4. FACILITY REQUIREMENTS

4.1. INTRODUCTION

The Facility Requirements chapter evaluates the airside, landside, and support facility requirements at the airport. Airside areas for general aviation airports include the runway and taxiway environment, as well as general aviation aircraft parking, storage hangars, and fueling needs. Landside and other airport support facilities include airport support buildings, access roads, parking lots, fencing, and utilities.

Although there are similar infrastructure and operational requirements that every Airport Master Plan evaluates, individual airports have different areas of focus to address specific safety related concerns, future facility needs, and/or environmental and planning considerations for the surrounding environment. The primary planning issues associated with Fleming Field relate to balancing the need to maximize safety and the utilization of Runway 16/34 with the physical constraints of the airport being located in a densely developed urban setting. Relevant considerations are depicted on **Figure 4-1**, at the end of this chapter. While airport users and other businesses have stressed the need for additional runway length during takeoff operations, the airport is surrounded by land uses which limit the potential for runway extensions. This situation requires careful and effective planning activities including strong outreach efforts and coordination between the various stakeholders including the City, airport users, FAA, MnDOT, and surrounding landowners.

In addition to addressing the existing conditions at the airport, this chapter evaluates the ability for the airport to accommodate the forecasted demand and meet applicable facility requirements for the users of the facility. These areas will be addressed in the following sections including:

- Airfield capacity and demand analysis
- Instrument approaches
- Runway facility requirements
- Airport visual aids & navigational aids
- Taxiway & taxilane facility requirements
- Apron requirements
- MN State Aviation System Plan (SASP) airside recommendations
- Landside facility requirements
- MN SASP landside recommendations

FAA Advisory Circular (AC) 150/5300-13A, *Airport Design,* was referenced for the design standard criteria used to evaluate the impacts of the recommended development throughout the Airport Master Plan and the corresponding ALP. Specific facility requirements are based on aeronautical compliance, demand, or triggering events, rather than specific time periods. This allows the City to use the Airport Master Plan as a tool for decision making and funding prioritization over the next 20 years.

4.2. AIRFIELD CAPACITY & DEMAND ANALYSIS

4.2.1. AIRFIELD CAPACITY

Airfield capacity is defined as the maximum aircraft operations an airfield configuration can accommodate. The FAA metric used to determine reasonable airfield capacity is Annual Service Volume. Annual Service Volume represents a reasonable estimate of an airport's annual operational capacity taking into account differences in runway utilization, weather conditions, and aircraft mix.

The Annual Service Volume is determined by grouping aircraft into classes of aircraft per FAA Advisory Circular 150/5060-5, *Airport Capacity and Delay*. These classes identify aircraft based on recommended separation distances. The aircraft classifications and operations are identified in **Table 4-1**.

Table 4-1
Annual Service Volume Classifications

Aircraft Classification	Maximum Takeoff Weight (lbs.)	Number of Engines	Wake Turbulence Classification	Percent of Operations at Fleming Field (2032)
A	12,500 or less	Single	Small	91
B	12,500 or less	Multi	Small	8
C	12,500 – 300,000	Multi	Large	1
D	Over 300,000	Multi	Heavy	0

Source: FAA AC 150/5060-5 *Airport Capacity and Delay*

The largest aircraft classification to utilize Fleming Field is C aircraft with one percent of the total annual operations in the long-term. Examples include the Beechcraft King Air B-350 and Cessna Citation 560 business aircraft.

FAA Advisory Circular 150/5060-5, *Airport Capacity and Delay* was also used to calculate the annual service capacity for a single-runway scenario at Fleming Field. It can be seen in **Table 4-2** that projected annual service operations are well below capacity. Under these conditions, the airfield configuration of one primary runway will adequately meet the capacity demand over the next 20 years.

Table 4-2
Annual Service Utilization

Annual Service Capacity	2032 Annual Operations	Percentage
230,000	87,120	37.9%

Source: Bolton & Menk Analysis, FAA AC 150/5060-5 *Airport Capacity and Delay*

4.2.2. PEAK AIRFIELD DEMAND

The ability to meet the peak demand at an airfield is a function of the number and location of exit taxiways, the runway configuration, wind, and weather conditions. The methodology for computing the relationship between the peak operational demands placed upon an airport versus its capacity is also contained in FAA Advisory Circular 150/5060-5. In order to facilitate this comparison, computations were made to determine the hourly capacity of a single runway configuration under visual flight rules and in instrument flight rules. Visual flight rules are when a pilot operates an aircraft during weather conditions that allow the pilot to see the ground and visually avoid obstructions. Instrument flight rules

are when a pilot operates an aircraft using instruments within the cockpit versus referencing the ground due to the surrounding cloud cover and weather conditions.

Based on the forecasts presented in **Chapter 3.0**, the peak hourly operations were calculated for the existing 2012 operations and for the future 2032 operations. The national FAA guidance for general aviation airports assumes that a single general aviation runway can accommodate 98 operations per hour during visual flight rules and 59 operations per hour during instrument flight rules. The FAA guidance also assumes that the busiest month at a general aviation airport conducts 14.8 percent of the annual operations. Due to the seasonal activity at Fleming Field, the busiest month was assumed to be 20 percent of the annual operations versus the national average of 14.8%. In 2012, the busiest month equals 12,528 operations (62,640 x 0.20). The number of peak operations for the busiest day in the busiest month is 418 (12,528/30) in 2012 and 580 (17,424/30) in 2032. The national FAA guidance also assumes that at general aviation airports, the peak hour is 20 percent of the peak daily operations. Therefore, the peak hourly operations for 2012 are 84 (418 x 0.20). Based on the airport layout and conditions at Fleming Field, the hourly capacity is shown in **Table 4-3**.

Table 4-3
Hourly Capacity

Visual Flight Rules Hourly Capacity	2032 Peak Hourly Operations	Visual Flight Rules Percentage	Instrument Flight Rules Hourly Capacity
98	84	85.7%	59

Source: Bolton & Menk Analysis, FAA AC 150/5060-5 *Airport Capacity and Delay*

The majority of operations at Fleming Field will occur under visual flight rules conditions. Peak hourly operations will likely never be achieved under instrument flight rule conditions. Using these assumptions, a single runway facility with the peak operations forecasted within the planning horizon will adequately meet the capacity of a single runway during visual and instrument weather conditions. No significant long-term delays are forecasted.

4.3. INSTRUMENT APPROACHES

Instrument approach procedures provide arriving aircraft with electronic guidance to the airport runway environment during periods of low visibility. Based on the wind data collected by the National Climatic Data Center through the Automated Weather Observation System (AWOS) at Fleming Field, weather conditions requiring the use of an instrument approach procedure occur 2.9 percent of the time. Visual approaches to a runway have no instrument approach procedure. For instrument approaches, FAA defines these types of procedures:

- Non-Precision Approach – is a standard instrument approach procedure with horizontal course guidance and no electronic vertical descent guidance. These approaches utilize ground-based or satellite-based navigational aids such as Global Positioning System, Very High Frequency Omnidirectional Range and Non-Directional Beacon. The definitions for these navigational aids are included in **Section 2.10.3** of this report.
- Approach with Vertical Guidance – provides electronic course and vertical descent electronic guidance. These approaches utilize ground-based Glideslope navigational aids or satellite based navigational aids such as a Localizer Performance with Vertical Guidance.
- Precision Approach – provides electronic course and vertical descent guidance and visibility minimums of less than ¾ mile visibility. These approaches utilize ground-based navigational aids as part of an Instrument Landing System. The three components of an ILS are a localizer antenna

for course guidance, a glideslope antenna for vertical guidance, and an Approach Lighting System.

Fleming Field currently has a non-precision approach to Runway 34. This includes an Area Navigation (RNAV) Global Positioning System (GPS) and Localizer approach to Runway 34. Published cloud ceiling minimums are as low as 500 feet above the airport elevation. Published visibility minimums are 1 mile for each approach.

Change in instrument approach procedures may require a modification to runway navigational aids and airport design standards. Due to the proximity of Fleming Field to the St. Paul Downtown Airport, the FAA indicated that they would not support any type of instrument approach to the Runway 16 end. Therefore, the Runway 16 end will remain visual throughout the 20 year planning period.

It is recommended in the future, that vertical guidance be added to the Runway 34 approach. Vertical guidance adds to the utility of the runway by lowering the cloud ceiling weather minimums to as low as 250 feet above the runway elevation.

4.4. RUNWAY FACILITY REQUIREMENTS

Runways at airports need to meet applicable design standards for safe operations and to remain eligible for federal and state funding. These standards are established by regulatory agencies in order to provide for the safe and efficient operation of aircraft on and in the vicinity of an airport. The design standards are based on two components which include the critical design aircraft and the most demanding type of approach established for either runway end.

The future critical design aircraft family for Runway 16/34 was determined in the forecast chapter to remain B-II/large over the 20 year planning period. The design requirements are important when determining the design standards for the future development of not only the runway but the entire airport.

4.4.1. RUNWAY LENGTH

Runway length is a critical component to any airport design, as it provides aircraft a defined area for their takeoff and landing operations. Runway length requirements are determined by reviewing the needs of the critical design aircraft planned to use the airport for a total of 500 annual operations or more. Aircraft require the most runway length during their takeoff roll. Factors affecting runway length include aircraft performance, aircraft load factor, route length, airport elevation, runway gradient, runway condition, and temperature.

FAA Advisory Circular 150/5325-4B, *Runway Length Requirements for Airport Design,* provides guidance in determining runway length requirements. **Table 4-4** lists the recommended runway lengths for Fleming Field.

Table 4-4
Recommended Runway Lengths (Airplanes less than 60,000 pounds)

Airport Data	
Airport elevation	821 feet MSL
Mean daily maximum temperature of the hottest month	83°F
Maximum difference in runway centerline elevation	2 feet
Aircraft Criteria	**Runway Length (feet)**
Small airplanes (with less than 10 passenger seats)	
75 percent fleet	2,700
95 percent of fleet	3,200
100 percent of fleet	3,800
Small airplanes with 10 or more passenger seats	4,300
Large airplanes of 60,000 pounds or less	
75 percent of fleet at 60 percent useful load	4,700
75 percent of fleet at 90 percent useful load	6,300
100 percent of fleet at 60 percent useful load	5,400
100 percent of fleet at 90 percent useful load	8,100

Source: FAA Design Program based on AC 150/5325-4B, *Runway Length Requirements for Airport Design*

The existing length of Runway 16/34 is 4,002 feet. The existing critical design aircraft are classified as aircraft weighing greater than 12,500 pounds, or large aircraft. The existing runway length meets the needs of 100% of small aircraft (aircraft weighing less than 12,500 pounds) however, it does not meet the required length for small airplanes with 10 or more passenger seats or aircraft greater than 12,500 pounds.

Large aircraft are grouped by percentage of fleet and useful load factor. Large airplanes are either within 75 percent or 100 percent of the large airplane fleet mix. There are two tables within FAA Advisory Circular 150/5325-4B, *Runway Length Requirements for Airport Design*, which list the types of airplanes that are within each category. Aircraft within 75 percent of fleet require less than 5,000 feet of runway. This type of aircraft includes the Cessna Citation II, Learjet 31, Dassault Falcon 10, and Bombardier Challenger 300. Aircraft within 100 percent of the fleet mix require a runway at least 5,000 feet in length and include aircraft such as the Cessna Citation X, Learjet 60, Dassault Falcon 900C, and Bombardier 604 Challenger.

Aircraft within 75 percent of fleet mix
Dassault Falcon 10

Aircraft within 100 percent of fleet mix
Dassault Falcon 900C

Useful load factor is the difference in the maximum allowable structural growth weight of an airplane and the operating empty weight. For calculations of runway length, the useful load factor is split into two groups, either 60 percent of 90 percent. Therefore, the runway length calculations take into consideration the weight of the aircraft during takeoff operations.

A sample of the confirmed aircraft types that use Fleming Field are listed in **Table 3-10**. These aircraft are within the 75 percent of fleet mix. At a 60 percent useful load, the recommended runway length at Fleming Field is 4,700 feet.

In addition to the critical aircraft needing a longer runway at the airport, the existing business and corporate users of Fleming Field have identified a strong need for additional takeoff length to fully utilize the capabilities of the aircraft. The additional takeoff distance will not significantly change the type of users utilizing the airport, but will allow the existing users to utilize the full capabilities of the aircraft.

One of the areas of emphasis for the Airport Master Plan project was to evaluate the feasibility of extending the runway length to meet the needs of both the existing and future users of the airport. Additional runway length and takeoff distance alternatives will be evaluated in the Runway Alternatives section below to determine the feasibility and impacts of this type of development at the airport.

4.4.2. RUNWAY WIDTH

FAA airport design standards require that a Runway Design Code B-II-5000 runway with non-precision instrument approaches have a width of 75 feet. Runway 16/34 is 100 feet wide and therefore exceeds the minimum standards for Runway Design Code B-II-5000.

As stated previously, Approach Category C aircraft will reach 500 operations by the end of the 20 year planning period. Approach Category C aircraft require a 100-foot wide runway. Therefore, it is recommended that the runway width remain at 100 feet. This width is adequate for the 20 year planning period.

4.4.3. RUNWAY PAVEMENT STRENGTH, TYPE, CONDITION

Airport pavement strength is based on single-wheel and dual-wheel aircraft wheel gear configurations. The gear configuration determines how the aircraft weight is distributed on the pavement. Published weight bearing capacity is a result of the pavement section thickness, materials, and underlying soils. The published weight bearing capacity for Runway 16/34 at Fleming Field is 30,000 pounds single-wheel, and 57,000 pounds dual-wheel.

The maximum gross weight of the future critical design aircraft is 20,200 pounds in single-wheel configuration with occasional operations in aircraft as heavy as 35,000 pounds single-wheel gear. The weight bearing capacity for Runway 16/34 and the other pavements at Fleming Field that would accommodate an aircraft of this size should withstand regular use of an aircraft up to a 35,000 pounds single-wheel gear. Aircraft weighing more than a published weight bearing capacity would need permission to use the runway from the Airport Manager. It is recommended that future improvements increase the weight bearing capacity of the runway to 35,000 pounds single-wheel gear.

Over time pavements deteriorate due to climate, vehicle loads, or other underlying conditions. To extend the useful life of pavements, they should be maintained by completing regular maintenance crack sealing and seal coating. As discussed in **Chapter 2.0**, Airport Inventory, Runway 16/34 is in “Good” condition. The Pavement Management Report should be used as a tool for determining the timing of future pavement maintenance projects.

4.4.4. RUNWAY ALTERNATIVES

Based on the runway length and takeoff distance discussions, alternatives were developed to meet the needs of the future users of the airport. Through both the airport user survey and the runway length requirement advisory circular, it is understood that additional takeoff distance is needed at the airport. Alternatives were evaluated based on the physical constraints of the airport and the impact to the surrounding communities and land owners.

Existing airspace obstructions & land use incompatibility alternatives

Currently, there are land use incompatibilities and obstructions that need to be mitigated on and/or in the vicinity of Fleming Field. As was discussed in **Chapter 2.0**, various land uses are not permitted within the Runway Protection Zone (RPZ), and FAA requires the airport sponsor to own or otherwise control the land within the RPZ. In addition to land uses on the ground, airspace obstructions are also regulated by the FAA through Part 77[2] and Approach/Departure "Row 3"[3] requirements. These surfaces determine which existing obstructions (primarily trees) need to be removed, lowered, or otherwise mitigated near Fleming Field.

The existing airspace obstructions include 265 individual trees located outside of airport property. There are also 12 man-made structures on airport property and 13 man-made structures off airport property that are obstructions to the airspace around the airport. The FAA has determined that these structures are not a hazard to the existing approaches at the airport as long as these obstructions are lit with FAA approved obstruction lighting.

Airfield configuration alternatives were evaluated to mitigate the existing incompatible land uses and airspace obstructions to Fleming Field and provide the least amount of impact to areas outside of airport property. Changing the airfield configuration reduces the operational and utilization potential for the airport. The initial alternatives that were reviewed and the rationale for rejecting them are summarized below:

- **Alternative 1: Conversion from an Other Than Utility to a Utility runway** – Federal Aviation Regulations Part 77 defines a utility runway as "a runway that is constructed for and intended to be used by propeller driven aircraft of 12,500 pounds maximum gross weight and less." An Other Than Utility runway is constructed for aircraft with a gross weight greater than 12,500 pounds. A Utility runway has smaller approach surface and Runway Protection Zone dimensions and would reduce the number of airspace obstructions that would need to be removed compared to the existing conditions at the airport. Reducing the pavement strength of the runway would require aircraft greater than 12,500 pounds to receive permission from the Airport Manager for every landing operation at Fleming Field. This alternative was dismissed because the local FAA Airports District Office will not fund projects at the airport if the project would not support the existing critical design aircraft.

- **Alternative 2: Conversion from an Other Than Utility to a Utility runway with a non-precision approach to Runway 16** – Although obtaining a non-precision approach to the Runway 16 end would be difficult due to the proximity of the St. Paul Downtown Airport to the north, the alternative was evaluated based on the classification change to a Utility runway. As previously stated, this would reduce the dimensions of the approach surface and Runway Protection Zone dimensions, it was removed from further discussion because the local FAA

[2] Federal Aviation Regulations Part 77, *Safe Efficient Use, Preservation of the Navigable Airspace*
[3] FAA Advisory Circular 150/5300-13A, *Airport Design,* Table 3-2

Airports District Office will not fund any future projects at the airport if the project would not support the existing critical design aircraft.

- **Alternative 3 (Figure 4-2, at the end of this chapter):** Since reducing the runway configuration to a Utility runway was not a feasible alternative, the existing conditions at Fleming Field were evaluated to determine the type of mitigation that would be required. This evaluation was also used in the environmental assessment (that received a Finding of No Significant Impact (FONSI) in February 2015). The existing airspace obstructions and land use incompatibilities at the airport were discussed in **Sections 2.8.3** and **2.13** respectively. There are approximately 265 individual tree obstructions and 25 man-made obstructions to the airspace surrounding the airport. The land use incompatibilities include removal of a shed on private property, two residential parcels on the north side of the airport that are proposed to be acquired and removed, parking along South Street, and parking associated with McMorrow Field. While this alternative does not meet the needs of the users of the airport by addressing the lack of additional runway length, the data from this alternative was used for completing the environmental assessment and beginning the obstruction removal negotiation process at the airport.

- **Alternative 4 & 5: Use of a 102-foot displaced threshold at the Runway 16 end** – Since changing the utilization of the runway was not a viable alternative, the next scenario was to look at changing the location of the Runway Protection Zone to avoid impacts to the four residential properties (two requiring full acquisition and two requiring easements over the front lawns) and South Street located north of the airport. Converting the northern 102 feet of the runway to a displaced threshold would shift the Runway Protection Zone south 102 feet and remove it from South Street and the residential properties. A runway threshold is defined by the FAA as "the beginning of that portion of the runway available for landing. In some instances, the threshold may be displaced. Threshold always refers to landing, not the start of takeoff." By installing a displaced threshold, the amount of runway length available for landing on the Runway 16 end would be reduced to 3,900 feet. This strategy was reviewed with the existing 20:1 approach slope as well as the 34:1 non-precision approach slope (Alternative 5). This overall strategy was rejected because the current runway length of 4,002 feet does not meet FAA design standards and any reduction in runway length for any type of operations at the airport is not considered viable by the users of Fleming Field, airport staff, and City staff.

All development alternatives were exhausted to reduce the obstruction mitigation and land use incompatibilities around Fleming Field. The final evaluation of mitigation areas is represented in Alternative 3 and **Figure 4-2**. As referenced previously and in **Chapter 2.0**, an Environmental Assessment covering actions required to address existing land use and obstruction deficiencies involving Fleming Field has been approved. This complies with National Environmental Policy Act (NEPA) requirements. A Finding of No Significant Impact (FONSI), which concludes the EA process, was received in February 2015.

Runway length alternatives

In addition to determining the preferred alternative for eliminating the airspace and land use incompatibilities around Fleming Field, alternatives were developed to address the runway length needs of the existing and future users of the airport. Based on the physical constraints surrounding the airport, all runway length alternatives were evaluated to the Runway 34 end. Any extension to the Runway 16 end would require the acquisition of additional residences and the relocation of South Street outside of the future Runway Protection Zone. There is open airport property to the south of the Runway 34 threshold,

which has the potential to be used for future runway development. This area was evaluated for use as additional runway length area.

As discussed in the Runway Length section, 300 feet of additional runway length is needed to serve small airplanes with 10 or more passenger seats. A runway length of 4,700 feet is needed to serve 75 percent of large aircraft at 60 percent useful load. A 700-foot runway extension is not economically feasible at the airport. It would require the relocation of additional neighborhood roadways and homes. The economic and environmental impact of that type of runway extension is not supported by the FAA or the City of South St. Paul. Therefore, alternatives were evaluated that would maximize the existing airport site.

- **Alternative 6a (Figure 4-3, at the end of this chapter): 198-foot Runway 34 extension to 4,200 feet** – Extending the runway an additional 198 feet to the south would maximize the runway length while keeping the future Runway Protection Zone from impacting any of the residences to the south. However, the southwest corner of the future Runway Protection Zone would go over 70th Street. Previous FAA guidance allowed roads through the Runway Protection Zone as long as the ditches were property graded to allow access by rescue and firefighting equipment or by aircraft that may land short or overshoot the runway. That is why South Street is going through the existing Runway 16 Runway Protection Zone. However, in September 2012, the FAA published a memorandum clarifying the FAA policy on land uses within the Runway Protection Zone. These guidelines state that transportation facilities such as public roads or highways within the Runway Protection Zone require consultation with the National Airport Planning and Environmental division within the FAA and are prohibited unless it can be proven that no viable alternative exists. This alternative was reviewed based on the interim guidance memo which is discussed below.

- **Alternative 6b (Figure 4-4, at the end of this chapter): 111-foot Runway 34 extension to 4,113 feet** – This alternative was evaluated to determine the amount of runway extension that could be accomplished to the south without the future Runway Protection Zone impacting 70th Street or any residential homes. This alternative keeps the future Runway Protection Zone on airport property. Although this alternative does not impact any homes or require the relocation of 70th Street, the cost to construct 111 feet of runway was questioned by the FAA against the benefits this would give existing and future airport users.

- **Alternative 6c (Figure 4-5, at the end of this chapter): 198-foot Runway 34 to 4,200 feet and realignment of approximately 1,100 linear feet of 70th Street** – This alternative is the same as Alternative 6a except that 70th Street is relocated to meet the Runway Protection Zone policy recommendations. The relocation of 1,100 linear feet of 70th Street around the southwest corner of the future Runway Protection Zone requires 13 residential households to be removed (**Figure 4-5**). 70th Street is under the jurisdiction of Dakota County as County State Aid Highway 26. It is an "A" minor arterial roadway in the County's functional classification system and has a raised median with left and right turn lanes. Any realignment of 70th Street would be very costly and would likely not be supported by Dakota County.

- **Alternative 7 (Figure 4-6, at the end of this chapter): 298-foot Runway 34 extension to 4,300 feet** – A runway length of 4,300 feet meets the needs of 100 percent of small airplanes with 10 or more passenger seats, which is a large portion of the users at Fleming Field. This alternative would require 70th Street to be relocated 1,650 linear feet and 20 residential households to be relocated. This alternative includes 550 additional linear feet of relocation of 70th Street and seven additional residential relocations compared to the relocation for a 198-foot runway extension. The impacts with this alternative were determined to be too cost prohibitive and

detrimental to the surrounding land owners to be considered a viable alternative to be pursued. Therefore, this alternative was removed from further consideration.

Alternative 6a was chosen as the preferred alternative because it increases the use of the runway by existing and future users of the airport without impacting the surrounding land owners. However, as mentioned above, because this alternative moves the future Runway Protection Zone over 70th Street, a Runway Protection Zone Alternative Analysis is needed by the FAA. A more detailed description of the FAA's interim guidance is below.

Runway Protection Zone Alternative Analysis

According to the FAA's interim guidance on *Land Uses Within a Runway Protection Zone* memorandum dated September 27, 2012, a Runway Protection Zone Alternative Analysis is prepared when incompatible land uses enter into the limits of the Runway Protection Zone as a result of the following projects:

- An airfield project including a runway extension or runway shift
- A change in the critical design aircraft that increases the Runway Protection Zone dimensions
- A new or revised instrument approach procedure that increases the Runway Protection Zone dimensions
- A new or reconfigured local development proposal in the Runway Protection Zone

The Runway Protection Zone Alternative Analysis information was submitted to the local FAA Airports District Office for review and concurrence (see **Appendix B**). The project is not anticipated to occur within the next five years so additional FAA review is not necessary at this time. The three alternatives presented in the Runway Protection Zone Alternative Analysis were Alternatives 6a (198-foot Runway 34 extension Runway Protection Zone over 70th Street), 6b (111-foot Runway 34 extension), and 6c (198-foot Runway 34 extension with 70th Street relocation).

The findings of the Runway Protection Zone Alternative Analysis resulted in additional discussion with City staff, Master Plan Advisory Group members, and users of Fleming Field. The determination from the FAA stated that altering the Runway 34 threshold or Runway Protection Zone in any way would cause the entire future Runway Protection Zone to be clear of the land uses listed above. Therefore, the originally selected alternative (Alternative 6a) would not be approved by FAA at this time because 70th Street would be within the future Runway Protection Zone.

The additional discussion determined that the Accelerate Stop Distance Available (ASDA) is the most critical operational need by the existing and future users of Fleming Field. ASDA is defined by the FAA as "the runway plus stopway length declared available and suitable for the acceleration and deceleration of an aircraft aborting a takeoff." As previously determined, aircraft require the most runway length during the takeoff roll. Any additional takeoff roll available would allow aircraft to operate closer to maximum takeoff weight capabilities of the aircraft. Due to this discussion, Alternative 8 was developed.

- **Alternative 8 (Figure 4-7, at the end of this chapter): Stopways** – The addition of a stopway on the runway end provides additional runway length for pilots to use during the calculation of an aborted takeoff without changing the location of the runway thresholds or Runway Protection Zones. A stopway is defined by the FAA as "an area beyond the takeoff runway, no less wide than the runway and centered upon the extended centerline of the runway, able to support the airplane during an aborted takeoff, without causing structural damage to the airplane, and designated by the airport authorities for use in decelerating the airplane during an aborted takeoff." While a stopway is not full-strength pavement, it is able to support an aircraft during an aborted takeoff without causing structural damage to the aircraft. Stopways are used by airports

to increase runway safety during takeoff, the most critical part of flight. Enhancing the ASDA gives pilots more time to reach takeoff speed, or determine that the aircraft is unable to take off and then bring the aircraft to a complete stop on the pavement.

There is adequate area south of the existing Runway 34 threshold to add a 300-foot stopway. A 120-foot stopway can be added north of the Runway 16 threshold. The controlling factor in determining the length of the stopway is the Runway Object Free Area. The Runway Object Free Area is a rectangle shape around the runway that is 500 feet wide and extends 300 feet beyond the end of the pavement. The Runway Object Free Area must remain clear of all above ground objects. A stopway of 120 feet north puts the edge of the Runway Object Free Area next to McMorrow Field. A stopway of 300 feet to the south puts the edge of the Runway Object Free Area near 70th Street.

The addition of a stopway increases the Accelerate Stop Distance Available from 4,002 feet to 4,302 feet when taking off to the south. The Accelerate Stop Distance Available when taking off to the north increases from 4,002 feet to 4,122 feet.

Selected Runway Alternative

Based on the alternative analysis and the Runway Protection Zone Alternative Analysis results, Alternative 8, construction of stopways, was selected as the preferred alternative for the 20 year plan at Fleming Field. This alternative meets the needs of the existing and future users of the airport while minimizing impacts to the surrounding community and environment. This alternative is depicted on the Airport Layout Plan (see **Appendix C**).

4.5. AIRPORT VISUAL AIDS & NAVIGATIONAL AIDS

Airport visual aids are a necessary component to provide pilots with the proper guidance within the immediate airport environment. As discussed in the Airport Inventory chapter, there are several visual aids at the airport. This section will identify if any airport visual aids need to be added, changed, or upgraded based on the needs of the existing and future users of the airport. In general, the existing visual aids at Fleming Field meet standards, are effective, and do not need upgrades.

- An economical alternative to taxiway lighting at general aviation airports are retro reflective markers. Blue taxiway lights are currently installed at locations on the runway near the taxiway turnoffs to indicate the location of the connecting taxiway. Retro reflective markers or Medium Intensity Taxiway Lights are recommended for taxiway edges at Fleming Field.
- Airfield signage assists pilots in identifying critical airfield areas during ground operations. Fleming Field has an array of location signs installed and some of those signs need to be updated to the current standards. It is recommended runway signage be maintained into the future and upgraded at the time of an airfield lighting project.
- Existing runway pavement markings are in good condition and should be maintained into the future for the appropriate published approach type for Runway 16/34. The runway hold position markings are currently 125 feet from the runway centerline. The markings need to be relocated to 200 feet from the runway centerline and should be maintained to the appropriate FAA design standards.
- The current four-box Precision Approach Path Indicator (PAPI) system, initially installed in 1988 is in need of replacement because the tilt switches for the individual PAPI installations have become problematic.

- At one time, Fleming Field had Runway End Identifier Lights (REILs) installed for both runway ends. Unidirectional REILs should be reinstalled as there are many lights around the airport, due to the density of homes in the area. Further study is needed to determine visual impacts to surrounding home owners. REILs are recommended, not required, by the FAA.

No additional visual aids or navigational aids are required at Fleming Field over the next 20 years. The existing GPS approach with future LPV capability to Runway 34 will be adequate for the existing and future users of the airport over the next 20 years. Additional approach navigational aids as discussed in the Airport Inventory chapter such as a VOR, ILS, or NDB require additional equipment be installed at the airport and are not recommended for Fleming Field over the next 20 years.

4.6. TAXIWAY & TAXILANE FACILITY REQUIREMENTS

4.6.1. TAXIWAY REQUIREMENTS

The existing taxiway system at Fleming Field consists of one full parallel taxiway, Taxiway A, to Runway 16/34 on the east side of the runway, and one partial parallel taxiway, Taxiway B, on the west side of the runway (see **Figure 2-3**). There are five connector taxiways form the runway to parallel Taxiway A and three connector taxiway from the runway to the west parallel Taxiway B (see the Airport Layout Plan within **Appendix C** for connector taxiway names). Taxiway facilities at an airport are established to enhance the safety and efficiency of airfield operations. A full parallel taxiway prohibits the need for aircraft to back taxi on an active runway after landing or prior to takeoff.

The runway to taxiway centerline separation distance and the taxiway safety area dimensions are defined by the critical aircraft and type of approaches proposed to be used at the airport over the next 20 years. The future critical design aircraft for the runway is RDC B-II and the future approaches are proposed to be non-precision with one mile visibility minimums. Based on this criteria, the parallel taxiway should be constructed 240 feet from the runway centerline. The taxiway object free area (TOFA) width is 131 feet centered on the taxiway centerline to ensure proper wing tip clearance. Only objects necessary for air navigation may be placed within the TOFA. The existing runway to taxiway centerline separation is 275 feet for Taxiway A and 250 feet for Taxiway B. Taxiway A has a non-standard separation distance on the south end connection to the Runway 34 end (see **Figure 4-8**, at the end of this chapter). FAA Advisory Circular 150/5300-13A, *Airport Design*, recommends 90 degree turns whenever possible when constructing a parallel taxiway. This allows pilots to view both runway approaches before taxiing onto the runway. It is recommended that the southeast taxiway connector to Runway 34 be reconstructed to allow for a 90 degree angle to the runway threshold at the recommended separation distance of 240 feet.

Taxiway width, fillet, and curve design are based on the Taxiway Design Group (TDG) of the critical aircraft identified for use on the parallel taxiway. The TDG is based on the width of the main gear of the aircraft and the distance between the cockpit and main gear of the critical design aircraft. The classification for taxiway development at Fleming Field is TDG-2. The taxiway width for this group of aircraft is 35 feet. Although the existing critical design aircraft at the airport are RDC B-II aircraft, there is a North American B-25 medium bomber based at the airport in a hangar located along the North Apron. The B-25 medium bomber is one of the 45 remaining B-25 aircraft still in operation and is used during air

shows and presentations across the country. There are also multiple tailwheel aircraft owned by the Commemorative Air Force and the general public that are based at the airport.

The B-25 medium bomber has a main gear width of 20.5 feet and a cockpit to main gear distance of 12 feet. This classifies the B-25 medium bomber as a TDG-3 aircraft. A TDG-3 aircraft requires a 50-foot wide taxiway to maneuver on the airfield. In addition, tailwheel aircraft have poorer forward visibility on the ground compared to nose wheel aircraft. This necessitates "S" turning on the ground for pilots to see while taxiing. Although the specifications for tailwheel aircraft are within TDG-2 standards, the wider the taxiway, the easier to perform "S" turning movements to safely taxi to the end of the runway. It is recommended that the new 90 degree connector taxiway to the Runway 34 end on the east side of the runway be constructed to 50 feet.

It is also recommended that the west parallel taxiway be extended to the Runway 34 threshold as more hangars are developed on the west side of the airport (see **Figure 4-8**). This will reduce taxiing time and the number of potential runway incursions by eliminating the need to cross over the active runway to access the Runway 34 threshold from the west side of the airfield. The separation distance for the completion of the west parallel taxiway should be 240 feet at a width of 35 feet. Construction of the remaining portion of the west parallel taxiway will require property acquisition of 0.13 acres for the airport to prohibit development in the Taxiway Object Free Area.

4.6.2. TAXILANE REQUIREMENTS

While taxiways provide access from the active runway to the building areas, taxilanes provide access to hangars and other facilities throughout the building area. Taxilanes are not as wide nor do they require the same safety area widths as taxiways due to aircraft operating at a lower speed than on a taxiway.

Based on the filet design tables for taxiways, the minimum recommended taxilane width for TDG-2 aircraft is 25 feet and 30 feet for TDG-3. The taxilane object free area used to maintain adequate wing tip clearance between hangars is based on the wing span of the critical aircraft and should be 115 feet for RDC B-II aircraft, including the B-25 medium bomber.

The majority of existing taxilanes at Fleming Field are constructed to a width of 20 feet which is based on standards prior to 2012. Taxilane construction for new hangar areas will be based on the type of aircraft that will have access to those hangars. The building area plan in the Airport Layout Plan (see **Appendix C**) depicts the appropriate taxilane widths based on the type of hangars developed within each area.

4.7. AIRCRAFT APRON & TIE-DOWN REQUIREMENTS

An aircraft apron provides an area for aircraft parking, aircraft movements, fueling operations, and access to the hangar area. The apron space requirements are developed according to local trends and FAA design standards. The existing apron is 33,200 square yards and provides 13 tie-downs. There are 17 additional tie-downs in the grass area west of the apron.

Aircraft Tie Downs

An analysis of the overall tie-down and apron size requirements was completed to determine the future needs at the airport. The peak number of operations on the busiest day of the year at Fleming Field will be used to calculate the number of tie-down spaces needed at this time and also at the end of the 20 year planning period. This will ensure there are adequate tie-down spaces available at any time throughout the year. The demand at the airport was calculated at the beginning of this chapter. In 2013, the peak number of operations on the busiest day is 418. Itinerant aircraft represent 50 percent of the operations at the airport for a total of 209 operations or 105 aircraft on the busiest day of the year. It is assumed that 50

percent of itinerant aircraft that use the airport on the busiest day will stay and park at the airport for a total of 53 tie-downs needed in 2012. The same formula was used to determine the number of tie-downs necessary at the end of the 20 year planning period. The peak number of operations at the airport in 2032 is 580. Therefore, there are approximately 290 operations per day by 145 aircraft on the busiest day of the year. If 50 percent of the itinerant aircraft that use the airport on the busiest day stay and park at the airport, 73 tie-downs will be needed in 2032 or 20 more tie-downs than planned for in 2012.

There are currently 29 aircraft tie-down spaces available for aircraft with wing spans less than 49 feet, which consists of small aircraft like a Cessna 182 or a Piper PA 28 Cherokee. There is one additional tie-down space available for aircraft with a wing span between 49 feet and 79 feet. This is the critical design aircraft at the airport including a Beechcraft Super King Air 300. The existing 30 aircraft tie-down spaces do not meet the existing and future needs of Fleming Field. There are 23 additional spaces needed in the existing condition and an additional 20 needed within the 20 year planning period. Because the larger wing span aircraft are the critical design aircraft for the airport, it is recommended that additional considerations be made for larger tie-down locations for these aircraft.

The existing apron was reconfigured to add space for three larger tie-down locations while allowing taxiing clearance around all tie-downs. **Figure 4-9**, at the end of this chapter, depicts space for 29 tie-downs on the existing apron for smaller aircraft and three tie-downs for the critical design aircraft. The 17 tie-downs located in the grass will remain until the need to construct additional apron space occurs. The additional apron space will have an area for six additional small aircraft tie-downs and four larger aircraft tie-downs. Apron and building area space is limited at Fleming Field. Airport staff will need to continue to monitor tie-down availability in the apron area.

Apron Size

General aviation apron space requirements necessitate an assessment of the space needed for aircraft tie-downs, types of aircraft that use the apron, wingtip clearance requirements, and aircraft maneuverability.

Existing apron facilities at the airport consist of a main 33,200 square yard area for parking, aircraft tie-down, fueling, and general aircraft circulation. General FAA size factors assume 960 square yards of apron space to accommodate both the aircraft and a taxilane for an ADG-I airplane and 1,385 square yards to accommodate both the aircraft and a taxilane for an ADG-II airplane. Accommodations for ADG-II sizing yield a recommended size of 30,424 square yards of apron space to accommodate existing demands, and 44,304 square yards of apron space to accommodate future demands. The existing apron of 33,200 square yards is adequate for the current conditions at the airport, however an expansion of 11,104 square yards is recommended over the next 20 year planning period. Actual apron size will be based on meeting local constraints and maneuverability requirements. An apron expansion to the west may require relocation of the wind cone. This should be evaluated when the need arises to expand the apron (see **Figure 4-9**).

4.8. MN STATE AVIATION SYSTEM PLAN (SASP) AIRSIDE RECOMMENDATIONS

The MN SASP gives a top down approach to looking at the needs of the aviation system in Minnesota. Although the Airport Master Plan process is a more in depth look at a specific airport, the SASP recommends basic needs for the airport based on how the airport serves the aviation system as a whole within the state.

Fleming Field is classified as an Intermediate Airport in the 2012 Minnesota State Aviation System Plan. Intermediate Airports have a paved and lighted primary runway less than 5,000 feet in length. These airports are capable of accommodating all single-engine aircraft and some multi-engine aircraft and business jets depending on runway length. These airport types serve a variety of roles including emergency medical flights, recreational flying, flight training, and business travel flights in support of local businesses.

For airside needs at Fleming Field, the SASP recommends pavement rehabilitation, a larger transient aircraft apron, and enhanced non-precision approaches with vertical guidance. These areas are similar to the airside recommendations made throughout the document and will be included on the Airport Layout Plan (see **Appendix C**.)

4.9. LANDSIDE FACILITY REQUIREMENTS

Building area facilities at a general aviation airport support airfield operations including aircraft parking and storage, fueling operations, aviation services, terminal space, and automobile parking. Overall facility requirements should be designed to accommodate Airplane Design Group (ADG) B-II/large aircraft to meet existing and future critical aircraft requirements. Areas designed to exclusively serve smaller aircraft will also be evaluated.

4.9.1. TERMINAL BUILDING

General aviation terminal buildings provide an area for local and transient pilots and passengers to transition to and from the aircraft operations area. The existing terminal building at Fleming Field was constructed in 1998 and is in very good condition. The building is approximately 5,400 square feet with approximately 60 percent of the building available for public use. The terminal building includes dual restrooms, public meeting space, a pilot's briefing area, a flight planning room, an observation room to watch aircraft, a modern-day lobby with lounge space for local and transient pilots, intern/transient pilot apartment, and the airport manager's office. Office and restaurant space is also available for rent. The building is located along the main apron and is adequate for the type of users at Fleming Field.

Public space requirements are designed around the number of passengers (including the pilot) during the peak hours of operations at the airport. A general average of one pilot and one passenger per general aviation flight can be assumed. A general aviation terminal building requires approximately 50 square

feet per passenger for circulation, waiting area, management/operations space, public conveniences, concessions area, and storage. The recommended size of the terminal building was based on the peak hourly operations of 84 in 2012 and 116 in 2032, assuming two persons per flight. The existing activity at Fleming Field requires a 4,200 square foot terminal building increasing to 5,800 square feet within the 20 year planning period. The existing terminal building of 5,400 square feet is adequate for the existing conditions but additional public use space may be needed within the 20 year planning period.

4.9.2. AIRPORT ACCESS AND VEHICLE PARKING

Airport Access

The automobile entrance to Fleming Field is located at the corner of Henry Avenue and Airport Road near the northeast corner of airport property. The airport entrance provides unrestricted access to the terminal building and controlled access to the north hangar area and the main apron area. The access gates to these areas are typically closed at all times but can be opened by based aircraft pilots and business employees through use of controlled access cards.

There is a perimeter road around the east side of the airport that leads to a controlled access area from Crossman Lane to the south hangar area (see **Figure 2-3**). The fourth controlled access area is on West Gate Road off of Claude Way to access the west hangar area. These service roads provide controlled access to hangars and airfield areas serving each of the airport hangar quadrants. These airport access points are adequate to serve existing and future needs of the airport.

Automobile Parking

An airport needs to provide adequate automobile parking to accommodate pilots, employees, visitors, and passengers. The main existing parking lot has approximately 110 parking stalls in immediate proximity to the terminal building. There are also additional parking spaces available around the airport for the various business operators on the airport. Public automobile parking requirements for airport activity can be estimated at 1.3 automobiles per peak hour general aviation passenger. Using the peak hour operations forecasts (116 persons in 2032), the airport requires 151 public spaces to adequately serve aeronautical terminal activity demand through the end of the 20 year planning period. The public automobile parking lot is recommended to be reconfigured to accommodate the additional spaces by the end of the planning period. Each stall is estimated to need 320 square feet (includes space for aisles).

On-site aviation business parking needs vary. Each business requires vehicular parking for employees and their visitors. Some of the businesses at Fleming Field require over 50 spaces and some require five spaces. Additional parking spaces are recommended for planning-purposes to accommodate any future businesses at the airport.

Parking recommendations include additional spaces near the terminal building to serve peak hour vehicles. Overall parking facilities around the apron area appear to be adequate to serve general aviation facilities, however, a concentration of aviation businesses have increased the need for parking. Public parking to serve T-hangar storage facilities away from the aircraft apron area should also be considered to keep vehicles away from the taxilanes.

4.9.3. AIRCRAFT STORAGE

Aircraft are typically stored in conventional, box hangars, or T-hangar structures on the airport. Currently, Fleming Field has two public T-hangar buildings (32 units), six public conventional hangars, and 75 private conventional hangars. Some based aircraft owners choose to store their aircraft on the grass tie-down area.

Planning considerations for hangar facilities include the appropriate number and type of hangars to accommodate the projected based aircraft, hangar owner/tenant needs, and geographic/environmental constraints. Aircraft storage needs are driven by the based aircraft forecast and the type of aircraft storage demands.

T-hangar Requirements

Currently, 12 percent of the based aircraft at Fleming Field utilize T-hangar units for storage. There are currently 10 aircraft owners on a waiting list for T-hangar space. Demand for T-hangar space at Fleming Field is assumed to remain strong for the smaller aircraft types (ADG-I). If 20 percent of the additional small based aircraft demand is assumed to desire T-hangars over conventional hangars, 19 T-hangar units will be needed throughout the planning period unless local preferences change. Additional T-hangar development is shown on the Airport Layout Plan within the south and west building areas.

Conventional Hangar Requirements

Conventional hangar storage is popular at Fleming Field. These hangars can be publically or privately developed and used for based aircraft storage, commercial businesses, or transient aircraft storage. Conventional hangars allow for private development at little cost to the airport. Public development of hangars also generates income. For private developers, conventional hangars allow the aircraft owner to customize a hangar to meet their specific needs.

About 85 percent of the based aircraft at SGS are stored in a conventional hangar for either small (ADG-I) or larger (ADG-II) aircraft. These hangars are typically up to 60-feet by 60-feet in size and are capable of storing multiple airplanes. Over 80 percent of additional based aircraft are assumed to desire conventional hangar storage. Demand forecasts indicate approximately 72 additional aircraft are expected to utilize conventional hangar storage through the 20-year planning horizon. At an average of two aircraft per hangar, approximately 36 conventional hangars are needed to accommodate demand. Additional hangar development areas should be planned when feasible. Development plans should be flexible to accommodate both small ADG-I and larger ADG-II aircraft.

Transient aircraft storage hangars are desired by transient aircraft to protect the aircraft from inclement weather or if the operator is planning an extended stay. Transient single-engine and multi-engine piston aircraft operators may or may not require aircraft storage hangar facilities. However, many higher performance single-engine, multi-engine, turboprop and turbojet aircraft operators desire overnight aircraft storage or a heated hangar in the winter. Based on the percentage of the larger itinerant aircraft flying to Fleming Field on peak days, transient hangar storage should be available to accommodate four ADG-II aircraft as needed.

Aviation Business Hangar Requirements

Commercial airport business requirements are based on local aviation demand for a business providing one or multiple aviation services. These hangar facilities include a mix of hangar and office space. A provider of multiple aviation services is known as a Fixed Based Operator (FBO). These users typically require larger hangars/buildings than a single-aviation service operator who could operate from a smaller conventional hangar.

The commercial airport businesses that are based at Fleming Field include aeronautical Fixed Based Operators (FBO), single-aviation service operators, and corporate businesses with hangar facilities. Each facility is customized to meet the individual business user needs. Additional development space for commercial airport businesses is recommended at Fleming Field. These facilities are typically 80-feet x 80-feet in size, which includes some office space. Each commercial business should have public access and a parking lot. Development areas should be near the apron and have critical utilities available including electricity, sewer, and water.

There are currently five lots next to the main apron ready for business development. On the south side of the apron there are four sites, three of which are platted for 100-feet x 120-feet and one for 120-feet x 120-feet. On the east side of the main apron a site is platted for 175-feet x 120-feet (see **Figure 4-9**).

Hangar Development Summary

Actual demand for T-hangars and conventional hangars is dependent on the airport sponsor and individual hangar owner preferences. The future building area depicted on the Airport Layout Plan may show additional hangar development beyond the 20 year planning period. This is beneficial to show the potential of the building area should additional user needs occur.

4.10. SUPPORT FACILITY REQUIREMENTS

4.10.1. FUELING SYSTEMS

Fuel storage requirements are based on the average forecasted number of annual operations and fuel sales data for the airport. Based on national estimates, an estimated fuel consumption rate of three gallons per piston aircraft operation for 100LL fuel and a consumption rate of five gallons per turbine aircraft operation for Jet A fuel is common at general aviation airports similar in size to Fleming Field. In 2012, approximately 99,000 gallons of 100LL fuel was sold in addition to approximately 53,000 gallons of Jet A fuel. Based on fuel sale data, the busiest month for 100LL fuel was August with 12,700 gallons sold. The busiest month for Jet A fuel was March with 7,600 gallons sold.

The existing fuel facility at Fleming Field consists of a 10,000 gallon underground 100LL tank, a 10,000 gallon underground Jet A fuel tank, and a 6,000 gallon 91-octane unleaded underground tank. Due to the amount of 100LL fuel pumped during the peak months at the airport, it is recommended that another 10,000 gallon tank be added in the 20 year planning period.

4.10.2. AIRPORT MAINTENANCE AND ADMINISTRATION

The City of South St. Paul owns dedicated airport snow removal and maintenance equipment. Airport maintenance equipment storage is located on-site in the South Hangar Area. A larger, dedicated, centrally located maintenance facility of at least 3,000 square feet in size is recommended to store and maintain all of the airport snow removal and maintenance equipment.

4.10.3. FENCING AND SECURITY

A perimeter fence is recommended at airports for security and wildlife purposes but not yet a requirement for general aviation airports. Fleming Field currently has an eight -foot high perimeter fence that fully encloses the airport. There are numerous controlled access gates throughout the airport allowing authorized entry through a card reader system. This is adequate for the 20 year planning period.

If wildlife is an issue at the airport, the FAA recommends the City conduct a Wildlife Hazard Assessment study to determine the risk wildlife pose to aircraft. One recommendation from the plan could be updating to a 10 to 12-foot high perimeter wildlife fence with two feet of barbed wire across the top to prevent wildlife from jumping over the fence.

4.11. LAND USE & ACQUISITION CONSIDERATIONS

4.11.1. AIRPORT PROPERTY

Airport property consists of 221.76 acres, owned in fee by the City of South St. Paul. In addition, the City has acquired 19.5 acres in easement within the Runway 16 Runway Protection Zone and also along the east and west side of the runway near the Runway 34 end.

The addition of a stopway to each runway end does not require additional property acquisition because the Runway Safety Area and Runway Object Free Area remain on airport property and the existing Runway Protection Zones do not move. There is a small area in the northeast corner of the Runway 16 Runway Protection Zone that is proposed to be acquired since the Environmental Assessment has been completed. This area is two residential parcels (0.56 total acres) that will be owned in fee by the City of South St. Paul as airport property. There are also two adjacent land owners whose front yards are in the Runway Protection Zone. It has been determined that these areas (0.04 acres) will be acquired as easement to protect from structures being constructed in this area.

The redesign of parallel Taxiway A to the Runway 34 end requires 0.2 acres of acquisition for the City to own the Taxiway Object Free Area, which is required by the FAA. Construction of the remaining portion of Taxiway B on the west side of the airport requires acquisition of 0.13 acres of land to own the Taxiway Object Free Area.

The additional airport property and easement acquisition is shown on the Airport Layout Plan, which can be found in **Appendix C**.

4.11.2. AIRPORT ZONING

FAA grant assurances require airport sponsors maintain compatible land uses around airport property. One method is to enact an airport zoning overlay ordinance. Airport zoning associated with Fleming Field

was discussed in **Section 2.13.5**. The 1990 South St. Paul Municipal Airport Zoning Ordinance which was created by the South St. Paul Joint Airport Zoning Board meets or exceeds all of the existing state standards for the current 4,002-foot runway except for the Horizontal Surface and Zone C. Since 1990, the standards for the Horizontal Surface have changed from a 6,000-foot radius from the end of the Primary Surface to a 10,000-foot radius. State airport safety Zone C follows the same dimensions as the Horizontal Surface, therefore this surface should be expanded during the next airport zoning update.

Safety Zone C is subject to the height restrictions of the Horizontal Surface which includes a height of 150 feet above the airport elevation and the general zoning restrictions which include no use which creates or causes interference with the operations of radio or electronic facilities on the airport or with radio or electronic communications between the airport and aircraft; which makes it difficult for pilots to distinguish between airport lights and other lights; results in glare in the eyes of pilots using the airport; impairs visibility in the vicinity of the airport; or otherwise endangers the landing, taking off, or maneuvering of aircraft. The outlines of safety Zone C are included in the Airport Layout Plan.

4.12. MN SASP LANDSIDE RECOMMENDATIONS

The 2012 MN State Aviation System Plan (SASP) also provides landside recommendations for each airport within the state. The 2012 MN SASP recommends additional T-hangar units and automobile parking spaces within the 20 year plan for Fleming Field. The timing of these projects depends on the demand for these services which should be monitored by Airport staff.

4.13. SUMMARY

The following points summarize the key facility requirements at Fleming Field:

- Critical design aircraft is expected to ARC B-II/large aircraft over the 20 year planning period. All existing and future airport design standards will meet the critical design aircraft requirements.

- The FAA recommended runway length is 4,300 feet for small aircraft with ten or more passenger seats. Although this does not meet the need for the large aircraft that currently use the airport, the site constraints around the airport restrict extension of the runway. However, it was determined that any additional takeoff length at Fleming Field is desired. In addition, the pavement strength should be enhanced to accommodate 35,000 pounds single-wheel gear aircraft.

- The Minnesota State Aviation System Plan recognizes Fleming Field as an Intermediate airport. The recommendations for the airport based on the State Aviation System Plan include pavement rehabilitation, a larger transient aircraft apron, enhanced non-precision approaches with vertical guidance, additional T-hangar units, and automobile parking spaces.

- Federal Aviation Regulations Part 77 and Approach/Departure "Row 3" airspace obstructions are recommended to be removed, lowered, and lighted to provide clear airspace around Fleming Field. In addition, land use incompatibilities will also be addressed including the reconfiguration of McMorrow Field, acquisition of two residential properties, acquisition of avigation easements over two residential yards, and removal of a storage shed.

- An additional 75 conventional aircraft storage hangars, 27 public T-hangar units, and five corporate/business hangars are recommended through the 20-year planning period. An expanded apron to meet ground storage requirements is also recommended.