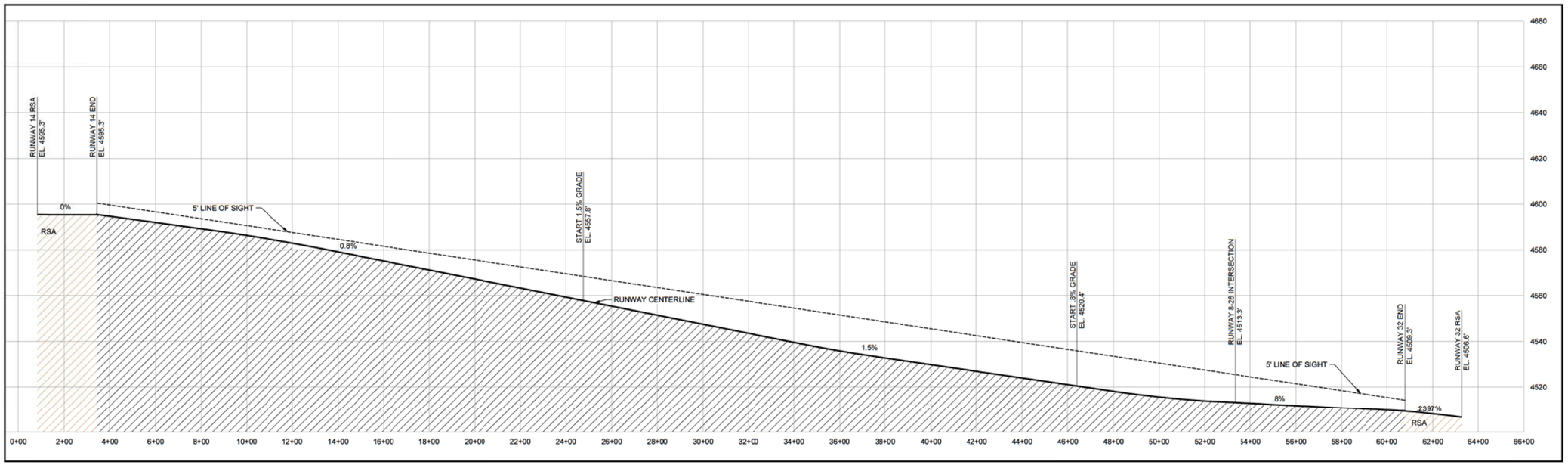
RUNWAY 32 NON-PRECISION APPROACH



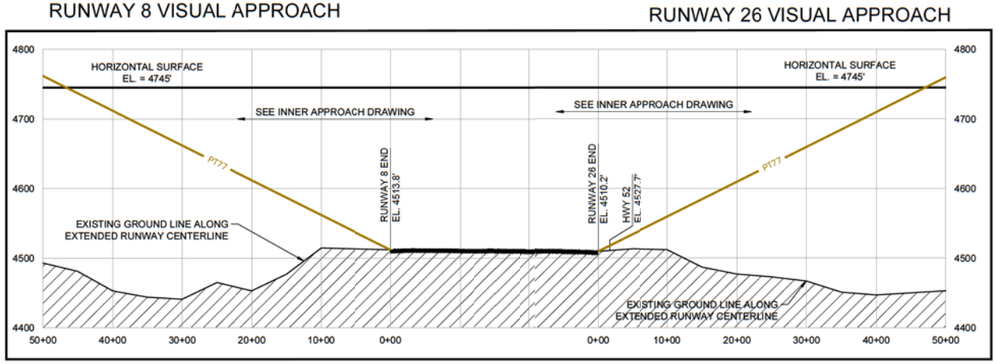


NOTE:
1. OBSTRUCTION DATA IS FOUND ON SHEETS 10-15: INNER APPROACH PLAN AND PROFILES.

RUNWAY 14-32 CENTERLINE PROFILE

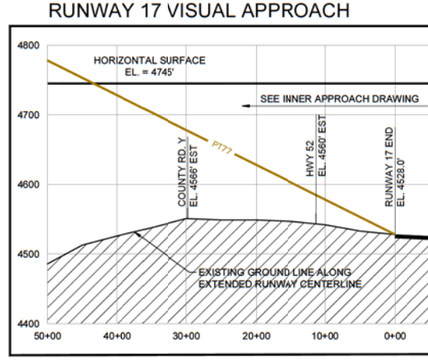


RUNWAY 8 VISUAL APPROACH

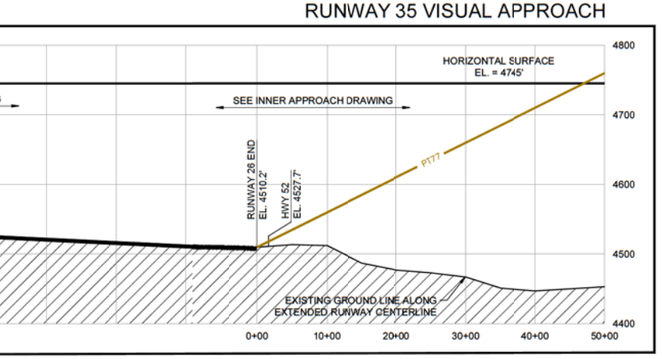


RUNWAY 26 VISUAL APPROACH

RUNWAY 17 VISUAL APPROACH



RUNWAY 35 VISUAL APPROACH



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224-0013-001

SHEET TITLE

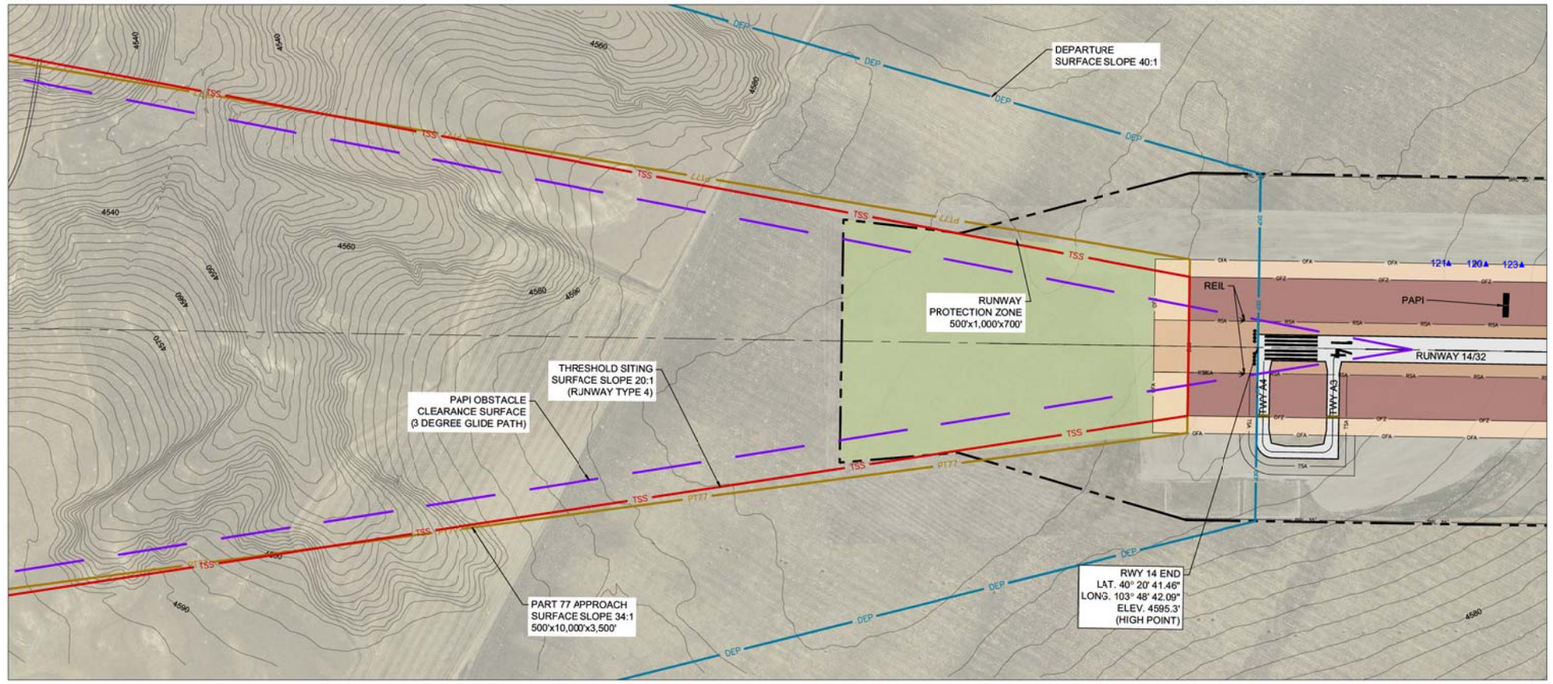
RUNWAY CENERLINE AND APPROACH PROFILES

SHEET NUMBER

9 OF 18

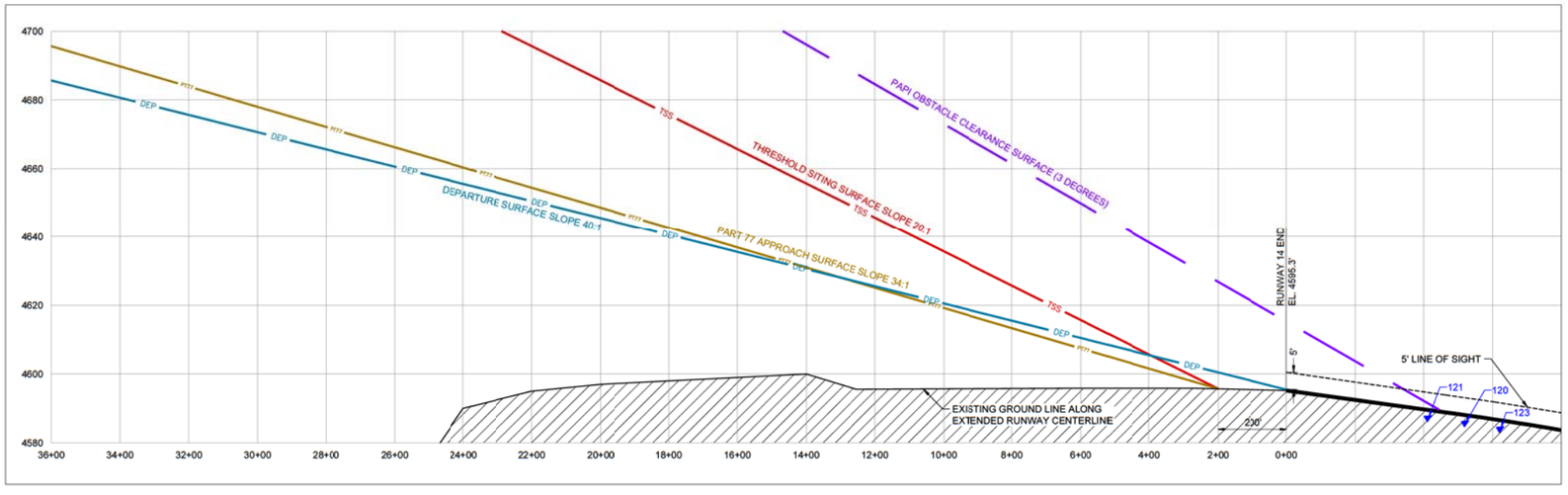
DRAFT

Drawing: T:\P\224.0013.001 Fort Morgan MPU\CAD\C\FWM_09_PT77_Profiles.dwg Plotted on: 6/29/2018 11:45 AMotted by: Derengowski, Steven



DESCRIPTION	EXISTING
PROPERTY LINE	
EASEMENT	
RUNWAY SAFETY AREA	RSA
RUNWAY OBJECT FREE AREA	ROFA
RUNWAY OBSTACLE FREE ZONE	ROFZ
RUNWAY VISIBILITY ZONE	RVZ
RUNWAY PROTECTION ZONE	
TAXIWAY SAFETY AREA	TSA
TAXIWAY OBJECT FREE AREA	TOFA
35' BUILDING RESTRICTION LINE	BRL 35'
PART 77 SURFACE	PT77
PAPI OBSTACLE CLEARANCE SURFACE	
DEPARTURE SURFACE	DEP
THRESHOLD SITING SURFACE	TSS
AIRFIELD PAVEMENT	
TURF RUNWAY	
BUILDINGS	
ROADWAY/PARKING	
THRESHOLD LIGHT	
REIL	
PAPI	
ARP	
BEACON	
SEGMENTED CIRCLE WITH LIGHTED WINDCONE	
AIRCRAFT HOLDING POSITION	
OBSTRUCTIONS	▲1000

NOTE:
1. NO FENCES ARE LOCATED IN THIS VIEW OF THE AIRPORT.



RUNWAY 14 OBSTRUCTION TABLE										
OBJECT NO.	OBJECT DESCRIPTION	ABOVE GROUND LEVEL (FT.)	OBJECT TOP ELEVATION (FT.)	CLEARANCE (+ PENETRATE) (- CLEAR)				PROPOSED DISPOSITION	PART 77 SURFACE VIOLATION	TRIGGERING EVENT
				PART 77 APPROACH SURFACE (FT.)	DEPARTURE SURFACE (FT.)	THRESHOLD SITNG SURFACE (FT.)	PAPI OBSTACLE CLEARANCE SURFACE (FT.)			
120	NATURAL HIGH POINT	0.0	4585.9	0.2	N/A	N/A	N/A	REGRADE	TRANSITIONAL	RUNWAY REHABILITATION
121	NATURAL HIGH POINT	0.0	4587.4	0.1	N/A	N/A	N/A	REGRADE	TRANSITIONAL	RUNWAY REHABILITATION
123	NATURAL HIGH POINT	0.0	4584.2	0.2	N/A	N/A	N/A	REGRADE	TRANSITIONAL	RUNWAY REHABILITATION

1. OBSTRUCTION SURVEY COMPLETED BY WOOLPERT JULY 17 2015

200' 100' 0 200'
HORIZONTAL SCALE

20' 10' 0 20'
VERTICAL SCALE

MAGNETIC DECLINATION
7° 44' EAST
DECEMBER 2016
ANNUAL CHANGE 0° 6' WEST

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REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: JULY 2018
REVIEWED BY: MB/PM/TM
DRAWN BY: SD
DESIGNED BY: SD

PROJECT NUMBER
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SHEET TITLE

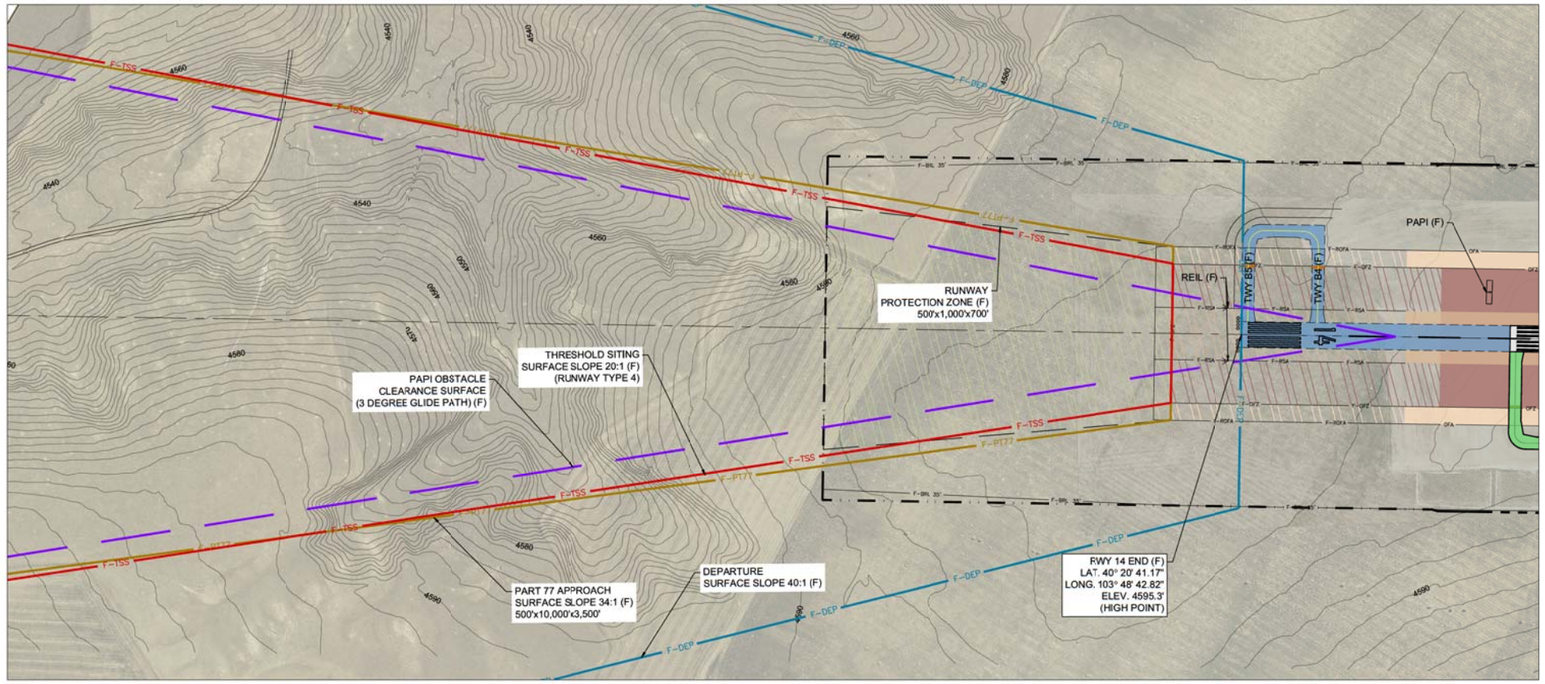
EXISTING RUNWAY 14 INNER APPROACH PLAN AND PROFILE

SHEET NUMBER

10 OF 18

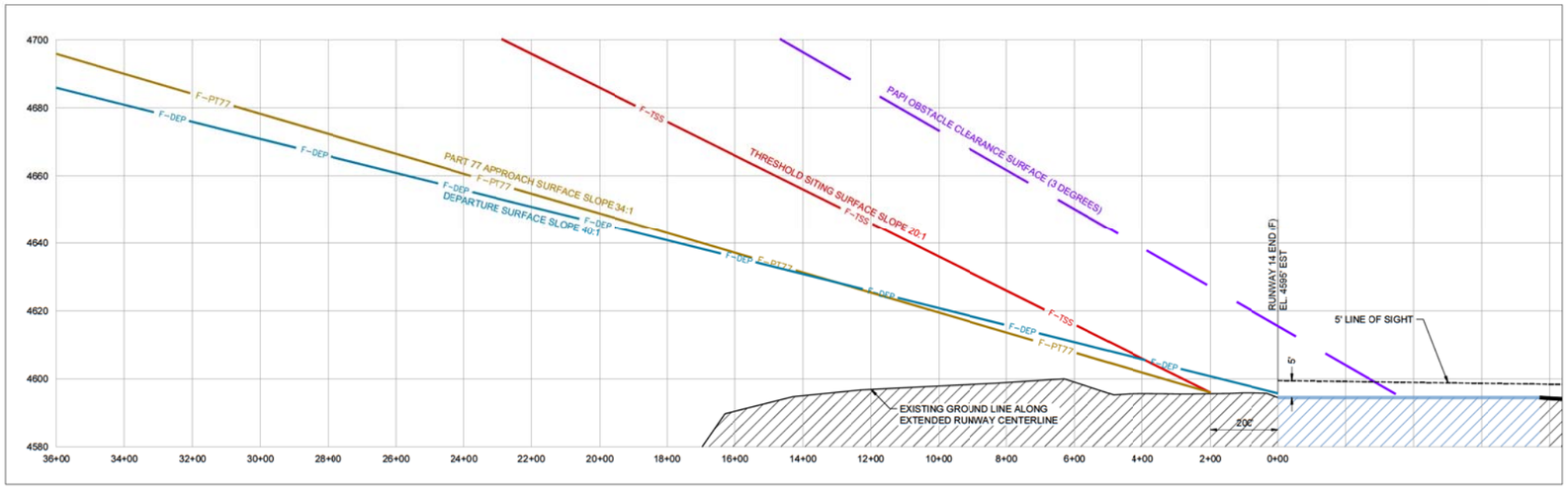
DRAFT

Drawing: T:\P\224.0013.001 Fort Morgan MPU\CAD\C\FMM_10-12_APP14-32.dwg Plotted on: 6/29/2018 11:54 AMplotted by: Derengowski, Steven



DESCRIPTION	EXISTING	FUTURE
PROPERTY LINE		
EASEMENT		N/A
RUNWAY SAFETY AREA	RSA	F-RSA
RUNWAY OBJECT FREE AREA	ROFA	F-ROFA
RUNWAY OBSTACLE FREE ZONE	ROFZ	F-ROFZ
RUNWAY PROTECTION ZONE		
TAXIWAY SAFETY AREA	TSA	F-TSA
TAXIWAY OBJECT FREE AREA	TOFA	F-TOFA
35' BUILDING RESTRICTION LINE	BRL 35'	F-BRL 35'
PART 77 SURFACE	PT77	F-PT77
PAPI OBSTACLE CLEARANCE SURFACE		
DEPARTURE SURFACE	DEP	F-DEP
THRESHOLD SITING SURFACE	TSS	F-TSS
AIRFIELD PAVEMENT		
AIRFIELD PAVEMENT TO BE REMOVED	N/A	
TURF RUNWAY		
TURF RUNWAY TO BE REMOVED	N/A	
BUILDINGS		
BUILDINGS TO BE REMOVED	N/A	
ROADWAY/PARKING		
THRESHOLD LIGHT		
REIL		
PAPI		
ARP		
BEACON		N/A
SEGMENTED CIRCLE WITH LIGHTED WINDCONE		N/A
AIRCRAFT HOLDING POSITION		
OBSTRUCTIONS	▲1000	N/A

NOTE:
1. NO FENCES ARE LOCATED IN THIS VIEW OF THE AIRPORT.



RUNWAY 14 OBSTRUCTION TABLE										
OBJECT NO.	OBJECT DESCRIPTION	ABOVE GROUND LEVEL (FT.)	OBJECT TOP ELEVATION (FT.)	CLEARANCE (+ PENETRATE) (- CLEAR)				PROPOSED DISPOSITION	PART 77 SURFACE VIOLATION	TRIGGERING EVENT
				PART 77 APPROACH SURFACE (FT.)	DEPARTURE SURFACE (FT.)	THRESHOLD SITNG SURFACE (FT.)	PAPI OBSTACLE CLEARANCE SURFACE (FT.)			
NO OBSTRUCTIONS										

1. OBSTRUCTION SURVEY COMPLETED BY WOOLPERT JULY 17 2015

200' 100' 0 200'
HORIZONTAL SCALE

20' 10' 0 20'
VERTICAL SCALE

MAGNETIC DECLINATION
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FUTURE RUNWAY 14 INNER APPROACH PLAN AND PROFILE

SHEET NUMBER

11 OF 18

DRAFT

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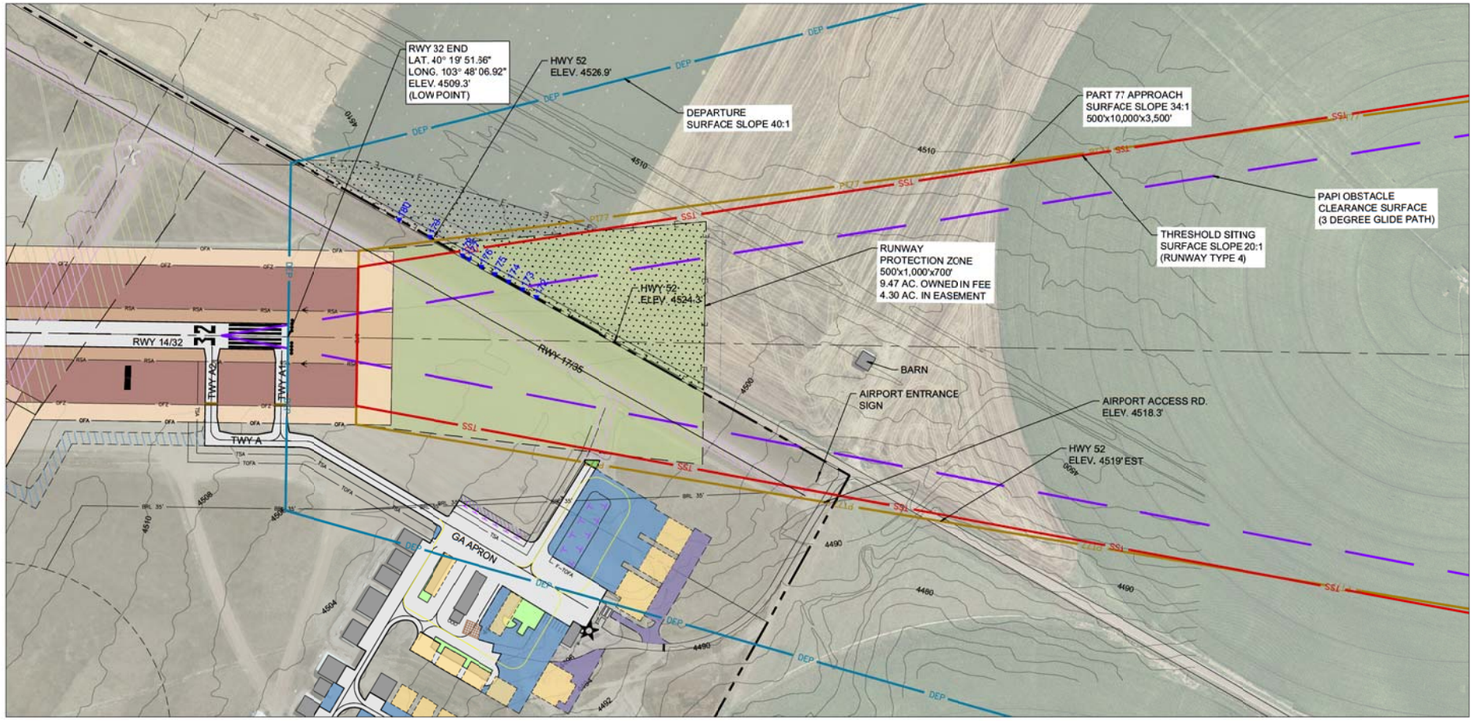

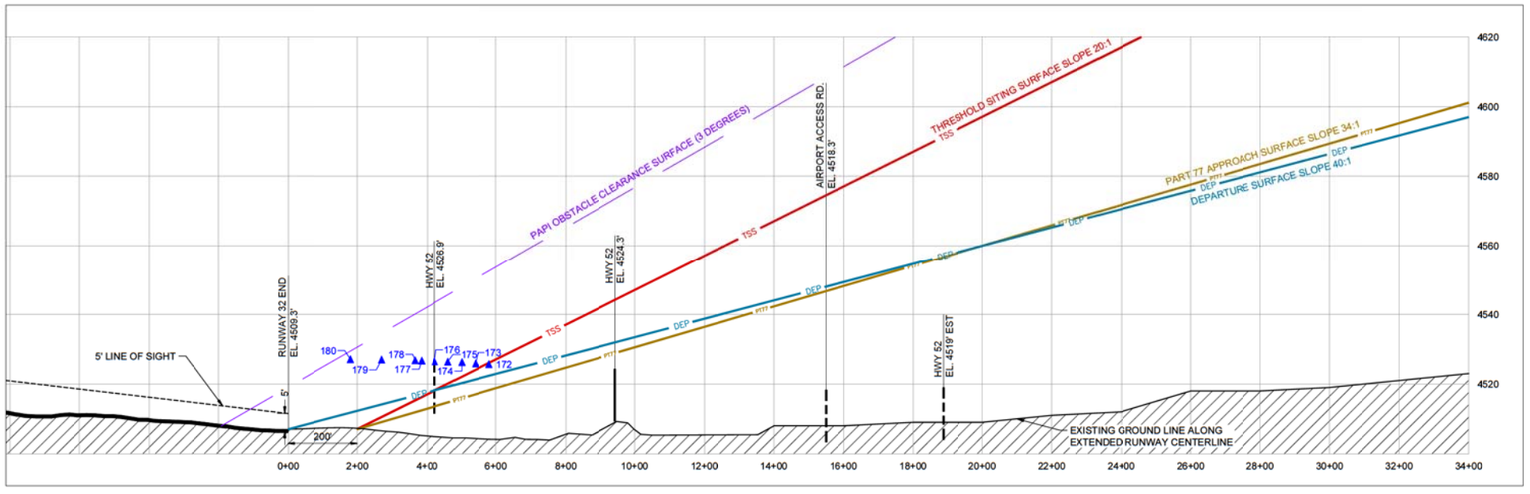

DESCRIPTION	EXISTING	FUTURE
PROFERTY LINE		
EASEMENT		N/A
RUNWAY SAFETY AREA	RSA	F–RSA
RUNWAY OBJECT FREE AREA	ROFA	F–ROFA
RUNWAY OBSTACLE FREE ZONE	ROFZ	F–ROFZ
RUNWAY PROTECTION ZONE		
TAXIWAY SAFETY AREA	TSA	F–TSA
TAXIWAY OBJECT FREE AREA	TOFA	F–TOFA
35' BUILDING RESTRICTION LINE	BRL 35'	F–BRL 35'
PART 77 SURFACE	PT77	F–PT77
PAPI OBSTACLE CLEARANCE SURFACE		
DEPARTURE SURFACE	DEP	F–DEP
THRESHOLD SITING SURFACE	TSS	F–TSS
AIRFIELD PAVEMENT		
AIRFIELD PAVEMENT TO BE REMOVED	N/A	
TURF RUNWAY		
TURF RUNWAY TO BE REMOVED	N/A	
BUILDINGS		
BUILDINGS TO BE REMOVED	N/A	
ROADWAY/PARKING		
THRESHOLD LIGHT	•	⊕
REIL		
PAPI		
ARP		
BEACON		N/A
SEGMENTED CIRCLE WITH LIGHTED WINDCONE		N/A
AIRCRAFT HOLIDING POSITION		
OBSTRUCTIONS	▲1000	N/A

NOTE:
1. ROADWAY ELEVATIONS INCLUDE TRAVERSEWAY ADJUSTMENT (23' RAILROADS | 17' HIGHWAYS | 15' PUBLIC ROADS | 10' PRIVATE ROADS).
2. NO FENCES ARE LOCATED IN THIS VIEW OF THE AIRPORT.

RUNWAY 32 OBSTRUCTICN TABLE

OBJECT NO.	OBJECT DESCRIPTION	ABOVE GROUND LEVEL (FT.)	OBJECT TOP ELEVATION (FT.)	CLEARANCE (+ PENETRATE) (- CLEAR)				PROPOSED DISPOSITION	PART 77 SURFACE VIOLATION	TRIGGERING EVENT
				PART 77 APPROACH SURFACE (FT.)	DEPARTURE SURFACE (FT.)	THRESHOLD SITING SURFACE (FT.)	PAPI OBSTACLE CLEARANCE SURFACE (FT.)			
172	ROAD	4510.7	4525.7	1.3	0.0	0.0	APPROACH	REGRADE HWY 52	APPROACH	HWY 52 RECONSTRUCTION
173	ROAD	4510.9	4525.9	2.7	0.0	0.0	APPROACH	REGRADE HWY 52	APPROACH	HWY 52 RECONSTRUCTION
174	ROAD	4511.3	4526.3	4.3	0.0	0.0	APPROACH	REGRADE HWY 52	APPROACH	HWY 52 RECONSTRUCTION
175	ROAD	4511.4	4526.4	5.5	0.0	0.0	APPROACH	REGRADE HWY 52	APPROACH	HWY 52 RECONSTRUCTION
176	ROAD	4511.5	4526.5	6.8	0.0	0.0	APPROACH	REGRADE HWY 52	APPROACH	HWY 52 RECONSTRUCTION
177	ROAD	4511.7	4526.7	8.1	0.0	0.0	APPROACH	REGRADE HWY 52	APPROACH	HWY 52 RECONSTRUCTION
178	ROAD	4511.8	4526.8	8.8	0.0	0.0	APPROACH	REGRADE HWY 52	APPROACH	HWY 52 RECONSTRUCTION
179	ROAD	4512.0	4527.0	9.6	0.0	0.0	TRANSITIONAL	REGRADE HWY 52	TRANSITIONAL	HWY 52 RECONSTRUCTION
180	ROAD	4512.1	4527.1	3.6	0.0	0.0	TRANSITIONAL	REGRADE HWY 52	TRANSITIONAL	HWY 52 RECONSTRUCTION

1. OBSTRUCTION SURVEY COMPLETED BY WOOLPERT JULY 17 2015

200' 100' 0 200'
HORIZONTAL SCALE

20' 10' 0 20'
VERTICAL SCALE

MAGNETIC DECLINATION
7° 44' EAST
DECEMBER 2016
ANNUAL CHANGE 0° 6' WEST

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REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: JULY 2018
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PROJECT NUMBER
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EXISTING / FUTURE RUNWAY 32 INNER APPROACH PLAN AND PROFILE

SHEET NUMBER
12 OF 18

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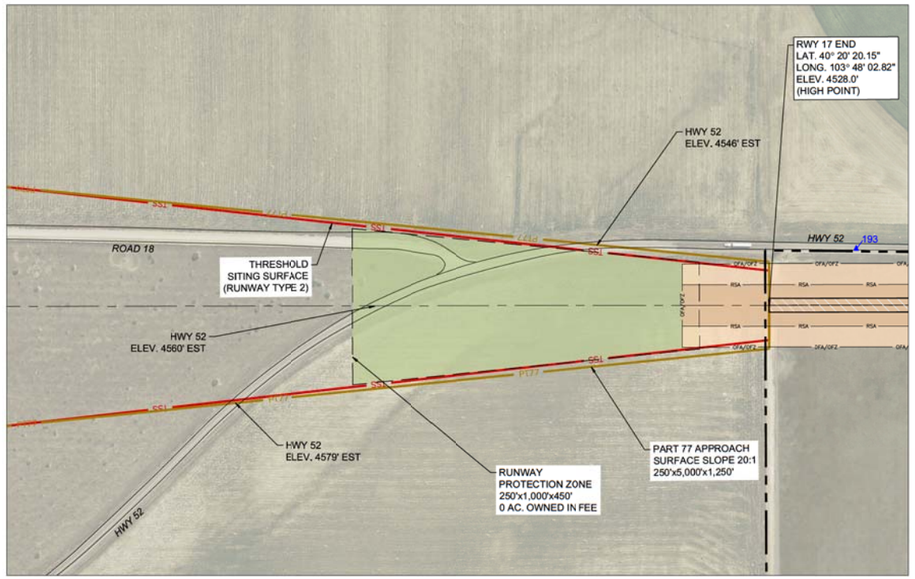

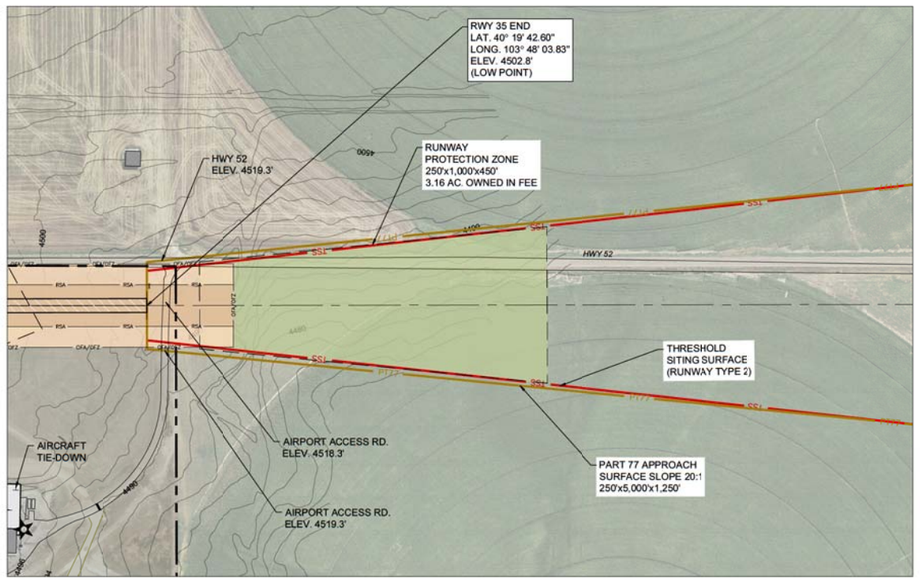

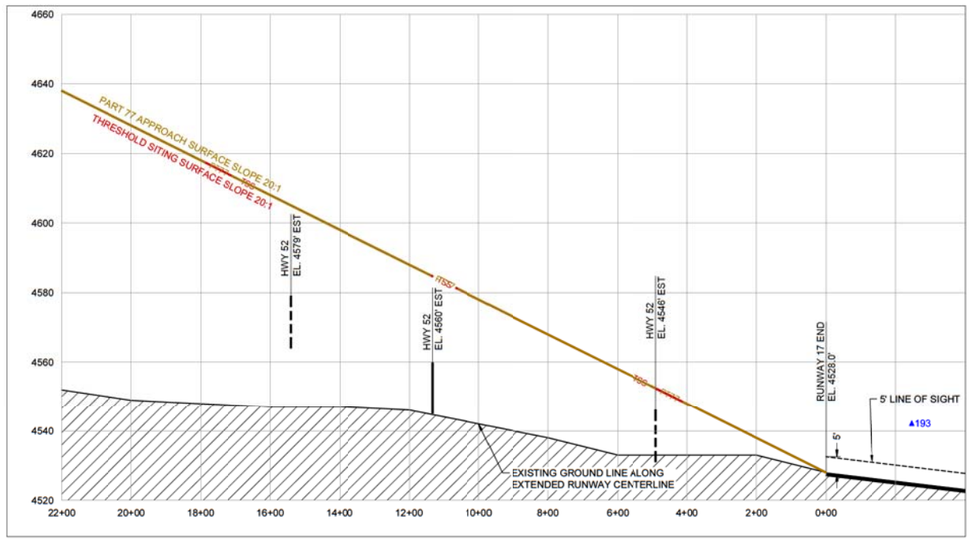

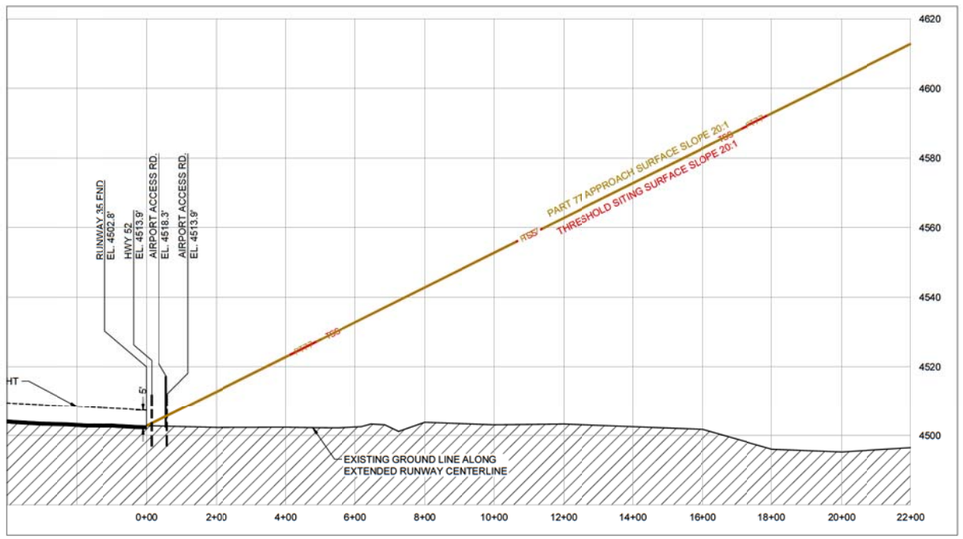

RUNWAY 17 OBSTRUCTION TABLE

OBJECT NO.	OBJECT DESCRIPTION	ABOVE GROUND LEVEL (FT.)	OBJECT TOP ELEVATION (FT.)	CLEARANCE (+ PENETRATE) (- CLEAR)		PROPOSED DISPOSITION	PART 77 SURFACE VIOLATION	TRIGGERING EVENT
				PART 77 APPROACH SURFACE (FT.)	THRESHOLD SITING SURFACE (FT.)			
193	ROAD	15.0'	4542.6	8.0	N/A	NONE	TRANSITIONAL	RWY 17-35 DECOMMISSION

1. OBSTRUCTION SURVEY COMPLETED BY WOOLPERT JULY 17 2015
2. ELEVATIONS IN TABLE REFLECT THE RECOMMENDED AIRSPACE CLEARANCES: 23' RAILROADS | 17' HIGHWAYS | 15' PUBLIC ROADS | 10' PRIVATE ROADS.

RUNWAY 35 OBSTRUCTION TABLE

OBJECT NO.	OBJECT DESCRIPTION	ABOVE GROUND LEVEL (FT.)	OBJECT TOP ELEVATION (FT.)	CLEARANCE (+ PENETRATE) (- CLEAR)		PROPOSED DISPOSITION	PART 77 SURFACE VIOLATION	TRIGGERING EVENT
				PART 77 APPROACH SURFACE (FT.)	THRESHOLD SITING SURFACE (FT.)			
NO OBSTRUCTIONS								

1. OBSTRUCTION SURVEY COMPLETED BY WOOLPERT JULY 17 2015

DESCRIPTION	EXISTING
PROPERTY LINE	
EASEMENT	
RUNWAY SAFETY AREA	RSA
RUNWAY OBJECT FREE AREA	ROFA
RUNWAY OBSTACLE FREE ZONE	ROFZ
RUNWAY VISIBILITY ZONE	RVZ
RUNWAY PROTECTION ZONE	
TAXIWAY SAFETY AREA	TSA
TAXIWAY OBJECT FREE AREA	TOFA
35' BUILDING RESTRICTION LINE	BRL 35'
PART 77 SURFACE	PT77
PAPI OBSTACLE CLEARANCE SURFACE	
DEPARTURE SURFACE	DEP
THRESHOLD SITING SURFACE	TSS

DESCRIPTION	EXISTING
AIRFIELD PAVEMENT	
TURF RUNWAY	
BUILDINGS	
ROADWAY/PARKING	
THRESHOLD LIGHT	
REIL	
PAPI	
ARP	
BEACON	
SEGMENTED CIRCLE WITH LIGHTED WINDCONE	
AIRCRAFT HOLDING POSITION	
OBSTRUCTIONS	▲1000

NOTE:
1. ROADWAY ELEVATIONS INCLUDE TRAVERSEWAY ADJUSTMENT (23' RAILROADS | 17' HIGHWAYS | 15' PUBLIC ROADS | 10' PRIVATE ROADS).
2. NO FENCES ARE LOCATED IN THIS VIEW OF THE AIRPORT.

200' 100' 0 200'
HORIZONTAL SCALE

20' 10' 0 20'
VERTICAL SCALE

MAGNETIC DECLINATION
7° 44' EAST
DECEMBER 2016
ANNUAL CHANGE 0° 6' WEST

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REVISIONS

NO.	DESCRIPTION	DATE

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224-0013-001

SHEET TITLE

RUNWAY 17 - 35 INNER APPROACH PLAN AND PROFILE

SHEET NUMBER

13 OF 18

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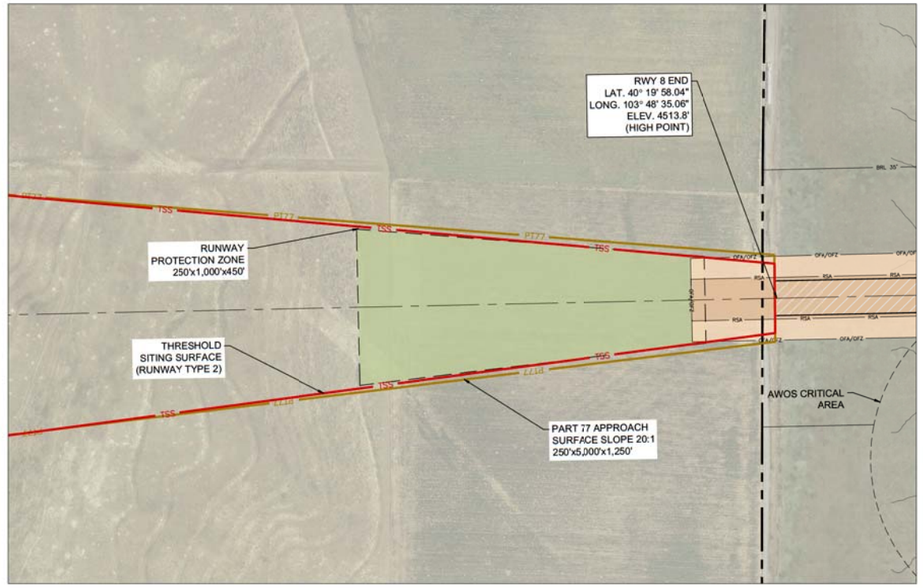

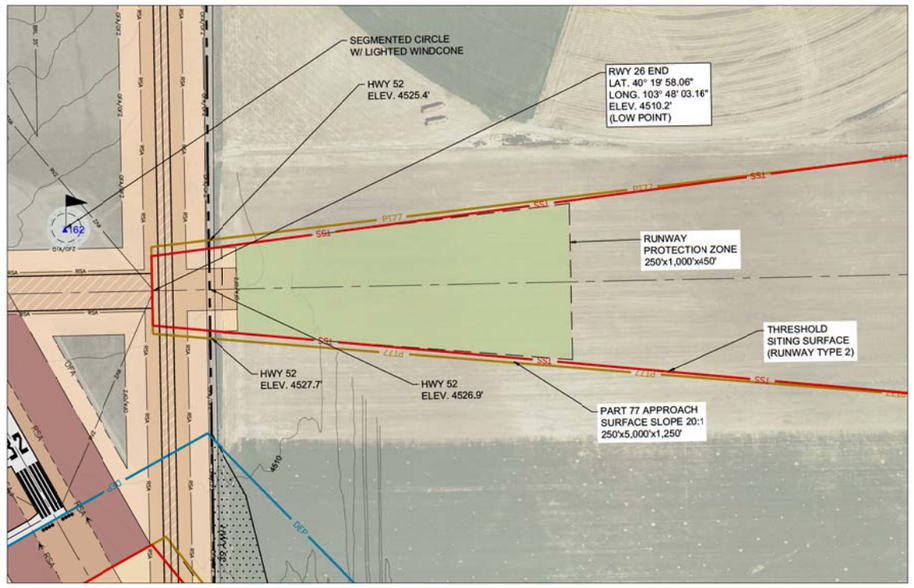

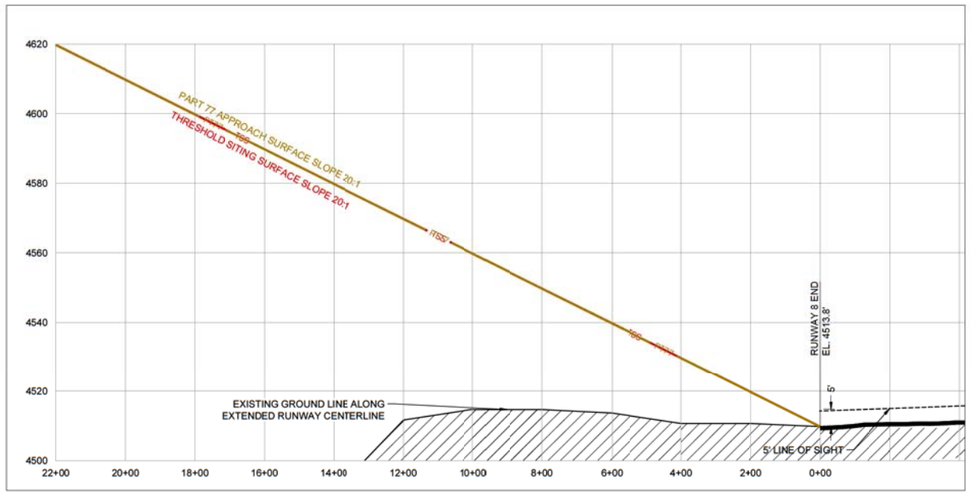

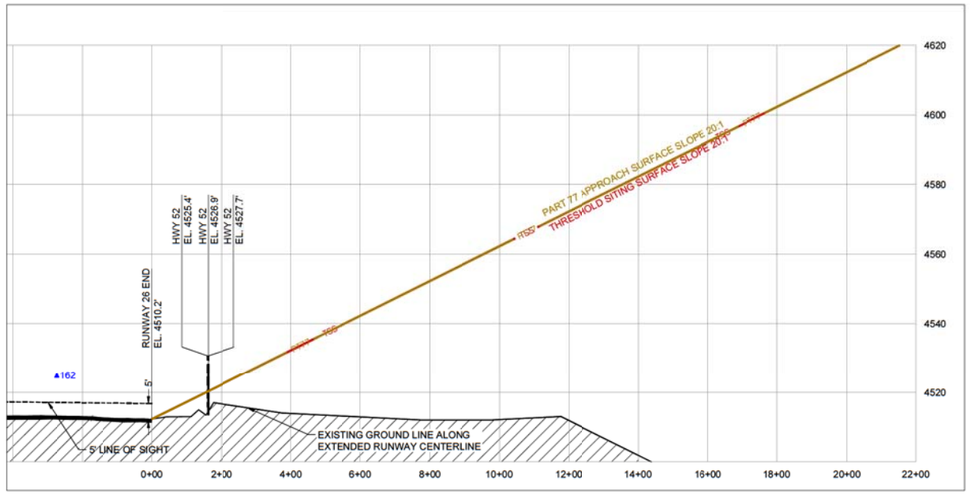

RUNWAY 8 OBSTRUCTION TABLE								
OBJECT NO.	OBJECT DESCRIPTION	ABOVE GROUND LEVEL (FT.)	OBJECT TOP ELEVATION (FT.)	CLEARANCE (+ PENETRATE) (- CLEAR)		PROPOSED DISPOSITION	PART 77 SURFACE VIOLATION	TRIGGERING EVENT
				PART 77 APPROACH SURFACE (FT.)	THRESHOLD SITING SURFACE (FT.)			
NO OBSTRUCTIONS								

1. OBSTRUCTION SURVEY COMPLETED BY WOOLPERT JULY 17 2015

RUNWAY 26 OBSTRUCTION TABLE								
OBJECT NO.	OBJECT DESCRIPTION	ABOVE GROUND LEVEL (FT.)	OBJECT TOP ELEVATION (FT.)	CLEARANCE (+ PENETRATE) (- CLEAR)		PROPOSED DISPOSITION	PART 77 SURFACE VIOLATION	TRIGGERING EVENT
				PART 77 APPROACH SURFACE (FT.)	THRESHOLD SITING SURFACE (FT.)			
162	NAVAID	4512.2	4533.5	15.8	N/A	OBSTRUCTON LIGHT	PRIMARY	RWY 8-26 RESEEDING

1. OBSTRUCTION SURVEY COMPLETED BY WOOLPERT JULY 17 2015

DESCRIPTION	EXISTING
PROPERTY LINE	
EASEMENT	
RUNWAY SAFETY AREA	RSA
RUNWAY OBJECT FREE AREA	ROFA
RUNWAY OBSTACLE FREE ZONE	ROFZ
RUNWAY VISIBILITY ZONE	RVZ
RUNWAY PROTECTION ZONE	
TAXIWAY SAFETY AREA	TSA
TAXIWAY OBJECT FREE AREA	TOFA
35' BUILDING RESTRICTION LINE	BRL 35'
PART 77 SURFACE	PT77
PAPI OBSTACLE CLEARANCE SURFACE	
DEPARTURE SURFACE	DEP
THRESHOLD SITING SURFACE	TSS

DESCRIPTION	EXISTING
AIRFIELD PAVEMENT	
TURF RUNWAY	
BUILDINGS	
ROADWAY/PARKING	
THRESHOLD LIGHT	•
REIL	
PAPI	
ARP	
BEACON	
SEGMENTED CIRCLE WITH LIGHTED WINDCONE	
AIRCRAFT HOLDING POSITION	
OBSTRUCTIONS	▲1000

NOTE:
1. ROADWAY ELEVATIONS INCLUDE TRAVERSEWAY ADJUSTMENT (23' RAILROADS | 17' HIGHWAYS | 15' PUBLIC ROADS | 10' PRIVATE ROADS).
2. NO FENCES ARE LOCATED IN THIS VIEW OF THE AIRPORT.

200' 100' 0 200'
HORIZONTAL SCALE

20' 10' 0 20'
VERTICAL SCALE

MAGNETIC DECLINATION
7° 44' EAST
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REVISIONS

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EXISTING RUNWAY 8 - 26 INNER APPROACH PLAN AND PROFILE

SHEET NUMBER
14 OF 18

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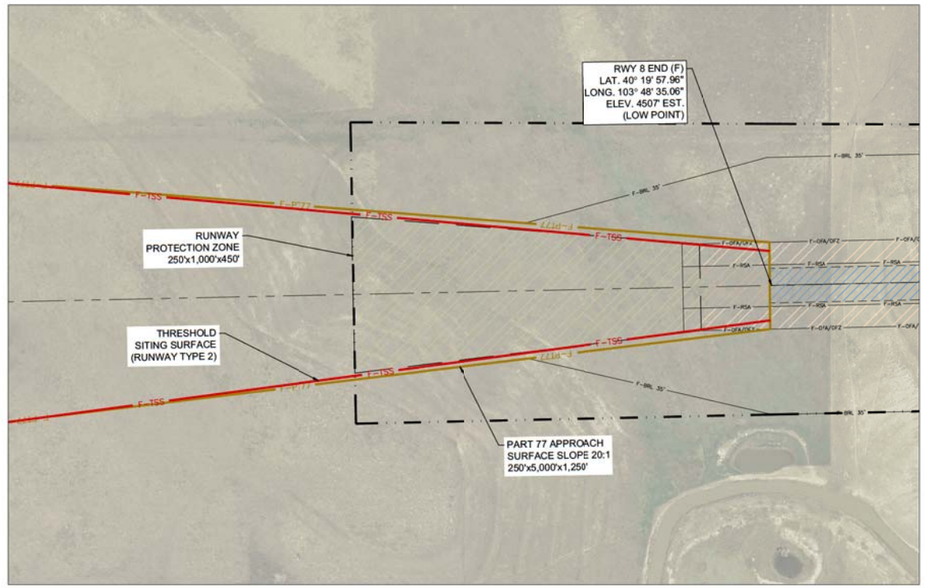

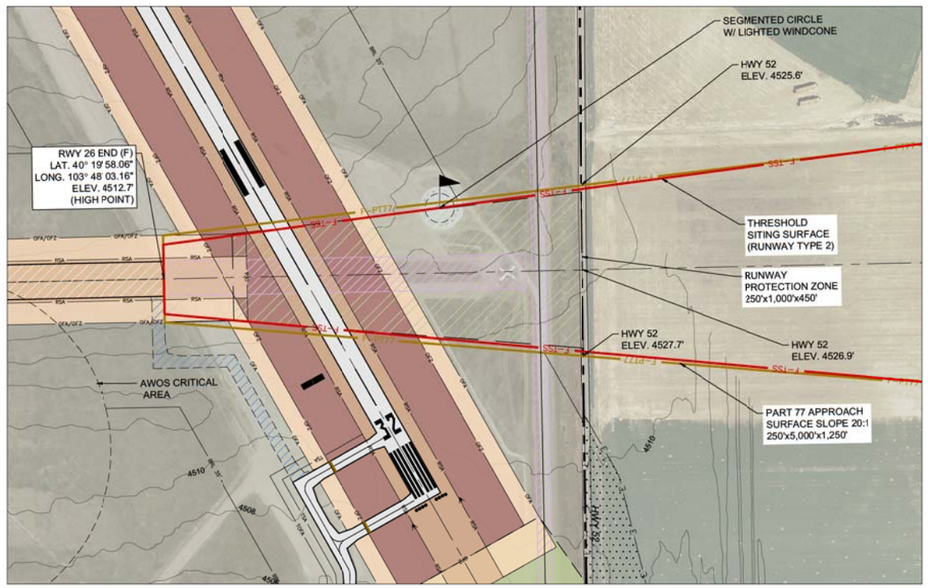

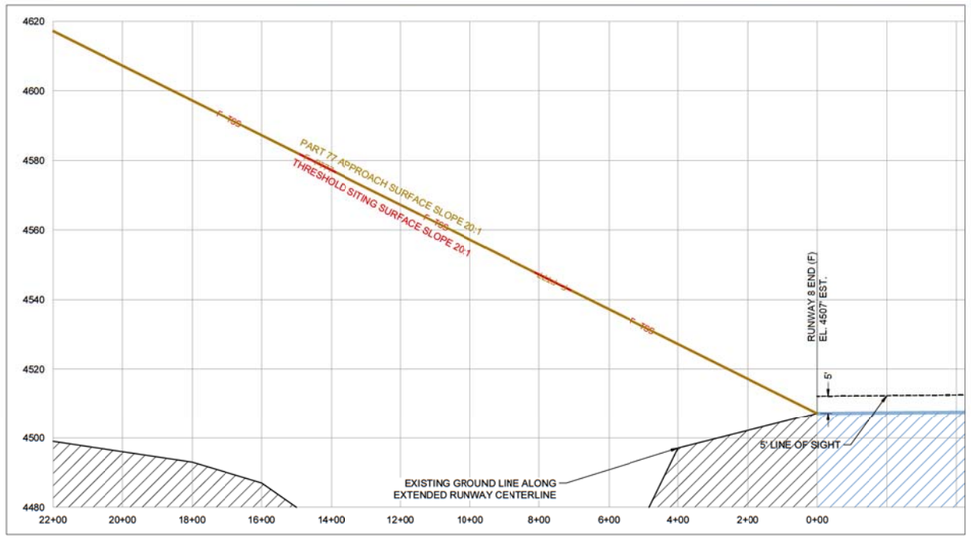

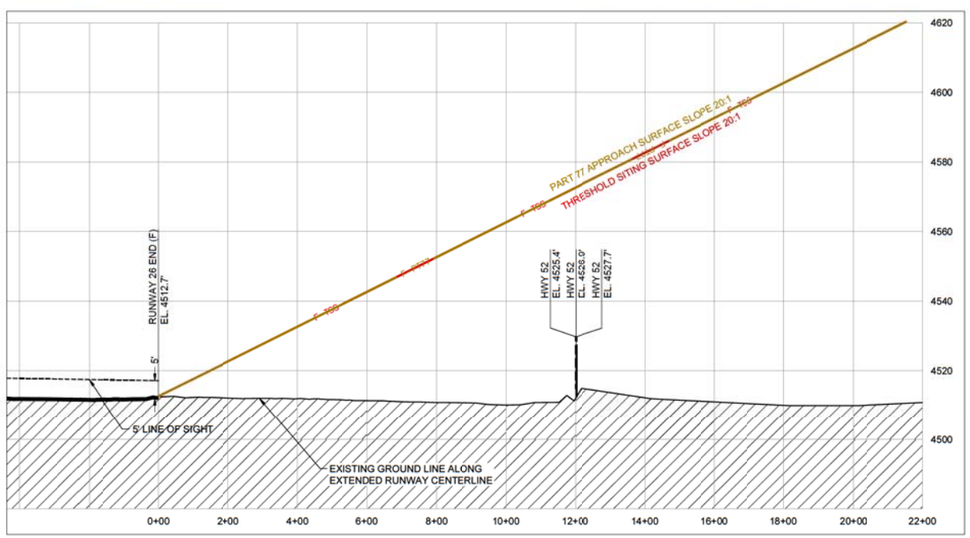

RUNWAY 8 OBSTRUCTION TABLE

OBJECT NO.	OBJECT DESCRIPTION	ABOVE GROUND LEVEL (FT.)	OBJECT TOP ELEVATION (FT.)	CLEARANCE (+ PENETRATE) (- CLEAR)		PROPOSED DISPOSITION	PART 77 SURFACE VIOLATION	TRIGGERING EVENT
				PART 77 APPROACH SURFACE (FT.)	THRESHOLD SITING SURFACE (FT.)			
NO OBSTRUCTIONS								

1. OBSTRUCTION SURVEY COMPLETED BY WOOLPERT JULY 17 2015

RUNWAY 26 OBSTRUCTION TABLE

OBJECT NO.	OBJECT DESCRIPTION	ABOVE GROUND LEVEL (FT.)	OBJECT TOP ELEVATION (FT.)	CLEARANCE (+ PENETRATE) (- CLEAR)		PROPOSED DISPOSITION	PART 77 SURFACE VIOLATION	TRIGGERING EVENT
				PART 77 APPROACH SURFACE (FT.)	THRESHOLD SITING SURFACE (FT.)			
NO OBSTRUCTIONS								

1. OBSTRUCTION SURVEY COMPLETED BY WOOLPERT JULY 17 2015

DESCRIPTION	EXISTING	FUTURE
PROPERTY LINE		
EASEMENT		N/A
RUNWAY SAFETY AREA	RSA	F-RSA
RUNWAY OBJECT FREE AREA	ROFA	F-ROFA
RUNWAY OBSTACLE FREE ZONE	ROFZ	F-ROFZ
RUNWAY PROTECTION ZONE		
TAXIWAY SAFETY AREA	TSA	F-TSA
TAXIWAY OBJECT FREE AREA	TOFA	F-TOFA
35' BUILDING RESTRICTION LINE	BRL 35'	F-BRL 35'
PART 77 SURFACE	(PT77)	F-PT77
PAPI OBSTACLE CLEARANCE SURFACE		
DEPARTURE SURFACE	DEP	F-DEP
THRESHOLD SITING SURFACE	TSS	F-TSS
AIRFIELD PAVEMENT		

NOTE:
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2. NO FENCES ARE LOCATED IN THIS VIEW OF THE AIRPORT.

DESCRIPTION	EXISTING	FUTURE
AIRFIELD PAVEMENT TO BE REMOVED	N/A	
TURF RUNWAY		
TURF RUNWAY TO BE REMOVED	N/A	
BUILDINGS		
BUILDINGS TO BE REMOVED	N/A	
ROADWAY/PARKING		
THRESHOLD LIGHT		
REIL		
PAPI		
ARP		
BEACON		N/A
SEGMENTED CIRCLE WITH LIGHTED WINDCONE		N/A
AIRCRAFT HOLIDING POSITION		
OBSTRUCTIONS	▲1000	N/A

200' 100' 0 200'
HORIZONTAL SCALE

20' 10' 0 20'
VERTICAL SCALE

MAGNETIC DECLINATION
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FORT MORGAN MUNICIPAL AIRPORT

FORT MORGAN, CO

AIRPORT LAYOUT PLAN

CONSULTANTS

REVISIONS

NO.	DESCRIPTION	DATE

DATE ISSUED: JULY 2018
REVIEWED BY: MB/PM/TM
DRAWN BY: SD
DESIGNED BY: SD

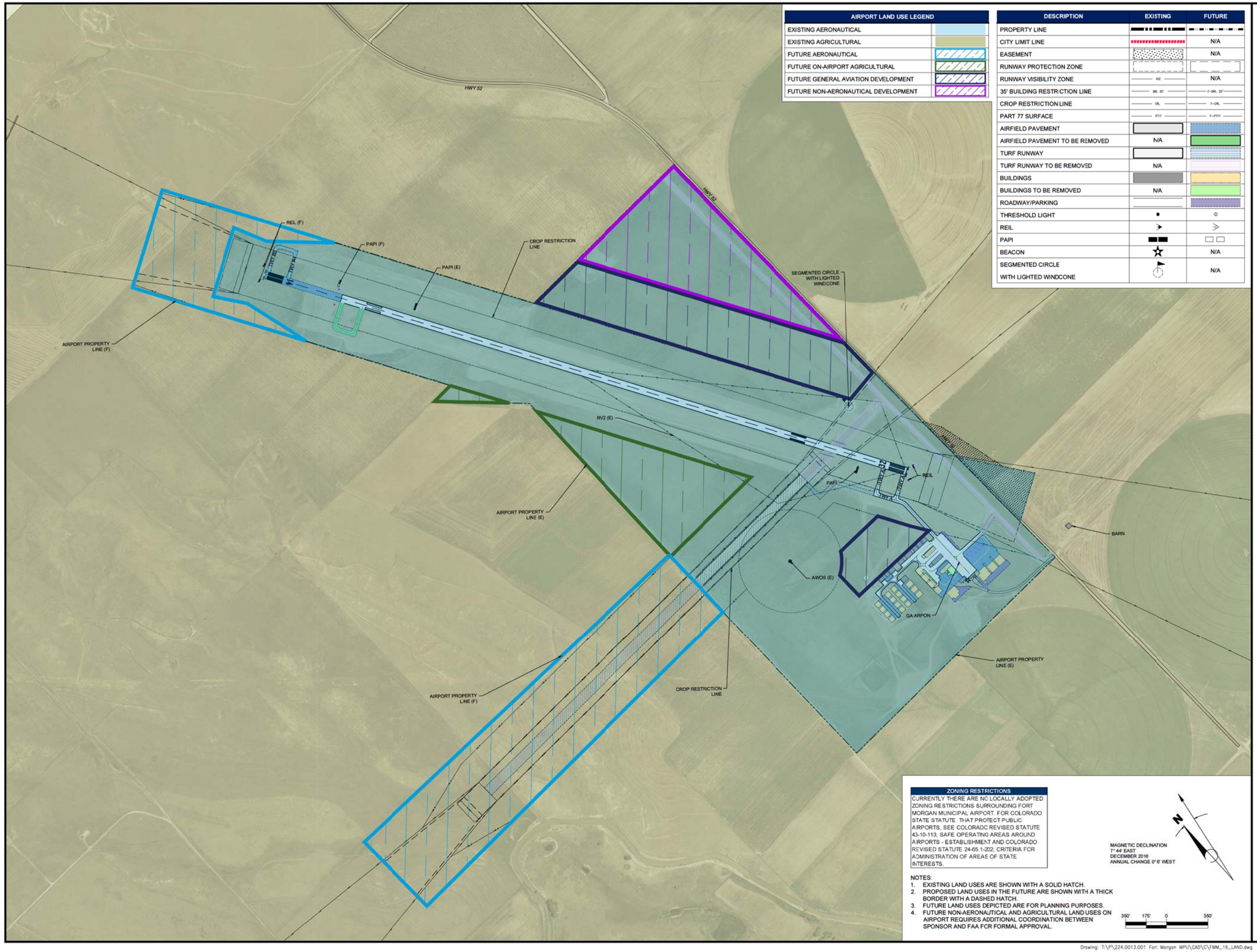
PROJECT NUMBER
224-0013-001

SHEET TITLE
FUTURE RUNWAY 8 - 26 INNER APPROACH PLAN AND PROFILE

SHEET NUMBER
15 OF 18

DRAFT

Drawing: T:\P\224.0013.001 Fort Morgan MPU\CAD\C\FMM_15_FuApp8-26.dwg Plotted on: 6/29/2018 12:09 Plotted by: Derengowski, Steven



AIRPORT LAND USE LEGEND
EXISTING AERONAUTICAL
EXISTING AGRICULTURAL
FUTURE AERONAUTICAL
FUTURE ON-AIRPORT AGRICULTURAL
FUTURE GENERAL AVIATION DEVELOPMENT
FUTURE NON-AERONAUTICAL DEVELOPMENT

DESCRIPTION	EXISTING	FUTURE
PROPERTY LINE		
CITY LIMIT LINE		N/A
EASEMENT		N/A
RUNWAY PROTECTION ZONE		
RUNWAY VISIBILITY ZONE	RVZ	N/A
35' BUILDING RESTRICTION LINE	BRL 35'	F-BRL 35'
CROP RESTRICTION LINE	CRL	F-CRL
PART 77 SURFACE	FT77	F-FT77
AIRFIELD PAVEMENT		
AIRFIELD PAVEMENT TO BE REMOVED	N/A	
TURF RUNWAY		
TURF RUNWAY TO BE REMOVED	N/A	
BUILDINGS		
BUILDINGS TO BE REMOVED	N/A	
ROADWAY/PARKING		
THRESHOLD LIGHT		
REIL		
PAPI		
BEACON		N/A
SEGMENTED CIRCLE WITH LIGHTED WINDCONE		N/A

ZONING RESTRICTIONS
CURRENTLY THERE ARE NO LOCALLY ADOPTED ZONING RESTRICTIONS SURROUNDING FORT MORGAN MUNICIPAL AIRPORT. FOR COLORADO STATE STATUTE THAT PROTECT PUBLIC AIRPORTS, SEE COLORADO REVISED STATUTE 43-10-113, SAFE OPERATING AREAS AROUND AIRPORTS - ESTABLISHMENT AND COLORADO REVISED STATUTE 24-65.1-202, CRITERIA FOR ADMINISTRATION OF AREAS OF STATE INTERESTS.

MAGNETIC DECLINATION
7° 44' EAST
DECEMBER 2016
ANNUAL CHANGE 0° 6' WEST

NOTES:
1. EXISTING LAND USES ARE SHOWN WITH A SOLID HATCH.
2. PROPOSED LAND USES IN THE FUTURE ARE SHOWN WITH A THICK BORDER WITH A DASHED HATCH.
3. FUTURE LAND USES DEPICTED ARE FOR PLANNING PURPOSES.
4. FUTURE NON-AERONAUTICAL AND AGRICULTURAL LAND USES ON AIRPORT REQUIRES ADDITIONAL COORDINATION BETWEEN SPONSOR AND FAA FOR FORMAL APPROVAL.

350' 175' 0 350'

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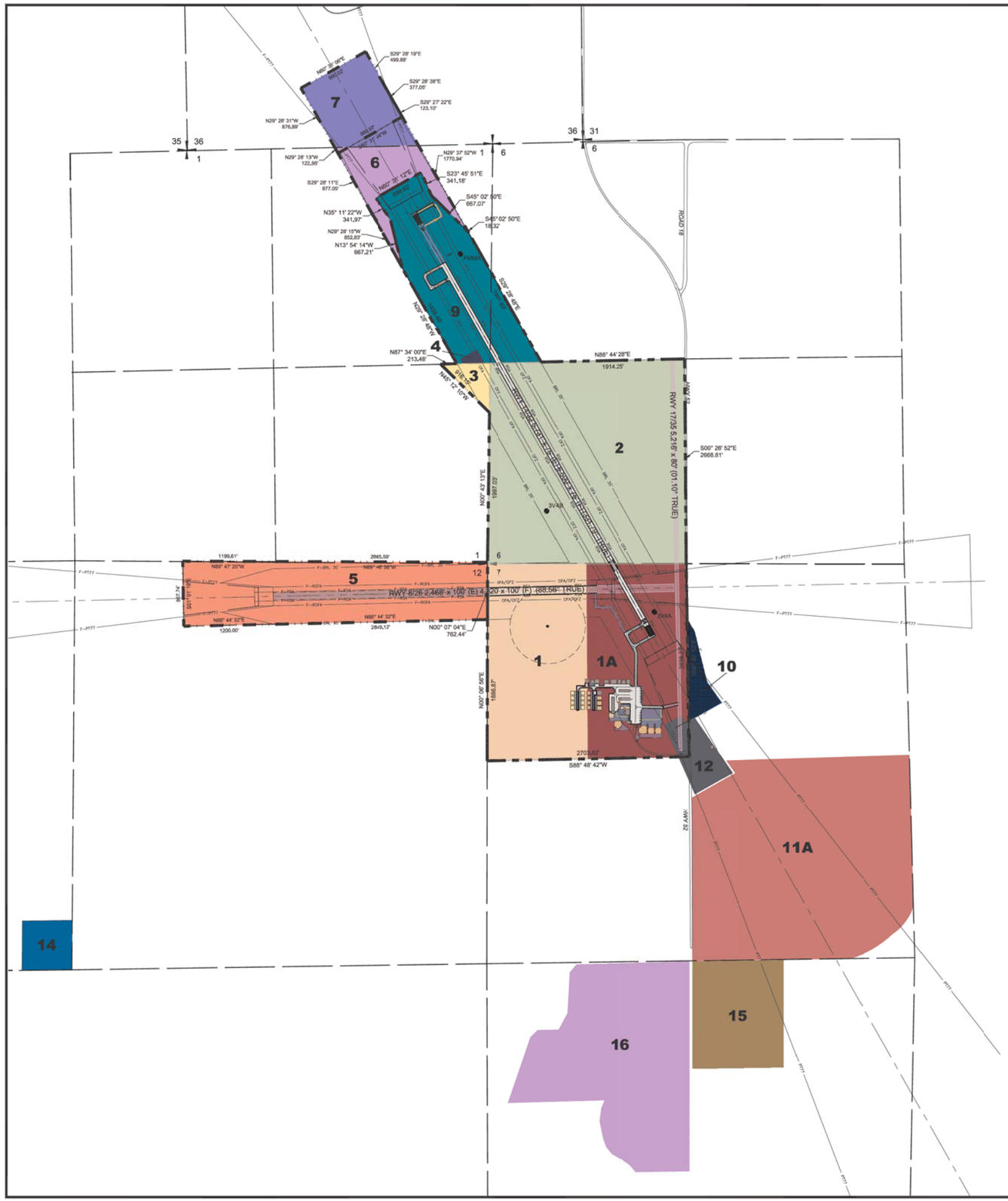
AIRPORT LAND USE PLAN

SHEET NUMBER

16 OF 18

DRAFT

Drawing: T:\P\224.0013.001 Fort Morgan MPU\CAD\C\FMM_16_LAND.dwg Plotted on: 7/12/2018 7:47 AMPlotted by: Derengowski, Steven



DESCRIPTION	EXISTING	FUTURE
PROPERTY LINE		
SECTION LINE		N/A
EASEMENT		N/A
RUNWAY SAFETY AREA	RSA	F-RSA
RUNWAY OBJECT FREE AREA	ROFA	F-ROFA
RUNWAY OBSTACLE FREE ZONE	ROFZ	F-ROFZ
RUNWAY PROTECTION ZONE		
PART 77 SURFACE	PT77	F-PT77
AIRFIELD PAVEMENT		
AIRFIELD PAVEMENT TO BE REMOVED	N/A	
TURF RUNWAY		
TURF RUNWAY TO BE REMOVED	N/A	
BUILDINGS		
BUILDINGS TO BE REMOVED	N/A	
ROADWAY/PARKING		
NGS MONUMENT	PACS/SACS	N/A
BEARING/DISTANCE	N00°10'20"W 30.0'	N00°10'20"W 30.0'

EXISTING AIRPORT PROPERTY

PARCELS	GRANTOR	TYPE OF INTEREST ACQUIRED	ACRES	CONVEYANCE INSTRUMENT	RECORDING DATE	RECORDING INFO	FEDERAL PARTICIPATION	PURPOSE OF ACQUISITION
1A	YOUNG	FEE	80	WARRANTY DEED	1/10/1940	BK 216, PG 422	NONE	AERONAUTICAL
1	BERRYHILL	FEE	80	WARRANTY DEED	5/24/1940	BK 383, PG 309	NONE	AERONAUTICAL
2	BAUMAN, E & MAGGIE	FEE	160	WARRANTY DEED	2/5/1940	BK 382, PG 43	NONE	AERONAUTICAL
3	ARFORD	FEE	5	WARRANTY DEED	12/21/1970	BK 722, PG 310	NONE	AERONAUTICAL
4	LONGACRE	FEE	0.81	WARRANTY DEED	8/3/1983	BK 845, PG 774	NONE	AERONAUTICAL
9	LONGACRE RANCH R;LP	FEE	56.4	ORDER	9/6/2014	BK 845, PG 774	NONE	RUNWAY 14-32 REALIGNMENT
10	BINGER/ CARRILLO/ RAMUSSEN	EASEMENT	5.85	AVIGATION AND RIGHT OF WAY	12/11/2012	REC #879798	NONE	RWY 32 RPZ
12	RASMUSSEN/ LEBSOCK	EASEMENT	8.38	CLEAR ZONE AVIGATION EASEMENT	9/22/1983	BK 847, PG 750	NONE	CLEAR ZONE APPROACH SURFACE PROTECTION
13*	LONGACRE RANCH R;LP	EASEMENT	8.03	CLEAR ZONE AVIGATION EASEMENT	7/25/1983	BK 845, PG 776	NONE	CLEAR ZONE APPROACH SURFACE PROTECTION
14	SCHOCKE	EASEMENT	10				NONE	
15	IUNGERICH	EASEMENT	40	CLEAR ZONE AVIGATION EASEMENT	9/22/1983	BK 848, PG 918	NONE	CLEAR ZONE APPROACH SURFACE PROTECTION
16	FORT MORGAN DEVELOPMENT	EASEMENT	106				NONE	

PROPOSED PROPERTY TO BE ACQUIRED

PARCELS	GRANTOR	TAX PARCEL NUMBER	TYPE OF INTEREST ACQUIRED	ACREAGE	PURPOSE OF ACQUISITION
5	WACKER/ WENDELL / MARGARET	R009581	FEE	75.89	AERONAUTICAL
6	LONGACRE RANCH R;LP	R009406	FEE	19.11	AERONAUTICAL AND APPROACH PROTECTION
7	LONGACRE RANCH R;LP	R009406	FEE	26.48	ULTIMATE DEV. AND APPROACH PROTECTION
11A	LEBSOCK	R009300 / R009302	EASEMENT	154.5	APPROACH PROTECTION

PLANS PREPARED BY:

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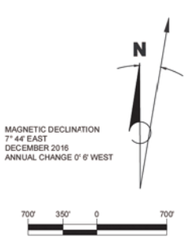
303-409-9700 FAX 303-409-9701
www.rsandh.com

APPROVED _____ PETER MAIMAN, C.M. _____ DATE

FORT MORGAN MUNICIPAL AIRPORT

APPROVED _____ STEVE GLAMMEYER / AIRPORT MANAGER _____ DATE

NOTES:
1. AIRPORT PROPERTY BOUNDARY WAS NOT SURVEYED AND IS DEPICTED BASED ON DEEDS FROM EACH PARCEL.
2. NO PARCEL SURVEY WAS CONDUCTED AS PART OF THIS STUDY.
3. PARCEL 14 AND 16 IS GRAPHICALLY REPRESENTED AND ACREAGE NUMBER IS AN APPROXIMATE.
4. PUBLIC ROAD RIGHT OF WAYS ARE SHOWN AS AN UNDEFINED PARCEL.
5. PARCEL 13 IS NOT DEPICTED. EASEMENT FOR PARCEL 13 WAS PURCHASED WHEN PARCEL 9 WAS ACQUIRED.
6. FUTURE BEARINGS/DISTANCES ARE FOR PARCELS PROPOSED TO BE ACQUIRED IN THE FUTURE / ULTIMATE.



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SHEET TITLE
EXHIBIT 'A' AIRPORT PROPERTY INVENTORY MAP

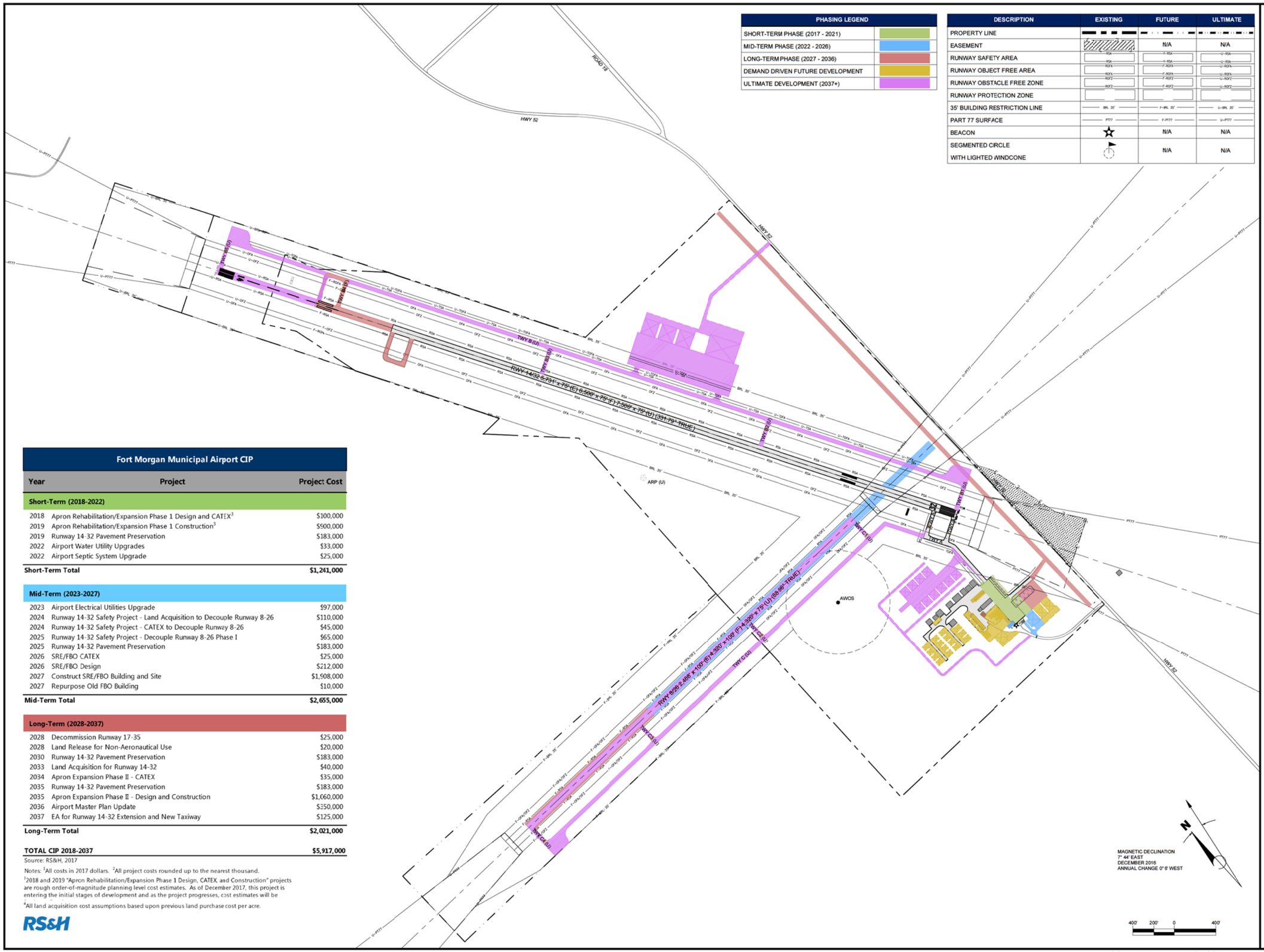
SHEET NUMBER
17 OF 18

DRAFT

Drawing: T:\P\224.0013.001 Fort Morgan MPU\CAD\C\FMM_17_PROP.dwg Plotted on: 7/12/2018 7:26 AMPlotted by: Derengowski, Steven

PHASING LEGEND	
SHORT-TERM PHASE (2017 - 2021)	
MID-TERM PHASE (2022 - 2026)	
LONG-TERM PHASE (2027 - 2036)	
DEMAND DRIVEN FUTURE DEVELOPMENT	
ULTIMATE DEVELOPMENT (2037+)	

DESCRIPTION	EXISTING	FUTURE	ULTIMATE
PROPERTY LINE			
EASEMENT		N/A	N/A
RUNWAY SAFETY AREA			
RUNWAY OBJECT FREE AREA			
RUNWAY OBSTACLE FREE ZONE			
RUNWAY PROTECTION ZONE			
35' BUILDING RESTRICTION LINE			
PART 77 SURFACE			
BEACON		N/A	N/A
SEGMENTED CIRCLE WITH LIGHTED WINDCONE		N/A	N/A



Fort Morgan Municipal Airport CIP

Year	Project	Project Cost
Short-Term (2018-2022)		
2018	Apron Rehabilitation/Expansion Phase 1 Design and CATEX[3]	$100,000
2019	Apron Rehabilitation/Expansion Phase 1 Construction[3]	$900,000
2019	Runway 14-32 Pavement Preservation	$183,000
2022	Airport Water Utility Upgrades	$33,000
2022	Airport Septic System Upgrade	$25,000
Short-Term Total		**$1,241,000**
Mid-Term (2023-2027)		
2023	Airport Electrical Utilities Upgrade	$97,000
2024	Runway 14-32 Safety Project - Land Acquisition to Decouple Runway 8-26	$110,000
2024	Runway 14-32 Safety Project - CATEX to Decouple Runway 8-26	$45,000
2025	Runway 14-32 Safety Project - Decouple Runway 8-26 Phase I	$65,000
2025	Runway 14-32 Pavement Preservation	$183,000
2026	SRE/FBO CATEX	$25,000
2026	SRE/FBO Design	$212,000
2027	Construct SRE/FBO Building and Site	$1,908,000
2027	Repurpose Old FBO Building	$10,000
Mid-Term Total		**$2,655,000**
Long-Term (2028-2037)		
2028	Decommission Runway 17-35	$25,000
2028	Land Release for Non-Aeronautical Use	$20,000
2030	Runway 14-32 Pavement Preservation	$183,000
2033	Land Acquisition for Runway 14-32	$40,000
2034	Apron Expansion Phase II - CATEX	$35,000
2035	Runway 14-32 Pavement Preservation	$183,000
2035	Apron Expansion Phase II - Design and Construction	$1,060,000
2036	Airport Master Plan Update	$350,000
2037	EA for Runway 14-32 Extension and New Taxiway	$125,000
Long-Term Total		**$2,021,000**
TOTAL CIP 2018-2037		**$5,917,000**

Source: RS&H, 2017

Notes: [1]All costs in 2017 dollars. [2]All project costs rounded up to the nearest thousand.

[3]2018 and 2019 "Apron Rehabilitation/Expansion Phase 1 Design, CATEX, and Construction" projects are rough order-of-magnitude planning level cost estimates. As of December 2017, this project is entering the initial stages of development and as the project progresses, cost estimates will be refined.

[4]All land acquisition cost assumptions based upon previous land purchase cost per acre.

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SHEET TITLE

AIRPORT DEVELOPMENT PHASING PLAN

SHEET NUMBER

18 OF 18

DRAFT

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APPENDIX A

GLOSSARY

Above Ground Level (AGL):	An elevation datum given in feet above ground level.
Advisory Circular (AC)	A series of external FAA publications consisting of all non-regulatory material of a policy, guidance, and informational nature.
Aircraft	A device that is used or intended to be used for flight in the air.
Aircraft Operation	A landing or takeoff by an aircraft.
Aircraft Owners and Pilots Association (AOPA)	A not-for-profit individual membership association serving the interests and needs of general aviation pilots and aircraft owners.
Aircraft Rescue and Fire Fighting (ARFF)	A facility designed to house emergency vehicles, extinguishing agents, and personnel responsible for minimizing the effects of an aircraft accident or incident.
Airport Advisory Area	The area within 10 statute miles of an airport where a flight service station is located, but where there is no control tower in operation.
Airport Authority	Similar to a port authority but with the single purpose of setting policy and management direction for airports within its jurisdiction.
Airport Beacon	A visual navigation aid displaying alternating lights used to identify the type of airport.
Airport Elevation	The highest point of an airport's usable runways measured in MSL.
Airport Improvement Program (AIP)	A program created under the Airport and Airway Improvement Act of 1982 to provide continued funding for airport planning and development.
Airport Layout Plan (ALP)	A plan for an airport showing boundaries and proposed additions to all areas owned or controlled by the sponsor for airport purposes, the location and nature of existing and proposed airport facilities and structures, and the location on the airport of existing

	and proposed non-aviation areas and improvements thereto.
Airport Master Plan (AMP)	A plan of the ultimate development of a specific airport. It presents the research and logic from which the plan was evolved and displays the plan in a graphic and written format.
Airport Movement Area Safety System (AMASS)	Enhances the function of the ground mapping radar by providing automated alerts and warnings of potential runway incursions and other hazards.
Airport Obstruction Chart (AOC)	A 1:12,000 scale graphic depicting Federal Aviation Regulations Part 77 surfaces, a representation of objects that penetrate these surfaces, runway, taxiway, and ramp areas, navigational aids, prominent airport buildings, plus a selection of roads and other planimetric detail in the airport vicinity.
Airport Surveillance Radar (ASR)	Approach and departure control radar used to detect and display an aircraft's position in the terminal area.
Airport Reference Point (ARP)	The latitude and longitude of the approximate center of the airport.
Airport Sponsor	A public agency or tax-supported organization, such as an airport authority, that is authorized to own and operate the airport, to obtain property interests, to obtain funds, and to be legally, financially, and otherwise able to meet all applicable requirements of current laws and regulations.
Airport Surveillance Radar (ASR)	Radar providing position of aircraft by azimuth and range data. It does not provide elevation data. It is designed for range coverage up to 60 nautical miles and is used by terminal area air traffic control.
Air Route Traffic Control Center (ARTCC)	A facility established to provide air traffic control service to aircraft operating on an IFR flight plan within controlled airspace and principally during the enroute phase of light.

Airspace	Space in the air above the surface of the earth or a particular portion of such space, usually defined by the boundaries of an area on the surface projected upward.
Air Taxi Aircraft	An aircraft operated by the holder of an Air Taxi Operating Certificate, which authorizes the carriage of passengers, mail, or cargo for revenue in accordance with FAR Parts 135 and 121.
Air Traffic Control (ATC)	A service operated by appropriate authority to promote the safe, orderly, and expeditious flow of air traffic.
Air Traffic Control System Command Center (ATCSCC)	A facility responsible for the operation of four distinct but integrated functions: central flow control, central altitude reservations, airport reservation position, and the air traffic service contingency command post.
Air Traffic Control Tower (ATCT)	A central operations facility in the terminal air traffic control system, consisting of a tower cab structure including an associated IFR room if radar equipped, using air/ground communications and/or radar, visual signaling, and other devices to provide safe and expeditious movement of terminal air traffic.
Air Transport Association (ATA)	An organization for the principal U.S. airlines that supports and assists its members by promoting the air transport industry and the safety, cost effectiveness, and technological advancement of its operations; advocating common industry positions before state and local governments; conducting designated industry-wide programs; and assuring governmental and public understanding of all aspects of air transport.
Alert Area	Special use airspace that may contain a high volume of pilot training activities or an unusual type of aerial activity.
Altitude	Height expressed in units of distance above a reference plane, usually above mean sea level or above ground level.

Approach Lighting System (ALS)	An airport lighting facility that provides visual guidance to landing aircraft by radiating light beams in a directional pattern by which the pilot aligns the aircraft with the extended centerline of the runway on the final approach and landing.
Approach Surface	An imaginary surface longitudinally centered on the extended centerline of the runway, beginning at the end of the primary surface and rising outward and upward to a specified height above the established airport elevation.
Apron	A defined area, on a land airport, intended to accommodate aircraft for purposes of loading or unloading passengers or cargo, refueling, parking, or maintenance.
Area Navigation (RNAV)	Application of the navigation process providing the capability to establish and maintain a flight path on any arbitrary chosen course that remains within the coverage area of navigation sources being used.
Automated Terminal Information Service (ATIS)	The continuous broadcast of recorded non-control information in selected terminal areas. Its purpose is to improve controller effectiveness and to relieve frequency congestion by automating the repetitive transmission of essential but routine information.
Automated Surface Observation System (ASOS)	Weather reporting system that provides surface observations every minute via digitized voice broadcasts and printed reports.
Automated Weather Observing System (AWOS)	Gathers weather data from unmanned sensors, automatically formulates weather reports, and distributes them to airport control towers.
Automatic Direction Finder (ADF)	An aircraft radio navigation system which senses and indicates the direction to an L/MF non-directional radio beacon (NDB) or commercial broadcast station.
Avigation Easement	A grant or property interest in land over which a right of unobstructed flight in the airspace is established.

Based Aircraft	The total number of active general aviation aircraft that use or may be expected to use an airport as a home base.
Basic Utility (BU) Airport	An airport that accommodates most single-engine and many of the small twin-engine aircraft.
Bearing	The horizontal direction to or from any point, usually measured clockwise from true north (true bearing), magnetic north (magnetic bearing), or some other reference point, through 360 degrees.
Blast Fence	A barrier that is used to divert or dissipate jet or propeller blast.
Blast Pad	A specially prepared surface placed adjacent to the ends of runways to eliminate the erosive effect of the high wind forces produced by airplanes at the beginning of their takeoff rolls.
Building Restriction Line	A line shown on the airport layout plan beyond which airport buildings must not be positioned in order to limit their proximity to aircraft movement areas.
Category I (CAT-I)	An ILS that provides acceptable guidance information from the coverage limits of the ILS to the point at which the localizer course line intersects the glide path at a height of 100 feet above the horizontal plane containing the runway threshold. Supports landing minima as low as 200 feet HAT and 1,800 feet RVR.
Category II (CAT-II)	An ILS that provides acceptable guidance information from the coverage limits of the ILS to the point at which the localizer course line intersects the glide path at a height of 50 feet above the horizontal plane containing the runway threshold. Supports landing minima as low as 100 feet HAT and 1,200 feet RVR.
Category III (CAT-III)	An ILS that provides acceptable guidance information from the coverage limits of the ILS with no decision height specified above the horizontal plane containing the runway threshold.

Capital Improvement Plan (CIP)	The primary planning tool used by the Federal Aviation Administration for systematically identifying, prioritizing, and assigning funds to critical airport development and associated capital needs for the National Airspace System. Also serves as the basis for distribution of grant funds under the Airport Improvement Program.
Ceiling	The height above the earth's surface of the lowest layer of clouds which is reported as broken or overcast or the vertical visibility into an obscuration.
Common Traffic Advisory Frequency (CTAF)	A frequency designed for the purpose of carrying out airport advisory practices while operating to or from an uncontrolled airport. The CTAF may be a UNICOM, MULTICOM, FSS, or tower frequency and it is identified in appropriate aeronautical publications.
Conical Service	A surface extending from the periphery of the horizontal surface outward and upward at a slope of 20 to 1 for the horizontal distances and to the elevations above the airport elevation as prescribed in FAR Part 77.
Controlled Airport	An airport that has an operating control tower.
Controlled Airspace	Airspace designed as a continental control area, control area, control zone, terminal control area, or transition area, within which some or all aircraft may be subject to air traffic control.
Crosswind	A wind which is not parallel to a runway or the path of an aircraft.
Crosswind Component	A wind component which is at a right angle to the runway or the flight path of an aircraft.
Decibel (dB)	A unit of noise level representing a relative quantity. This reference value is a sound pressure of 20 micronewtons per square meter.

Decision Height (DH)	With respect to the operating of aircraft means the height at which a decision must be made, during the ILS or PAR instrument approach, to either continue the approach or to execute a missed approach.
Department of Transportation (DOT)	Established in 1966 to promote coordination of existing federal programs and to act as a focal point for future research and development efforts in transportation.
Discretionary Funds	Grants that go to projects that address goals established by Congress, such as enhancing capacity, safety, and security or mitigating noise at all types of airports
Displaced Threshold	When the landing area begins at a point on the runway other than the designated beginning of the runway.
Distance Measuring Equipment (DME)	Equipment (airborne and ground) to measure, in nautical miles, the slant range distance of an aircraft from the navigational aid.
Dual Tandem Wheel Gear (DTWG)	Two wheels side by side followed by two additional side-by-side wheels.
Dual Wheel Gear (DWG)	Two wheels side by side on a single strut.
Environmental Assessment (EA)	A concise public document for which a Federal agency is responsible that serves to briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement of a finding of no significant impact.
Environmental Impact Statement (EIS)	A federal document that reflects the FAA's final evaluation of the environmental impact of a proposed action.
Essential Air Service (EAS)	Guarantees air carrier service to selected small cities and provides subsidies if needed so as to prevent these cities from losing service.

Federal Aviation Administration (FAA)	Created by the act that established the DOT. Assumed all of the responsibilities of the form Federal Aviation Agency.
Federal Aviation Regulations (FAR)	The codification of the general and permanent rules published in the Federal Register by the executive departments and agencies of the Federal Government for aviation.
Federal Inspection Services (FIS)	Conducts customs and immigration services including passport inspection, inspection of baggage, and collection of duties on certain imported items, and sometimes inspection for agricultural materials, illegal drugs, or other restricted items.
Final Approach Fix (FAF)	Designated point at which the final approach segment begins for a non-precision approach.
Finding of No Significant Impact (FONSI)	A federal document prepared by a Federal agency that briefly presents the reasons why an action will not have a significant effect on the human environment and for which an environmental impact statement will not be prepared.
Fixed Base Operator (FBO)	A business located at an airport that provides a variety of services to pilots, which may include aircraft rental, training, fueling, maintenance, parking, and the sale of pilot supplies.
Flight Level (FL)	Designations for altitudes within controlled airspace Class A.
Flight Service Station (FSS)	A central operations facility in the national flight advisory system utilizing data interchange facilities for the collection and dissemination of NOTAM, weather, and administrative data and providing preflight and inflight advisory service and other services to pilots via air/ground communication facilities.
General Aviation (GA)	That portion of civil aviation that encompasses all facets of aviation except air carriers holding a certificate of convenience and necessity and large aircraft commercial operators.

General Utility (GU) Airports	Accommodates all general aviation aircraft.
Global Positioning System (GPS)	A satellite-based navigation system that will enhance user preferred routing, reduce separation standards, and increase access to airports under instrument meteorological conditions through more precision approaches.
Height Above Touchdown (HAT)	A designated height measured from the touchdown zone elevation or the threshold elevation of the runway served by the instrument approach.
High Intensity Runway Lights (HIRL)	The highest classification for the intensity of the lights bordering the sides of the runway.
Horizontal Surface	A specified portion of a horizontal plane located 150 feet above the established airport elevation which established the height above which an object is determined to be an obstruction to air navigation.
Initial Approach Fix (IAP)	The designated point at which the initial approach segment begins for an instrument approach.
Instrument Approach Procedures (IAP)	A procedure that allows an aircraft to descend safely by reference to instruments from the enroute altitude to a point near the runway at the pilot's discretion from which a landing can be made visually.
Instrument Flight Rules (IFR)	FAR rules that govern the procedures of conducting flight in weather conditions below VFR weather minimums. The term IFR is also used to define weather conditions and the type of flight plan under which an aircraft is operating.
Instrument Landing System (ILS)	A system that provides, in the aircraft, the lateral, longitudinal, and vertical guidance necessary for a landing.
Instrument Meteorological Conditions (IMC)	Meteorological conditions expressed n terms of visibility and ceiling less than the minimum specified for visual meteorological conditions.

Itinerant Operation	Operation by an aircraft other than local operations.
Knots (Kts)	A unit of length used in navigation equivalent to the distance spanned by one minute of arc in latitude (1,852 meters or 6,076 feet)
Large Aircraft	Aircraft of more than 12,500 pounds maximum certificated takeoff weight.
Latitude	The angular distance of a place north or south of the earth's equator, or of a celestial object north or south of the celestial equator, usually expressed in degrees and minutes.
Local Area Augmentation System (LAAS)	A differential GPS system that provides localized measurement correction signals to basic GPS signals to improve navigation accuracy, integrity, continuity, and availability.
Local Operation	Operations performed by aircraft that (1) operate in the local traffic pattern or within sight of the airport; (2) are known to be departing for, or arriving from, flight in local practice areas within a 20-mile radius of the airport; or (3) execute simulated instrument approaches or low passes at the airport.
Longitude	Measurement east or west of the Prime Meridian in degrees, minutes, and seconds. Lines of longitude are also called meridians. The Prime Meridian is zero degrees longitude and runs through Greenwich, England.
Long Range Navigation System (LORAN)	A navigational system by which lines of position are determined by measuring the difference in the time of reception of synchronized pulse signals from fixed transmitters.
Low Intensity Runway Lights (LIRL)	The lowest classification for the intensity of the lights bordering the sides of the runway.
Mean Sea Level (MSL)	The average height of the surface of the sea for all stages of tide.

Medium Intensity Runway Lights (MIRL)	The middle classification for the intensity of the lights bordering the sides of the runway.
Microwave Landing System (MLS)	An instrument approach and landing system operating in the microwave frequencies that provides guidance in azimuth, elevation, and distance measurement.
Military Operations Area (MOA)	Special use airspace of defined vertical and lateral limits established to help VFR traffic identify locations where military activities are conducted.
Military Training Route (MTR)	Route depicted on an aeronautical chart for the conduct of military flight training at speeds above 250 knots.
National Airspace System (NAS)	A network of navigational aids and a number of air traffic control facilities designed to operate in conjunction with the various defined classes of airspace.
National Plan of Integrated Airport Systems (NPIAS)	A national airport system plan published and revised every two years by the Secretary of Transportation for the development of public-use airports in the United States.
National Transportation Safety Board (NTSB)	Created by the act that established the DOT to determine the cause of transportation accidents and review on appeal the suspension or revocation of any certificates or licenses issued by the Secretary of Transportation.
Nautical Mile (Nm)	A unit of length equivalent to 3.45 statute miles.
Navigational Aid (NAVAID)	Any facility used as, available for use as, or designed for use as an aid to air navigation, including landing area, lights, any apparatus or equipment for disseminating weather information, for signaling, for radio direction-finding, or for radio or other electronic communication, and any other structure or mechanism having similar purpose for guiding and controlling flight in the air or the landing or takeoff of aircraft

Non-Directional Beacon (NDB)	Ground-based navigational aid
Non-Precision Approach (NPA)	Provides an aircraft with horizontal course guidance to a runway surface.
Notice to Airmen (NOTAM)	A notice containing information concerning the establishment, condition, or change in any component of, or hazard in, the National Airspace System, the timely knowledge of which is essential to personnel concerned with flight operations.
Obstruction Light	A light, or one of a group of lights, usually red or white, mounted on a surface structure or natural terrain to warn pilots of the presence of a flight hazard.
Pilot Controlled Lighting	Runway lighting systems which are controlled by keying the aircraft's microphone on a specific frequency.
Precision Approach (PA)	A standards instrument approach procedure in which an electronic glideslope is provided.
Precision Approach Path Indicator (PAPI)	A visual-approach slope aid system consisting of four lights on either side of the approach runway that gives precise indication to the pilot of the approach path of the aircraft.
Precision Approach Radar (PAR)	A radar facility in the terminal air traffic control system used to detect and display, with a high degree of accuracy, azimuth, range, and elevation of an aircraft on the final approach to a runway.
Primary Surface	A rectangular surface longitudinally centered about a runway.
Prohibited Area	Airspace of defined dimensions identified by an area on the surface of the earth within which the flight of aircraft is prohibited.
Radial	A navigational signal generated by a VOR or VORTAC, measured as a magnetic bearing from the station.

Restricted Area	Designated special use airspace within which aircraft flight, while not prohibited, is subject to restrictions.
Runway (RWY)	A defined rectangular area on a land airport prepared for the landing and taking off of aircraft along its length.
Runway Alignment Indicator Light (RAIL)	A series of five or more sequenced flashing light installed on the extended centerline of the runway. The maximum spacing between lights is 200 feet, extending out from 1,600 feet to 3,000 feet from the runway threshold.
Runway End Identifier Lights (REIL)	An airport lighting facility in the terminal area navigation system consisting of one flashing white high-intensity strobe light installed at each approach end corner of a runway and directed toward the approach zone, which enable the pilot to identify the threshold of a usable runway.
Runway Gradient	The amount of change in elevation over the length of the runway.
Runway Visibility Zone (RVZ)	An area formed by imaginary lines connecting two intersecting runways' visibility points.
Runway Visual Range (RVR)	An instrumentally derived value that represents the horizontal distance a pilot can see down the runway from the approach end.
Sectional Chart	Most commonly used chart for VFR flight. Each chart covers six degrees to eight degrees of longitude and approximately four degrees of latitude and is given the name of a primary city within its coverage. The scale of a sectional chart is 1:500,000.
Segmented Circle	A set of visual indicators that provide traffic pattern information at airports without operating control towers.
Single Wheel Gear (SWG)	One wheel per strut.

Special Use Airspace	Defined airspace areas where aircraft operations may be limited.
Small Aircraft	Aircraft of 12,500 pounds or less maximum certificated takeoff weight.
Standard Instrument Departure Procedures (SIDS)	A procedure used after takeoff to provide a transition between the airport and the enroute structure.
Standard Terminal Arrival Route (STAR)	A procedure for departing the enroute structure and navigating to a destination.
Stopway	An area beyond the takeoff runway which is designed to support an airplane during an aborted takeoff without causing structural damage to the airplane. It cannot be used for takeoff, landing, or taxiing.
Terminal Instrument Procedures Standards (TERPS)	Procedures used for conducting independent instrument approaches to converging runways under instrument meteorological conditions.
Terminal Radar Approach Control (TRACON)	An air navigation system facility responsible for monitoring the enroute and terminal segment of air traffic in the airspace surrounding airports with moderate to high-density traffic
Threshold	The designated beginning of the runway that is available and suitable for the landing of airplanes.
Threshold Crossing Height (TCH)	The height of the straight-line extension of the visual or electronic glideslope above the runway threshold.
Touchdown	The point at which an aircraft first makes contact with the landing surface.
Touchdown Zone (TDZ)	The area of a runway near the approach end where aircraft normally alight.
Traffic Pattern	The traffic flow that is prescribed for aircraft landing and taking off from an airport. The usual components are the departure, crosswind, downwind, and base legs; and the final approach.

Uncontrolled Airport	A nontower airport where control of VFR traffic is not exercised.
Uncontrolled Airspace	Airspace within which aircraft are not subject to air traffic control.
Universal Communication (UNICOM)	A non-government communications facility which may provide airport information at certain airports.
Very High Frequency Omnidirectional Ranging (VOR)	Ground based navigational system consisting of very high frequency omnidirectional range stations that provide course guidance.
Victor Airway	An airway system based on the use of VOR facilities.
Visual Approach Slope Indicator (VASI)	An airport lighting facility in the terminal area navigation system used primarily under VFR conditions. It provides vertical visual guidance to aircraft during approach and landing by radiating a direction pattern of high intensity red and white focused light beams that indicate to the pilot that the aircraft is on path, above path, or below path.
Visual Flight Rules (VFR)	Rules that govern the procedures for conducting flight under visual conditions.
Visual Meteorological Conditions (VMC)	Meteorological conditions expressed in terms of visibility and ceiling equal o or better than specified minima.
VORTAC	Combined VOR and TACAN
Warning Area	Airspace of defined dimensions, extending from three nautical miles outward from the coast of the United States, which contains activity that may be hazardous to nonparticipating aircraft.
Wide-Area Augmentation System (WAAS)	An augmentation of GPS that includes integrity broadcasts, differential corrections, and additional ranging signals; its primary objective is to provide accuracy, integrity, availability, and continuity required to support all phases of flight.

World Aeronautical Chart (WAC)	Similar to a sectional chart, but with a scale of 1:1,000,000 provides less detail and is best suited for flight planning.

APPENDIX B

BIOLOGICAL RESOURCES

U.S. Fish and Wildlife Service's Information for Planning and Conservation (IPaC) was referred to for federally-threatened and –endangered species and migratory birds with the potential to occur within the Airport property.[1] Colorado Parks and Wildlife was referred to for state-threatened and –endangered species in Morgan County.[2]

B.1 FEDERALLY- AND STATE-THREATENED AND -ENDANGERED SPECIES

Table B-1 lists the 76 federally- and state-threatened and –endangered species that have the potential to be found at the Airport. Because the habitat requirements of the species listed in **Table B-1**, it is highly unlikely that all, if any of the 76 species would be found within the Airport property.

TABLE B-1
FEDERALLY AND STATE LISTED SPECIES

Species	Listing Status[/a/]
Amphibians	
Boreal Toad (*Bufo boreas boreas*)	SE
Couch's Spadefoot (*Scaphiopus couchii*)	SC
Great Plains Narrowmouth Toad (*Gastrophryne olivacea*)	SC
Northern Cricket Frog (*Acris crepitans*)	SC
Northern Leopard Frog (*Rana pipiens*)	SC
Plains Leopard Frog (*Rana blairi*)	SC
Wood Frog (*Rana sylvatica*)	SC
Birds	
American Peregrine Falcon (*Falco peregrinus anatum*)	SC
Bald Eagle (*Haliaeetus leucocephalus*)	SC
Burrowing Owl (*Athene cunicularia*)	ST
Columbian Sharp-Tailed Grouse (*Tympanuchus phasianellus columbianus*)	SC
Ferruginous Hawk (*Buteo regalis*)	SC
Greater Sage Grouse (*Centrocercus urophasianus*)	SC
Gunnison Sage-Grouse (*Centrocercus minimus*)	SC
Least Tern (*Sterna antillarum*)	FE, SE
Lesser Prairie-Chicken (*Tympanuchus pallidicinctus*)	ST
Long-Billed Curlew (*Numenius americanus*)	SC
Mexican Spotted Owl (*Strix occidentalis lucida*)	ST
Mountain Plover (*Charadrius montanus*)	SC
Plains Sharp-Tailed Grouse (*Tympanuchus phasianellus jamesii*)	SE
Piping Plover (*Charadrius melodus*)	FT, ST

[1] U.S. Fish and Wildlife Service, Information for Planning and Conservation (IPac), Fort Morgan Municipal Airport. Accessed: https://ecos.fws.gov/ipac/location/4H5BJ5D7LNF4ROZ67JVF7FYZE4/resources, January 2017.
[2] Colorado Parks and Wildlife, Threatened and Endangered List. Accessed: http://cpw.state.co.us/learn/Pages/SOC-ThreatenedEndangeredList.aspx, January 2017.

TABLE B-1 CONTINUED
FEDERALLY AND STATE LISTED SPECIES

Species	Listing Status[a]
Birds	
Southwestern Willow Flycatcher (*Empidonax traillii extimus*)	SE
Western Snowy Plover (*Charadrius alexandrines*)	SC
Western Yellow-Billed Cuckoo (*Coccyzus americanus*)	SC
Whooping Crane (*Grus americana*)	FE, SE
Mammals	
Black-Footed Ferret (*Mustela nigripes*)	SE
Black-Tailed Prairie Dog (*Cynomys ludovicianus*)	SC
Botta's Pocket Gopher (*Thomomy bottae rubidus*)	SC
Gray Wolf (*Canis lupus*)	SE
Grizzly Bear (*Ursus arctos*)	SE
Kit Fox (*Vulpes macrotis*)	SE
Lynx (*Lynx Canadensis*)	SE
Northern Pocket Gopher (*Thomomys talpoides macrotis*)	SC
Preble's Meadow Jumping Mouse (*Zapus hudsonius preblei*)	FT, ST
River Otter (*Lontra Canadensis*)	ST
Swift Fox (*Vulpes velox*)	SC
Townsend's Big-Eared Bat (*Corynorhinus townsendii pallescens*)	SC
Wolverine (*Gulo gulo*)	SE
Fishes	
Arkansas Darter (*Etheostoma cragini*)	ST
Bonytail (*Gila elegans*)	SE
Brassy Minnow (*Hybognathus hankinsoni*)	ST
Colorado Pikeminnow (*Ptychocheilus lucius*)	ST
Colorado River Cutthroat Trout (*Oncorhynchus clarki pleuriticus*)	SC
Colorado Roundtail Chub (*Gila robusta*)	SC
Common Shiner (*Luxilus cornutus*)	ST
Flathead Chub (*Platygobio gracilus*)	SC
Greenback Cutthroat Trout (*Oncorhynchus clarki stomias*)	ST
Humpback Chub (*Gila cypha*)	ST
Iowa Darter (*Etheostoma exile*)	SC
Lake Chub (*Couesius plumbeus*)	SE
Mountain Sucker (*Catostomus playtrhynchus*)	SC
Northern Redbelly Dace (*Phoxinus eos*)	SE
Pallid Sturgeon (*Scarphirhynchus albus*)	FE
Plains Minnow (*Hybognathus placitus*)	SE
Plains Orangethroat Darter (*Etheostoma spectabile*)	SC

TABLE B-1 CONTINUED
FEDERALLY AND STATE LISTED SPECIES

Species	Listing Status/a/
Fishes	
Rio Grande Chub (*Gila Pandora*)	SC
Rio Grande Cutthroat Trout (*Oncorhynchus clarki virginalis*)	SC
Rio Grande Sucker (*Catostomus plebeius*)	SE
Razorback Sucker (*Xyrauchen texanus*)	SE
Southern Redbelly Dace (*Phoxinus erythrogaster*)	SE
Stonecat (*Noturus flavus*)	SC
Suckermouth Minnow (*Phenacobius mirabilis*)	SE
Flowering Plants	
Ute Ladies'-tresses (*Spiranthes diluvialis*)	FT
Western Prairie Fringed Orchid (*Platanthera praeclara*)	FT
Reptiles	
Triploid Checkered Whiptail (*Cnemidophorus neotesselatus*)	SC
Midget Faded Rattlesnake (*Crotalus viridis concolor*)	SC
Longnose Leopard Lizard (*Gambelia wislizenii*)	SC
Yellow Mud Turtle (*Kinosternon flavescens*)	SC
Common King Snake (*Lampropeltis getula*)	SC
Texas Blind Snake (*Leptotyphlops dulcis*)	SC
Texas Horned Lizard (*Phrynosoma cornutum*)	SC
Roundtail Horned Lizard (*Phrynosoma modestum*)	SC
Massasauga (*Sistrurus catenatus*)	SC
Common Garter Snake (*Thamnophis sirtalis*)	SC
Mollusks	
Rocky Mountain Capshell (*Acroloxus coloradensis*)	SC
Cylindrical Papershell (*Anodontoides ferussacianus*)	SC

/a/ = FE – Federally Endangered, FT – Federally Threatened, SE – State Endangered, ST – State Threatened, SC – State Species of Concern

Sources: USFWS, 2017; CPW, 2017; RS&H, 2017.

B.2 MIGRATORY BIRDS

Table B-2 lists 20 migratory bird species that have the potential to occur within the Airport property. Because the habitat requirements of the species listed in **Table B-2**, it is highly unlikely that any of the 20 species would be found within the Airport property.

TABLE B-2
MIGRATORY BIRD SPECIES

Migratory Bird Species	Season[/a/]
American Bittern (*Botaurus lentiginosus*)	B
Bald Eagle (*Haliaeetus leucocephalus*)	YR
Black Rosy-finch (*Leucosticte atrata*)	YR
Brewer's Sparrow (*Spizella breweri*)	B
Burrowing Owl (*Athene cunicularia*)	B
Dickcissel (*Spiza americana*)	B
Ferruginous Hawk (*Buteo regalis*)	YR
Golden Eagle (*Aquila chrysaetos*)	YR
Grasshopper Sparrow (*Ammodramus savannarum*)	B
Lark Bunting (*Calamospiza melanocorys*)	B
Loggerhead Shrike (*Lanius ludovicianus*)	B
Long-billed Curlew (*Numenius americanus*)	B
Mountain Plover (*Charadrius montanus*)	B
Prairie Falcon (*Falco mexicanus*)	YR
Red-headed Woodpecker (*Melanerpes erythrocephalus*)	B
Sage Thrasher (*Oreoscoptes montanus*)	B
Short-eared Owl (*Asio flammeus*)	W
Swainson's Hawk (*Buteo swainsoni*)	B
Upland Sandpiper (Bartramia longicauda)	B
Western Grebe (*aechmophorus occidentalis*)	B

/a/: W – Wintering, B – Breeding, YR – Year-round
Sources: USFWS, 2017; RS&H, 2017.

B.3 NOXIOUS WEEDS

Morgan County currently has a noxious weed plan to meet the requirements of the Colorado Noxious Weed Act of 1996 that is used by both private of public land owners. Due to flood events in 2013 and 2015, there are currently noxious weed species found in county right of ways, as well as on private and state lands.[3]

Noxious weeds species found on "List A" are rare noxious weed species that should be exterminated whenever detected. Noxious weed species found on "List B" are those for which a management plan has been developed by the commissioner, along with the state weed advisory committee, local governments, and other interested parties. "List C" noxious weed species are those for which a management plan will be developed. **Table B-3** lists the 42 noxious weed species that have the potential to occur within the Airport property.

[3] Morgan County, Noxious Weed Plan. Accessed: https://www.co.morgan.co.us/Documents/NoxiousWeedPlanredline.pdf, January 2017.

TABLE B-3
NOXIOUS WEED SPEICES

Noxious Weed Species
List A Species
Bohemian knotweed *(Polygonum x bohemicum)*
Camelthorn (*Alhagi pseudalhagi*)
Elongated mustard (*Brassica elongata*)
Flowering rush *(Butomus umbellatus)*
Giant knotweed (*Polygonum* cuspidatum)
Giant reed (*Arundo donax*)
Hairy willow-herb *(Epilobium hirsutum)*
Japanese knotweed (*Polygonum cuspidatum*)
Myrtle spurge (*Euphorbia myrsinites*)
Parrotfeather *(Myriophyllum aquaticum)*
Purple loosestrife (*Lythrum salicaria*)
Rush skeletonweed (*Chondrilla juncea*)
Yellow starthistle (*(Centaurea solstitialis)*
List B Species
Canada thistle (*Cirsium arvense*)
Common teasel (*Dipsacus fullonum*)
Cutleaf teasel (*Dipsacus spp.*)
Diffuse knapweed (*Centaurea diffusa*)
Hoary cress (*Cardaria draba*)
Houndstongue (*Cynoglossum officinale*)
Jointed goatgrass (*Aegilops cylindrica*l)
Leafy spurge (*Euphorbia esula*)
Musk thistle (*Carduus nutans*)
Perennial pepperweed (*Lepidium latifolium*)
Russian knapweed (*Acroptilon repens*)
Russian olive (*Elaeagnus angustifoilia*)
Salt cedar (*Tamarix Spp.)*
Scotch thistle (*(Onopordum acanthium)*
List C Species
Bulbous bluegrass (*Poa bulbosa)*
Chicory (*Chichorium intybus*)
Common burdock (*Arctium minus*)
Common mullein (*Verbascum thapsus*)
Common St. Johnswort (*Hypericum perforatum*)
Downy brome (*Bromus tectorum*)
Field bindweed *(Convolvulus arvensis)*
Halogeton (Halogeton glomeratus)
Johnsongrass (*Sorghum halpense*)

TABLE B-3 CONTINUED
NOXIOUS WEED SPEICES

Noxious Weed Species
List C Species
Perennial sowthistle (*Sonchus arvensis*)
Poison hemlock (*Conium maculatum*)
Puncturevine (*Tribulus terrestris*)
Redstem filaree (*Erodium cicutarium*)
Velvetleaf (*Abutilon theophrasti*)
Wild-proso millet (*Panicum miliaceum*)

Source: CDOA, 2017; RS&H, 2017.

APPENDIX C

AIRPORT RECYCLING PLAN

C.1 INTRODUCTION

The purpose of this appendix is to provide the history of and current Airport recycling practices, as well identify opportunities where the Airports' recycling efforts could be established. The Airport falls under the City of Fort Morgan (the City) whose vision statement in the 2016 Comprehensive Plan Update (Plan)[1] reads:

> *"Increase focus on fiscal and environmental sustainability, technological advancements, and resource preservation."*

On September 30, 2014, the Federal Aviation Administration (FAA) provided guidance on preparing airport recycling, reuse, and waste reduction plans as an element of a master plan or master plan update.[2] This guidance was in response to the FAA Modernization and Reform Act (FMRA) of 2012[3] that added a requirement for all master plans and master plan updates to include a plan for "recycling and minimizing the generation of airport solid waste" to be consistent with the local recycling laws.

This appendix identifies the following at Fort Morgan Municipal Airport (the Airport):

- Current waste management sources;
- Local recycling programs;
- Feasibility of recycling;
- Potential for cost saving and revenue generation; and
- Plan to minimize solid waste generation.

C.2 CURRENT AIRPORT WASTE MANAGEMENT SOURCES

As described in **Section 1.6**, **Environmental Conditions**, the Morgan County Landfill, the closest landfill to the Airport, is about five miles southeast of the Airport. Based on the Morgan County Comprehensive Annual Financial Report,[4] the Morgan County Landfill is not expected to reach capacity until 2083 under current operating conditions due to a baler system that was installed in 2009. As **Chapter 2, Forecast** describes, the Airport had 10,000 operations in 2016, and is forecast to increase to over 12,000 operations by planning year 2036. The Airport does not have any enplanements and is not forecast to have any enplanements by planning year 2036. The forecast increase in operations will result in additional waste generation that would be disposed at the Morgan County Landfill. However, the amount of Airport municipal solid waste that has the potential to reach the Morgan County Landfill is not expected to significantly affect landfill's capacity. If the Airport implemented a recycling program, it would help to extend the life expectancy of the landfill.

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[1] City of Fort Morgan, *Connect Fort Morgan Comprehensive Plan Update, Final* Adopted August 8, 2016. Accessed: http://www.cityoffortmorgan.com/DocumentCenter/View/4726, October 2017.

[2] FAA Memorandum, Guidance on Airport Recycling, Reuse, and Waste Reductions Plans, Accessed: https://www.faa.gov/airports/environmental/media/airport-recycling-reuse-waste-reduction-plans-guidance.pdf, September 2017.

[3] 49 United State Code (U.S.C.), §§ 132 and 133.

[4] Morgan County, *Comprehensive Annual Financial Report for the Fiscal Year ended December 31, 2016*. Accessed: https://www.co.morgan.co.us/Documents/2016CAFR-FullDocument.pdf, October 2017.

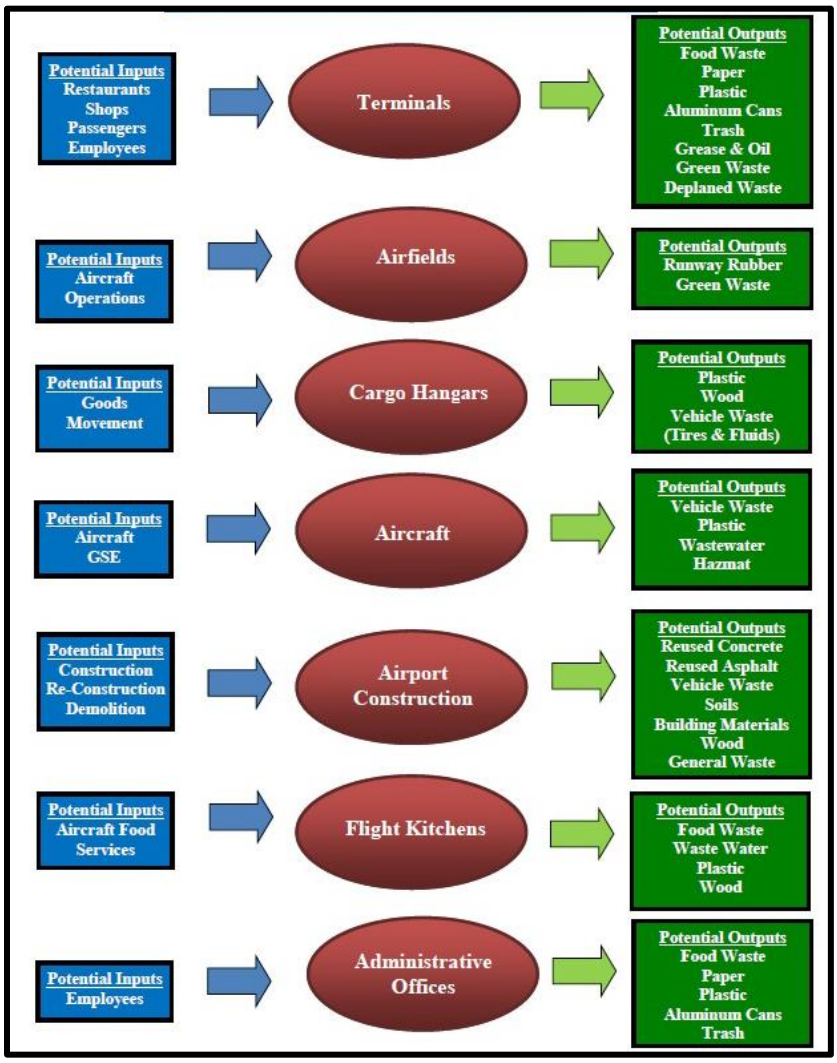
Waste management at an airport includes many components and can be complex. For instance, the Airport has various tenants, agreements, differing operational requirements, and disposal processes that all contribute to the waste stream from the Airport. According the FAA's September 2014 guidance, an Airport's waste management is broken down into three main areas:

- Areas where an airport has direct control over the waste stream (e.g., public spaces, office space, main terminal, and airfield);
- Areas where an airport does not have direct control over the waste steam, but can influence waste management (e.g., tenants and aircraft deplaned waste); and
- Areas where an airport has no control over the waste stream (i.e., areas where the airport does not own or lease).

In addition to the FAA-identified three main areas for waste management, the FAA's 2013 Recycling Synthesis report[5] identified seven main airport waste streams; terminals, airfields, cargo hangars, aircraft, airport construction, flight kitchens, and administrative offices (see **Figure C-1**).

[5] Federal Aviation Administration, *Recycling, Reuse, and Waste Reduction at Airports – A Synthesis Document*. FAA Office of Airports. April 24, 2013.

FIGURE C-1
AIRPORT WASTE STREAMS



SOURCE: FAA, 2013 RECYCLING SYNTHESIS DOCUMENT

The main generators of waste at the Airport are the Fixed Base Operator (FBO), Scott Aviation and the airfield. The airfield generates waste typically during construction projects. Waste materials can range from runway concrete or asphalt to lighting and signage.

C.3 LOCAL AND AIRPORT RECYCLING PROGRAMS

C.3.1 Morgan County, Colorado

Morgan County, Colorado started a Single Stream Recycling pilot program in 2012.[6] This pilot program accepted the following waste items to be recycled:

- Aluminum, tin, and steel cans;

[6] Morgan County, Colorado, Single Stream Recycling Pilot Project. Accessed: https://www.co.morgan.co.us/Documents/SINGLESTREAMRECYCLINGBrochurePrintOnRecycled-1.pdf, May 2017.

- Plastic bottles and food containers (#1 - #7 only);
- Paper bags;
- Office paper and junk mail;
- Newspapers, magazines, catalogs, phone books;
- Paperboard; and
- Corrugated cardboard.

These types of recyclables were accepted at the Morgan County Landfill (landfill); however, County residents were required to transport their recyclables to the landfill, as no collection service was offered as a part of the pilot program.

In 2015, Morgan County updated its Single Stream recycling program[7] to allow all waste items that were accepted in the pilot program, and added the capabilities to accept the following waste items:

- Aluminum and metal scrap;
- Rechargeable batteries; and
- Cell phones without batteries.

In addition to the new types of recyclables accepted at the landfill, Morgan County also provide residents with locations for other recyclables that are not accepted at the landfill (e.g., tires, motor oil, paint televisions, etc.).[5] However, residents are still required to transport their own recyclable materials to the landfill, as a collection service is still not offered by the County.

C.3.2 City of Fort Morgan

In 2016, the City published its Plan including a goal to "increase awareness of the community's environmental needs and issues in all facets of community life." One of the policies to support that goal in the Plan is to "explore a recycling program and newer recycling technology." Additionally, the Plan discusses the need for a study to investigate the feasibility of a city-wide recycling collection program and would implementation of such a program be feasible.

C.3.4 Fort Morgan Municipal Airport

The Airport currently does not have an established recycling program. Although the County accepts recyclable materials, it is not feasible for the Airport to transport recyclables to the landfill. The City would need to implement a city-wide recycling collection program in order to initiate a feasible recycling program at the Airport. However, once the City implements such a program, the Airport could at that time initiate a recycling program and use the ten steps of creating a recycling program outlined in **Section X.6**.

C.4 RECYCLING FEASIBILITY AT THE AIRPORT

At this time, there are no mandatory requirements for solid waste reduction in Morgan County or City of Fort Morgan. The Airport does not having a formal recycling program or plan in place and does not

[7] Morgan County, Recycle Guide 2015. Accessed: https://www.co.morgan.co.us/Documents/RecycleGuide2015.pdf, May 2017.

currently recycle. The Airport is managed by one City employee and given lack of recycling programs available within the City, combined with a lack of means to transport recyclables, and financial incentives, recycling at the Airport is not feasible at this time. However, once the City implements a recycling collection program, the Airport could implement one of the three waste assessment approaches shown in **Table C-1**. This will allow the Airport to gain an understanding of the types and quantities of waste being generated at the Airport, which will ultimately lead to the Airport being able to identify opportunities to recycle.

TABLE C-1
WASTE ASSESSMENT APPROACHES[8]

Method	Advantages	Disadvantages
Hauler Records Examination	Provides accurate data on the weight/volume of waste generated at a facility. Usually requires less time and staff than a facility walk-through or waste sort approach.	Waste hauling records may not exist. Volume/weight data does not provide specifics regarding waste materials. Difficult to quantify the sources of waste if dumpster is shared.
Facility Walk-Through	Requires less time than a full waste sort. Provides for qualitative data for waste generated. Allows for interviews with Airport staff.	May not provide data regarding specific waste materials. May require multiple walk-throughs to obtain representative data sample. May not provide for accurate quantities.
Waste Sort	Provides for quantitative data for specific types of waste generated. Provides for estimates of waste generated for the whole facility.	Requires significant length of time to conduct. Requires significant number of staff to conduct. Requires multiple waste sorts to obtain a valid representative data sample.

SOURCE: EPA, 2013

C.5 POTENTIAL FOR COST SAVINGS OR REVENUE GENERATION

As previously stated, the Airport does not have a recycling program in place because the City does not have a recycling program in place. The County does have a recycling program; however, businesses transport the recyclables to the landfill themselves, which is not feasible for the Airport.

C.6 PLAN TO MINIMIZE SOLID WASTE GENERATION

The Airport does not have a recycling program due to the infeasibility of such a program; the City does not having a recycling program or a recycling collection program and the County requires businesses to

[8] U.S. Environmental Protection Agency, *Business Guide for Reducing Solid Waste*. EPA/530-K-92-004. November 1993.

transport recyclables to the landfill themselves. However, the City is currently investigating the feasibility of implementing a recycling program. Once the City implements such a program, the Airport could initiate and establish a recycling program. The Airport could do so by implementing the ten steps established by the FAA (see **Table C-2**) to create and execute a formal recycling program.

TABLE C-2
TEN STEPS FOR CREATING AND IMPLEMENTING AN EFFECTIVE AIRPORT RECYCLING / WASTE REDUCTION PROGRAM

1. Management Commitment
2. Program Leadership
3. Waste Identification
4. Waste Collection and Hauler
5. Waste Management Plan Development
6. Education and Outreach
7. Monitor and Refine Program
8. Performance Monitoring
9. Promote Success
10. Continuous Improvements

SOURCE: FAA, 2013

By implementing the ten steps in **Table C-2**, the Airport would be able to outline waste reduction and recycling policies, set goals, track and monitor progress, and improve upon the program. Outlining policies for a recycling program can be challenging because this often requires coordination and buy-in from all Airport stakeholders, which includes the public. Establishing a recycling coordinator who would oversee the stakeholder engagement can help encourage participation to ensure policies established for the recycling program are effective. Setting goals for a formal recycling program will assist the Airport to conduct a waste assessment. This step is imperative in understanding the types and quantities of waste being generated at the Airport. Once the types and quantities of waste are understood, goals can be set to reduce those quantities. Goals should be realistic and achievable. However, as shown in **Table C-1**, conducting a waste assessment can be labor and time intensive. Partnering with the County and/or the City to help conduct the waste assessment can alleviate some of the staffing pressures off of the Airport. There are a variety of tools that help track and monitor the progress or success of the program. For example, the U.S. Environmental Protection Agency (USEPA) has an online tool, the Waste Reduction Model (WARM) that allows businesses to quantify their greenhouse emissions and energy savings that are a direct result from implementing recycling practices. This would help the Airport monitor goals that have been established and report back to stakeholders that are following the program. As the recycling program is being monitored and progress is tracked, refinements should be made to the program to allow for ultimate goal achievement. The recycling coordinator can consider new waste management practices that can be adopted into the program for further waste reduction at the Airport.
To further facilitate recycling on Airport construction projects, language can be included in contract documents encouraging material reuse and recycling. The Airport will consider possibilities of changing specifications to include a recycling component to encourage expanded contractor participation.

C.7 CONCLUSION

The Airport currently does not have a recycling program. The City is currently investigating establishing a recycling program and potentially implementing a city-wide recycling collection program. At such time that the City implements a recycling program and a recycling collection program, the Airport will investigate establishing a recycling program at the Airport.

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