CHAPTER 5

ALTERNATIVES

Introduction

This chapter presents and analyzes alternatives developed to meet needs identified in **Chapter 3: Facility Requirements**. The alternatives take into consideration long-term development at FSD while addressing near-term needs. Alternatives are presented and analyzed in the following sections:

- **Objectives and Development Considerations**
- **Runway and Taxiway Alternatives**
- **Terminal Area Alternatives**
- **Air Cargo Alternatives**
- **General Aviation Alternatives**
- **Other Development Alternatives**

The project team collected a significant amount of stakeholder input early in the Master Plan through focus group and input committee meetings. The alternatives development considered and incorporated the input received as appropriate. The alternatives were then reviewed and further refined through meetings with FSD staff. Preliminary recommended alternatives were reviewed with focus groups and the Airport Authority in January 2023. Alternatives were presented at a public open house on March 16, 2023.

5.1 Objectives and Development Considerations

5.1.1 Objectives

Major objectives for alternatives development include:

- **Meeting facility needs for the 20-year planning period while considering needs beyond that planning horizon.**
- **Optimizing the use of airport property by considering the highest and best use of developable space.**
- **Improving accessibility to the Airport by examining instrument approach procedure improvement opportunities.**
- **Providing feasible and flexible alternatives.**
- **Promoting FSD's long-term sustainability.**

5.1.2 Development Considerations

Alternatives development is an iterative process. Some development areas had specific alternatives considered, while recommended alternatives for other areas were selected based on a single, logical development concept with minor refinements. Alternatives presented in this chapter are conceptual in nature and subject to further refinement through financial, environmental, and engineering considerations.

Phasing, flexibility, and maximizing the use of available space were primary focus areas of alternatives development. Specific cost estimates were not a factor in alternatives analysis aside from terminal area alternatives. However, minimizing cost through efficient facility development was also a major consideration.

Environmental

Potential environmental impacts are considered during alternative development. The evaluation of environmental impacts should only be done to the level necessary to evaluate and compare how each alternative would involve sensitive environmental resources. If early review indicates alternatives are likely to have extensive environmental effects, it may be appropriate to develop additional alternatives. When potential environmental impacts are likely negligible or similar among alternatives being considered, environmental impacts play a lesser role in alternative evaluation.

Sustainability

As detailed in **Chapter 4: Sustainability Plan**, Airport staff identified the following sustainability vision statement:

To foster a sustainable future for the communities that we serve while providing a safe, efficient, and sustainable gateway for Sioux Falls and South Dakota.

FSD staff selected Sustainability Focus Areas important to the Airport and community. The Focus Areas detailed in the prior chapter and listed below were considered during alternatives analysis when pertinent.

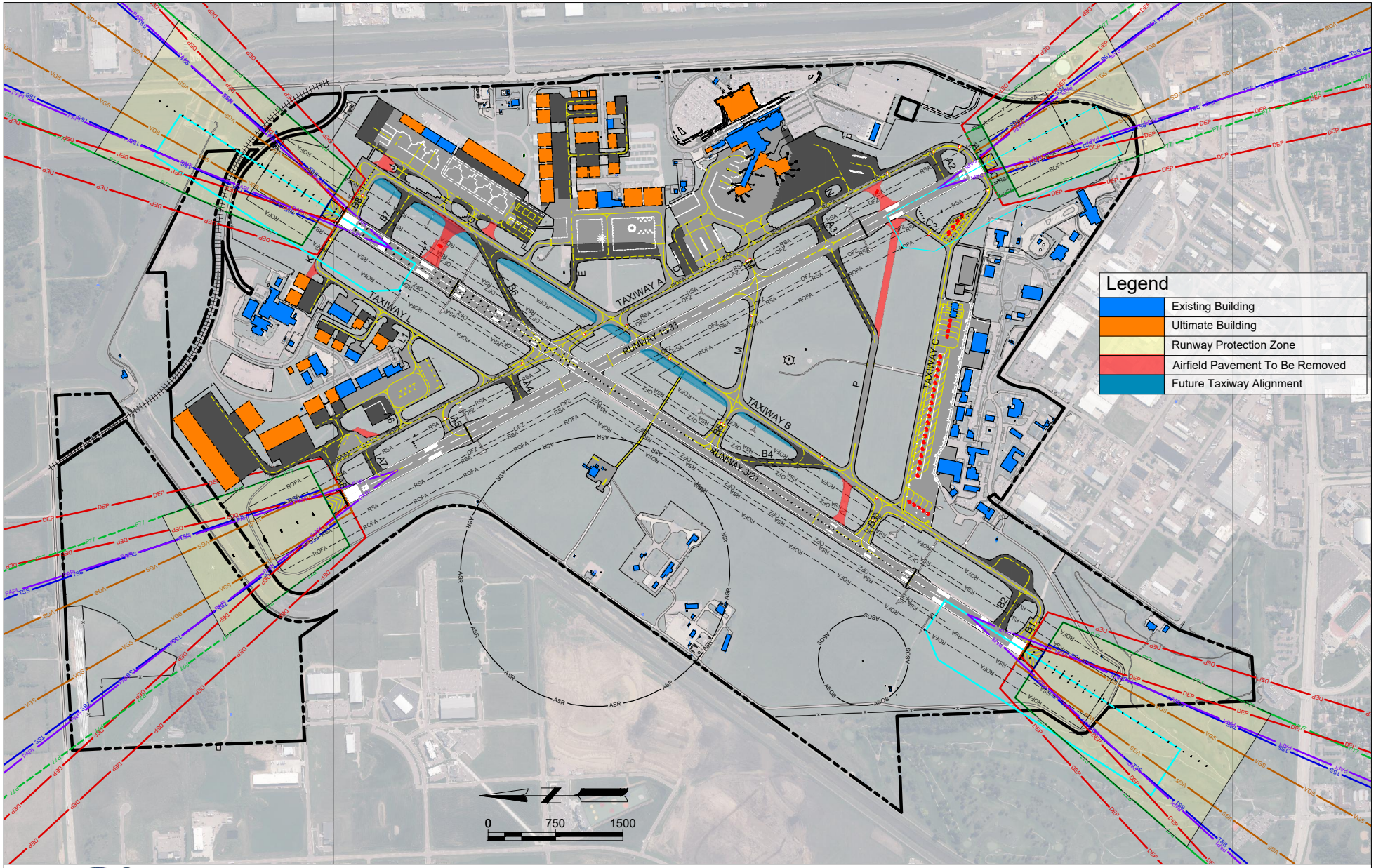
- **Waste:** FSD has developed a waste management plan as part of this Master Plan, which provides a path forward for reducing waste and emphasizing recycling.
- **Energy:** Energy is an important sustainability issue for FSD because reducing energy/fuel use can reduce greenhouse gases (GHG) and reduce operating costs for the Airport.
- **Operations and Maintenance:** The majority of Airport staff time and resources is dedicated to the continued maintenance and operation of FSD facilities. Operations and maintenance activities represent the best opportunity to incorporate sustainability into both the management and infrastructure of the Airport.
- **Passenger Experience:** Enhancing conditions for Airport users is an important social sustainability issue for FSD to ensure all passengers have a positive travel experience at the Airport. In turn, as

passengers continue to choose to fly into and out of FSD, the Airport's long-term viability is enhanced.

5.2 Runway and Taxiway Alternatives

Because all airport functions relate to and revolve around the basic airfield layout, runway and taxiway alternatives must first be carefully examined and evaluated to meet standards and operational necessity. The recommended airfield concepts are depicted on **Figure 5-1**.

10/17/2023 10:08:32 AM
X:\2890700\210946.01\TECH\CAD\ALP\EXHIBITS\FSD-ALP MASTER PLAN.DWG



FSD
SIOUX FALLS REGIONAL AIRPORT

SIOUX FALLS
REGIONAL AIRPORT
JOE FOSS FIELD

2890700-210946.01
OCTOBER 2023

AIRFIELD CONCEPT

Mead & Hunt

FIGURE 5-1

5.2.1 Instrument Approach Procedure Considerations

Runway alternatives provided below primarily focus on the potential to improve instrument approach procedures. Airport access can be improved by reducing the ceiling and/or visibility minimums associated with instrument approach procedures (IAPs). An airport's ability to improve approach capability is dependent on many factors, including airspace obstacle clearance, marking, lighting, available NAVAIDs, and design standard requirements.

The actual improvement in terms of airport accessibility is also dependent on an aircraft's ability to utilize available IAPs. Larger, heavier aircraft can typically handle greater crosswinds and therefore take advantage of lower approach minimums to runways that may not be accessible to smaller aircraft in strong crosswind conditions. Only aircraft equipped with global positioning systems (GPS)/Wide Area Augmentation System (WAAS) receivers can take full advantage of localizer performance with vertical guidance (LPV) approach procedures. Currently, most airlines are not able to utilize LPV procedures due to lack of equipment or airline policy. For some IAPs, aircraft with higher approach speeds are assigned greater minimums, reducing the utility of those approaches. For example, the *VOR or TACAN RWY 15* instrument approach procedure has 1-mile visibility minimums for category A and B aircraft but 1 ⅜-mile visibility minimums for category C through E aircraft.

5.2.2 Runway 3/21

Runway Layout

Runway 3/21, the primary air carrier runway, is 9,000 feet long and 150 feet wide. Runway layout alternatives were not evaluated for Runway 3/21 for two reasons:

1. **The existing runway length and width are sufficient to meet current and projected critical aircraft operations.**
2. **Constraints in proximity to runway ends are major impediments to any future runway extensions.**

Instrument Approach Procedures

Options for improving instrument approach capability for both ends of Runway 3/21 were considered. Implementation of recommended alternatives would involve weighing the benefits of improvements with initial project costs and ongoing costs.

Runway 3

The previous Master Plan recommended planning for Category II (CAT II) instrument landing system (ILS) approaches with visibility minimums as low as ¼-mile (1200 runway visual range, or RVR). It is recommended FSD continue to plan for CAT II ILS. An intermediate step to achieve minimums comparable to Runway 21 (1800 RVR) could be accomplished through the installation of runway touchdown zone lighting for Runway 3 approaches.

Upgrading Runway 3 from its existing Category I ILS Approach (2400 RVR) to a Category II ILS (1200 RVR) would require the following improvements:

- **Upgrade from a Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) to a High Intensity Approach Lighting System with Sequenced Flashing Lights (ALSF-2).**
- **Install touchdown zone lighting and centerline lighting.**
- **Install midfield RVR equipment.**
- **Install rollout RVR equipment.**

Runway 21

Similar to Runway 3, the previous Master Plan recommended planning for CAT II ILS approaches with visibility minimums as low as ¼-mile (1200 RVR) for Runway 21.

Upgrading Runway 21 from its existing Category I ILS approach (2400 RVR) to a Category II ILS would require the following improvements:

- **Upgrade from a MALSR to an ALSF-2. Lights are spaced at 100-foot intervals outward from the runway threshold, which may require placement of a light in the Big Sioux River.**
- **Install midfield RVR equipment.**
- **Relocate Runway 21 glideslope antenna and RVR equipment 400 feet from runway centerline.**

5.2.3 Runway 15/33

Runway Layout

Runway 15/33, the secondary air carrier runway, is 8,000 feet long and 150 feet wide. Runway 15/33 is planned to continue serving D-IV aircraft and remain at the existing length, width, and pavement strength. Planned improvements to better meet D-IV design standards include expanding the Runway 33 blast pad to 200 feet by 200 feet and adding 25-foot paved runway shoulders.

The Runway Object Free Area (ROFA) beyond the Runway 15 departure end doesn't meet the 1,000-foot length requirement. The airport perimeter fence penetrates the eastern edge of the ROFA approximately 740 feet beyond the runway end, 260 feet short of the requirement. Two alternatives were considered to mitigate incompatibilities without modifying runway ends or significantly impacting City of Sioux Falls infrastructure.

Alternative 1: Implement Declared Distances

Declared distances represent the maximum distances available and suitable for meeting takeoff and landing distance performance requirements. This alternative involves reducing the Landing Distance Available (LDA) and Accelerate Stop Distance Available (ASDA) from 8,000 feet to 7,700 feet for Runway 15. This reduction would impact the runway's ability to accommodate critical aircraft operations. In addition, the 7,700-foot LDA and ASDA for Runway 15 is less than the 8,000 feet required for South Dakota Air National Guard (SDANG) F-16 operations.

Alternative 2: Continue FAA Modification of Standards (MOS)

On November 21st, 2016, a MOS was approved by the FAA for the Runway 15 departure end ROFA. A continuance of the MOS would avoid impacts to Runway 15/33 operations. As mentioned in the prior Master Plan, an acceptable level of safety could be maintained considering the critical aircraft (Boeing 767-300) could be located at the edge of the RSA without encroaching into the fence line.

Continuation of the MOS is the recommended alternative.

Instrument Approach Procedures

Runway 15

Options evaluated for Runway 15 include:

1. No Action – maintain current 1-mile IAP
2. Plan for ¾-mile IAP
3. Plan for lower than ¾-mile IAP

No Action

FSD would plan for 1-mile IAP to Runway 15. An approach lighting system (ALS) would not be planned and there would be no changes to Runway Protection Zone (RPZ) or approach surface standards.

Plan for ¾-mile IAP

An approach with visibility minimums not lower than ¾ mile requires a 1,000-foot by 1,510-foot by 1,700-foot Approach RPZ. Expanded RPZ areas, except for the Big Sioux River, fall within existing airport property. No incompatible land uses would be introduced into the RPZ.

A ¾-mile approach widens the FAR Part 77 primary surface width from 500 feet to 1,000 feet. The FAA 20:1 Approach Surface would be clear of obstructions.

Based on current approach minimums, an intermediate approach lighting system is required to attain ¾-mile minimums. A Medium Intensity Approach Lighting System (MALS) is planned for Runway 15.

Plan for lower than ¾-mile IAP

An approach with visibility minimums lower than ¾ mile requires precision approach markings and a 1,000-foot by 1,750-foot by 2,500-foot Approach RPZ. Expanded RPZ areas, except for the Big Sioux River, fall within existing airport property. No incompatible land uses would be introduced into the RPZ.

An IAP with less than ¾-mile visibility minimums widens the FAR Part 77 primary surface width from 500 feet to 1,000 feet. A 50:1 Part 77 approach surface applies to this type of IAP; significant penetrations to this surface exist. More critically, there would be penetrations to the FAA 34:1 Approach Surface.

The recommended Runway 15 option is planning for an IAP with ¾-mile visibility minimums.

Runway 33

Options evaluated for Runway 33 include:

1. No Action – maintain current ⅞-mile IAP
2. Plan for ¾-mile IAP
3. Plan for lower than ¾-mile IAP

No Action

FSD would maintain a ⅞-mile IAP to Runway 33. An approach lighting system (ALS) would not be planned and there would be no changes to RPZ or approach surface standards.

Plan for ¾-mile IAP

An approach with visibility minimums not lower than ¾ mile would have the same Approach RPZ applicable to the existing ⅞-mile IAP (1,000 feet by 1,510 feet by 1,700 feet).

A ¾-mile approach requires widening the FAR Part 77 primary surface width from 500 feet to 1,000 feet. The FAA 20:1 Approach Surface would be clear of obstructions.

An intermediate approach lighting system or basic approach lighting system is required to attain ¾-mile visibility minimums based on current approach minimums. A MALS is planned for Runway 33. The MALS would extend 1,400 feet beyond the runway end, with the last light being located on airport property, just north of the perimeter fence. An Omnidirectional Approach Lighting System (ODALS) is a basic approach lighting system option; however, the system is 1,500 feet long. The last light would likely be located off airport property and within the right-of-way for Minnesota Avenue.

Another option to improve access for aircraft that are not able to take advantage of LPV approaches would be the addition of an ILS for Runway 33. The addition of the ILS would trigger Part 77 precision instrument runway surfaces. However, standards for RPZs and FAA Approach Surfaces listed in FAA Advisory Circular 150/5300-13B, *Airport Design*, would not change since the planned minimums would not be lower than ¾ mile. Siting the glide slope antenna poses challenges due to existing infrastructure and constraints around the Runway 33 end.

Plan for lower than ¾-mile IAP

An approach with visibility minimums lower than ¾ mile requires precision approach markings and a 1,000-foot by 1,750-foot by 2,500-foot Approach RPZ. Incompatible land uses would be located in the expanded Approach RPZ beyond what exists today.

An approach with less than ¾-mile visibility minimums also requires widening the FAR Part 77 primary surface width from 500 feet to 1,000 feet. A 50:1 Part 77 approach surface applies to this type of IAP; significant penetrations to this surface exist. More critically, there would be penetrations to the FAA 34:1 Approach Surface.

The recommended option is planning for an IAP with ¾-mile visibility minimums and the ultimate addition of an ILS. This option provides feasible approach capability improvements to FSD's runway end with the best overall wind coverage.

5.2.4 Runway 9/27

Runway 9/27 is not needed to achieve 95 percent wind coverage and future reconstruction may not be eligible for FAA funding. Also, operations on Runway 9/27 require Runway 15/33 and Runway 3/21 to be clear of traffic. No independent operations are allowed with the current configuration.

The recommended alternative for Runway 9/27 is ultimate conversion to a cross-field taxiway. This carries forward the recommended long-term alternative from the prior Master Plan.

5.2.5 Taxiway Concepts

Taxiway system improvements and considerations identified as part of the facility requirements analysis include:

- **Ultimately converting Runway 9/27 to a taxiway.**
- **Constructing paved taxiway shoulders for pavement serving ADG-IV and larger aircraft.**
- **Reconfiguring airfield geometry to eliminate direct access from aprons to runways.**
- **Evaluating bypass and exit taxiway improvements depicted on the prior ALP to determine if adjustments should be made.**

Runway 9/27 Conversion

As mentioned above, the recommended alternative for Runway 9/27 is conversion to a cross-field taxiway.

Eliminating Direct Access

Taxiway B5 currently provides direct access from the East Cargo Apron to the Runway 21 end. Taxiway B5 is planned to be relocated to the south to eliminate direct access.

Taxiway K currently provides direct access from the West Cargo Apron to the Runway 21 end. Proposed West GA development would eliminate direct access from Taxiway K.

Exit Taxiways, Bypass Taxiways, and Hold Bays

Taxiway improvements to increase capacity and enhance airfield efficiency were reviewed. Recommended taxiway improvements include:

- **High-speed exit taxiways for Taxiway B consistent with what is shown on the 2016 ALP.**
- **Bypass taxiways for Runway 3/21 and Runway 15/33 ends.**
- **Holding bay additions for Runway 3 and Runway 15 ends.**

As discussed in Chapter 3, *Facility Requirements*, FAA guidelines advise airport sponsors to consider airfield capacity improvements when activity reaches 60 to 75 percent of an airport's Annual Service Volume (ASV). The preferred forecasts presented in Chapter 2, *Aviation Activity Forecasts* project 48 percent of ASV being reached by the end of the planning period, below the 60 percent threshold.

While airfield capacity improvements in the form of high-speed exit taxiways may not be necessary during the 20-year planning period, it is prudent to plan for them. A high-speed exit for Runway 21

landings would reduce the need for back-taxiing from Taxiway B2 and B1 and reduce overall taxiing times. After accounting for existing exit taxiways, a practical position for the high-speed exit would be approximately 5,000' beyond the Runway 21 landing threshold. A high-speed exit for Runway 3 landings would reduce the need for back-taxiing from Taxiway B4 and B5 and reduce overall taxiing times. A location approximately 6,500' beyond the Runway 3 landing threshold is planned.

Bypass taxiways are recommended for both ends of Runway 3/21 and both ends of Runway 15/33. Bypass taxiways are entrance taxiways used to manage aircraft queuing demand by providing multiple runway access points near a runway end or threshold.

Holding bays enhance capacity by providing a space for queuing of aircraft awaiting departure clearance. Expansion and reconfiguration of the Runway 15 holding bay is recommended to increase the types of aircraft that can hold in the bay while meeting appropriate design standards. *The Runway 15 hold bay shown on the Airport Layout Plan (ALP) includes adjustments to the hold bay depicted on* ***Figure 5-1***. Preserving space for a Runway 3 holding bay is recommended; however, construction of a lower-cost bypass taxiway may sufficiently meet FSD and ATC needs over the 20-year planning period.

Ultimate Taxiway B Alignment

Taxiway B serves as a parallel taxiway to Runway 3/21. The distance from the runway centerline to parallel taxiway centerline ranges from 560 feet near the Runway 3 end to 660 feet near the Runway 21 end. A straightened Taxiway B located 560 feet from the Runway 3/21 centerline is portrayed on the 2016 ALP. Carrying forward this reconfiguration option provides FSD flexibility by increasing developable space near the Runway 21 end and potential use of the parallel taxiway as a temporary runway during periods of runway intersection construction.

However, FAA taxiway design policy changed with latest version of Advisory Circular 150/5300-13B. The updated standard requires right-angle (90-degree) intersections for runway/taxiway intersections, except where there is a need for acute angled exit taxiways, such as a high-speed exit. If the updated FAA policy remains in place, usage of Taxiway B as a runway would not be practical given the ultimate geometry of the parallel taxiway (Taxiway B would be required to cross Runway 15/33 at a right-angle).

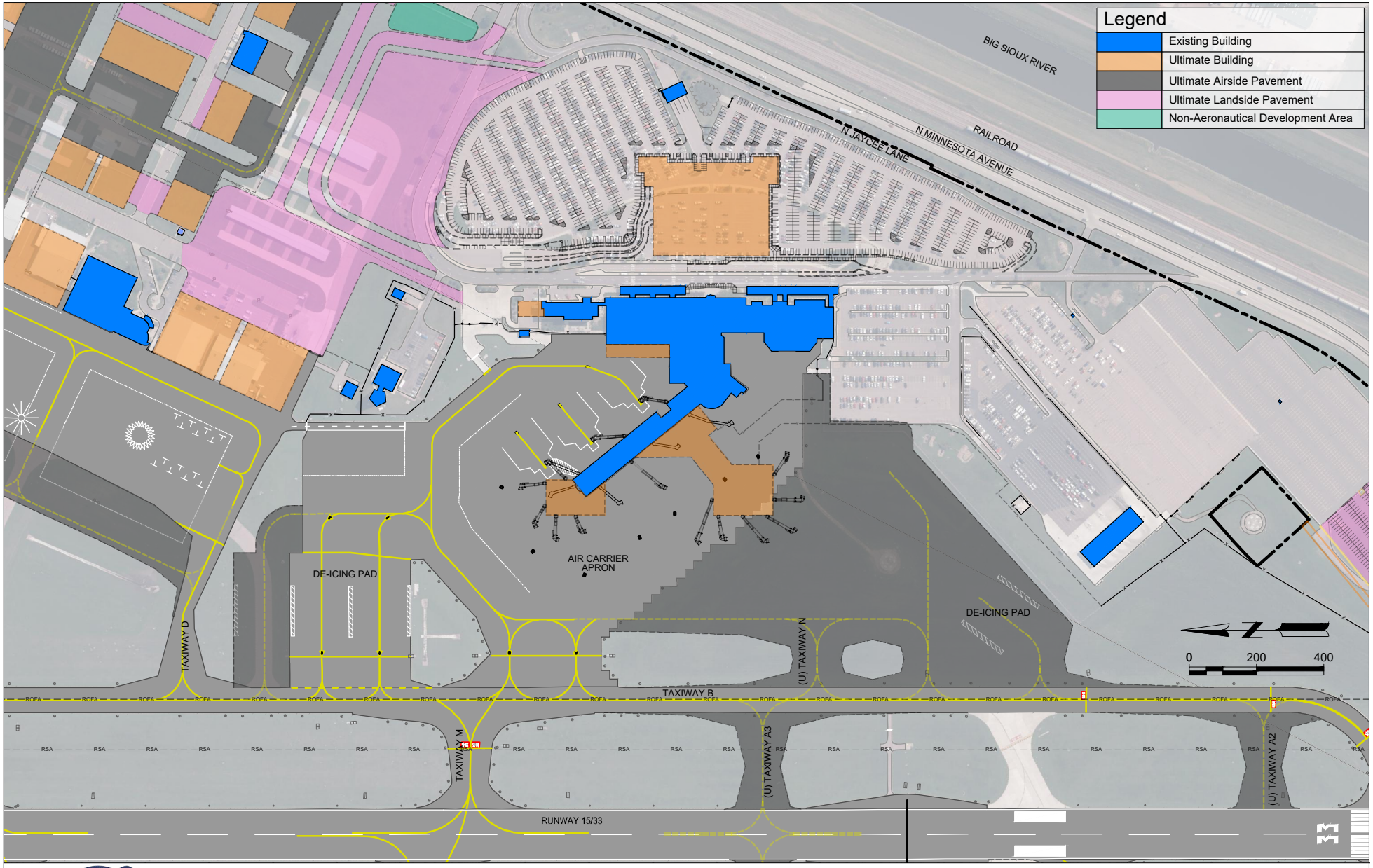
5.2.6 Terminal Area Alternatives

During development of the Master Plan, it became apparent the terminal area analysis scoped for the Master Plan would be insufficient to achieve FSD's goals with respect to implementation of near-term terminal projects. The preferred method to adequately analyze terminal facility requirements and develop alternatives to meet those needs was completion of a standalone Terminal Planning Study (TPS), which is included as **Appendix C**. Section 5 of the TPS, *Improvement Alternatives*, evaluates terminal alternatives and identifies a recommended alternative. **Figure 5-2** depicts the recommended terminal area alternative[1], including a potential relocation of the terminal access road to the north to allow for additional terminal parking.

The recommended terminal area concept also includes potential expansion areas for deicing operations or remain overnight (RON) parking positions.

[1] Adjustments have been made to the recommended terminal area after completion of this chapter. Changes include reconfiguration of apron and taxiway areas to fully meet "direct access" design standard requirements. The revised recommended terminal area alternative is shown on the Airport Layout Plan (ALP).

10/17/2023 10:39:10 AM
X:\2890700\210946.01\TECH\CAD\ALP\EXHIBITS\FSD-TERMINAL AREA MASTER PLAN.DWG



FSD
SIOUX FALLS REGIONAL AIRPORT

SIOUX FALLS
REGIONAL AIRPORT
JOE FOSS FIELD

2890700-210946.01
OCTOBER 2023

TERMINAL AREA CONCEPT

Mead & Hunt

FIGURE 5-2

5.3 Air Cargo Alternatives

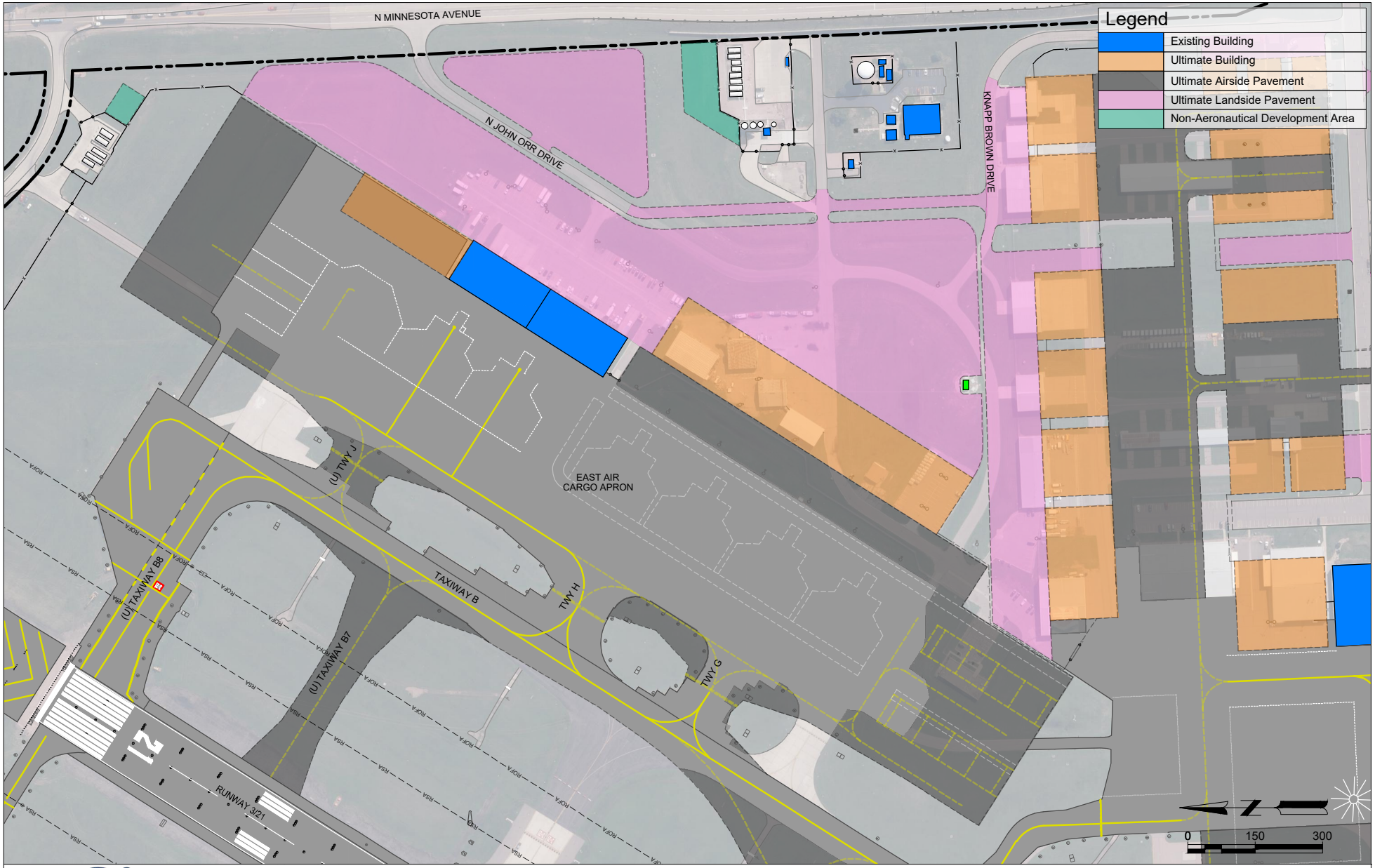
Air cargo facility requirements detailed in **Chapter 3** incorporated input from FedEx, UPS, Alpine Air Express, Encore Air Cargo, and third-party developers, along with future development scenarios provided by Hubpoint Strategic Advisors. Air cargo concept development was an iterative process involving collaboration between FSD staff, air cargo operators, and the planning team. Selection of a recommended alternative also included collaboration with FSD's engineering firm.

The project team developed East Cargo Area expansion alternatives for "north" and "south" areas separately, as well as air cargo concepts for the area northwest of the West GA Area. Numerous alternatives and iterations were considered and can be found in **Appendix E: Air Cargo Alternatives**. Concepts detailed in Appendix E were further refined until the recommended alternative, depicted on **Figure 5-3**, was selected.

The recommended development concept allows for six mainline aircraft to park nose-in on the expanded East Cargo Area apron. The apron is planned to accommodate Group IV mainline aircraft currently operating out of FSD. Feeder apron expansion to the north and south ends of the East Cargo Apron will accommodate displaced and/or increased parking needs for feeder aircraft operations.

The recommended development concept shown in **Figure 5-3** can be developed in phases as facility demands arise. A potential interim phase for East Cargo development is provided in **Appendix E.**

10/17/2023 10:41:21 AM
X:\2890700\210946.01\TECH\CAD\ALP\EXHIBITS\FSD-TERMINAL AREA MASTER PLAN.DWG



FSD
SIOUX FALLS REGIONAL AIRPORT

SIOUX FALLS
REGIONAL AIRPORT
JOE FOSS FIELD

2890700-210946.01
OCTOBER 2023

AIR CARGO CONCEPT

Mead & Hunt

FIGURE 5-3

5.4 General Aviation (GA) Area Alternatives

GA alternatives were developed for "east" and "west" GA areas. Overarching goals for alternatives development include maximizing use of available space and providing FSD flexibility to react to changing circumstances and facility needs.

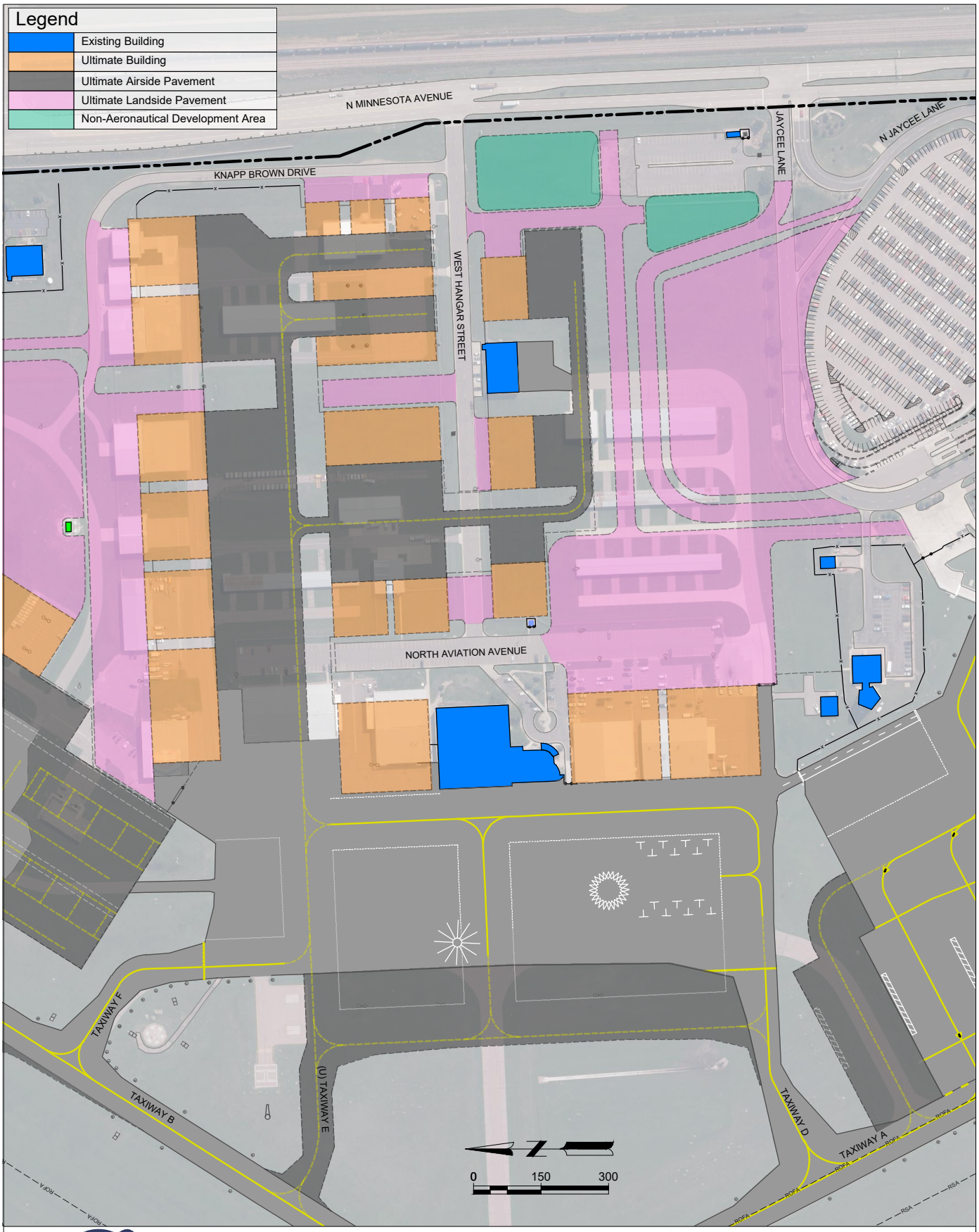
5.4.1 East GA Area Alternatives

East GA analysis evaluated alternatives to maximize available space and accommodate movement and storage of larger, more demanding aircraft than what is shown on the current ALP. Analysis also considered potential needs for adjacent air cargo and terminal facilities. Specific objectives and planning criteria for East GA development include:

- **Accommodate ADG-III aircraft operations to and from the East GA apron.** An example of this would be charter operations by Boeing 737 aircraft.
- **Improve access to hangar development.** Taxilanes providing access to hangar development areas do not meet ADG-II taxilane object free area (TLOFA) standards and limit the type of aircraft that can operate in the area.
- **Accommodate large/corporate aircraft hangars.** Concepts were developed to accommodate aircraft with wingspans up to 100 feet such as the Gulfstream GVI. A custom TLOFA of 140 feet was applied to accommodate this type of aircraft in certain areas, allowing a more efficient use of space compared to accommodating full ADG-III TLOFA standards.
- **Reuse existing facilities where appropriate.**
- **Avoid or minimize impacts to existing water wells, water lines, and other infrastructure.**
- **Minimize pavement footprint where possible to improve operational efficiency and lower construction and ongoing maintenance costs.**
- **Consider potential Airport Traffic Control Tower (ATCT) line-of-sight impacts.**
- **Consider phasing options to:**
    - Promote feasibility and flexibility.
    - Minimize impacts to existing tenants.

The recommended East GA alternative that best met the objectives listed above is depicted on **Figure 5-4**. Preliminary East GA alternatives are located in **Appendix F: East GA Alternatives** along with potential phasing of the recommended alternative.

The recommended alternative provides space for larger hangar lots along with a mix of medium-sized (executive) and small hangar development. There is flexibility in the northeast area to pursue a range of future development options (see **Appendix F**). The long-term highest and best use of the southern East GA Area is preserving the space for terminal parking expansion and associated road relocation.



FSD
SIOUX FALLS REGIONAL AIRPORT

SIOUX FALLS
REGIONAL AIRPORT
JOE FOSS FIELD

2890700-210946.01
OCTOBER 2023

EAST GENERAL AVIATION CONCEPT

Mead & Hunt

FIGURE 5-4

5.4.2 West GA Area Alternatives

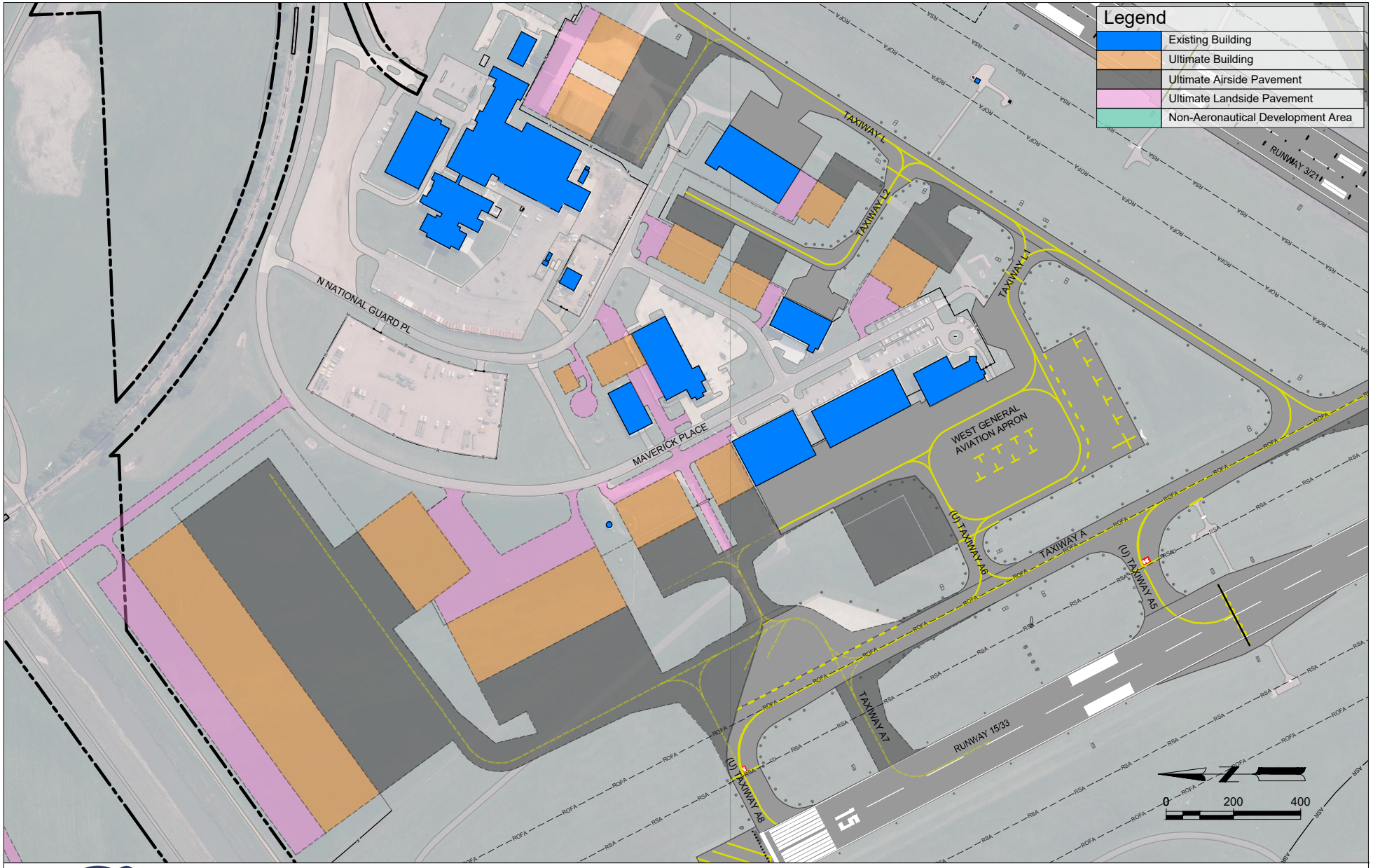
West GA alternatives analysis included determining the best options for infill in areas that are already partially developed or have development plans in place. Undeveloped greenfield space northwest of existing GA development and west of the South Dakota Army National Guard (SDARNG) facilities was evaluated for a wide range of potential uses.

Specific objectives and planning criteria for West GA development include:

- **Accommodate the movement and storage of Group III aircraft in the greenfield space.**
  - FSD has had discussions with potential tenants interested in constructing 200-foot-by-200-foot hangars to accommodate Group III aircraft.
  - Other airports in the region are not capable of supporting operations by larger, more demanding aircraft.
  - While the recommended alternative focuses on larger aircraft operations, there are options developed for the greenfield area allowing FSD flexibility to deviate from the recommended alternative, particularly along the northern edge, to accommodate smaller and mid-size aircraft.
- **Reuse existing facilities where appropriate.**
- **Minimize pavement footprint where possible to improve operational efficiency and lower construction and ongoing maintenance costs.**
- **Consider phasing options to:**
  - Promote feasibility and flexibility.
  - Minimize impacts to existing tenants.

The recommended West GA alternative that best met the objectives listed above is depicted in **Figure 5-5**. Preliminary West GA Alternatives are detailed in **Appendix G** along with potential phasing of the recommended alternative.

10/17/2023 10:44:33 AM
X:\2890700\210946.01\TECH\CAD\ALP\EXHIBITS\FSD-TERMINAL AREA MASTER PLAN.DWG



FSD
SIOUX FALLS REGIONAL AIRPORT

SIOUX FALLS
REGIONAL AIRPORT
JOE FOSS FIELD

2890700-210946.01
OCTOBER 2023

WEST GENERAL AVIATION CONCEPT

Mead & Hunt

FIGURE 5-5

5.5 Other Development Alternatives

A graphic summary of all recommended alternatives to address the Airport's facility needs is presented in **Figure 5-6: Ultimate Layout Plan**, including development concepts from the following sections.

5.5.1 Airport Traffic Control Tower (ATCT) Site Analysis

The existing ATCT at FSD was originally constructed in 1965 and has operational challenges. The tower has reduced visibility to Taxiways G, H, and J along with difficulty viewing the Runway 3 approach end.

The Master Plan analyzed potential ATCT sites on- and off-airport with the overall objective of preserving space for viable ATCT sites. In July of 2023, the FAA's Airway Facilities Tower Integration Laboratory (AFTIL) conducted a study for FSD. The study included analysis for the existing ATCT site and potential sites depicted on **Figure 5-6**.

5.5.2 Helipad

The helipad (H1) is currently located adjacent to the northwest edge of the East GA apron. The helipad is planned to be removed when East GA apron expansion occurs as depicted in **Figure 5-6**. Helicopter operators currently prefer to land on the GA aprons and the helipad is rarely used. Helipad removal will allow greater apron expansion potential.

5.5.3 Snow Removal Equipment (SRE)

In June 2021, FSD began development of a Snow Operations Maintenance & Storage Facility Master Plan. Recommended alternatives identified by the plan are depicted in **Figure 5-6** and above in **Figure 5-5: West General Aviation Concept**.

5.5.4 Aircraft Rescue and Firefighting (ARFF)

The South Dakota Air National Guard manages the ARFF building and operates its equipment. The facility is located east of Runway 3/21 in the southwest corner of the SDANG complex. Alternative ARFF sites were not analyzed as the existing facility is anticipated to meet ARFF needs for the 20-year planning period.

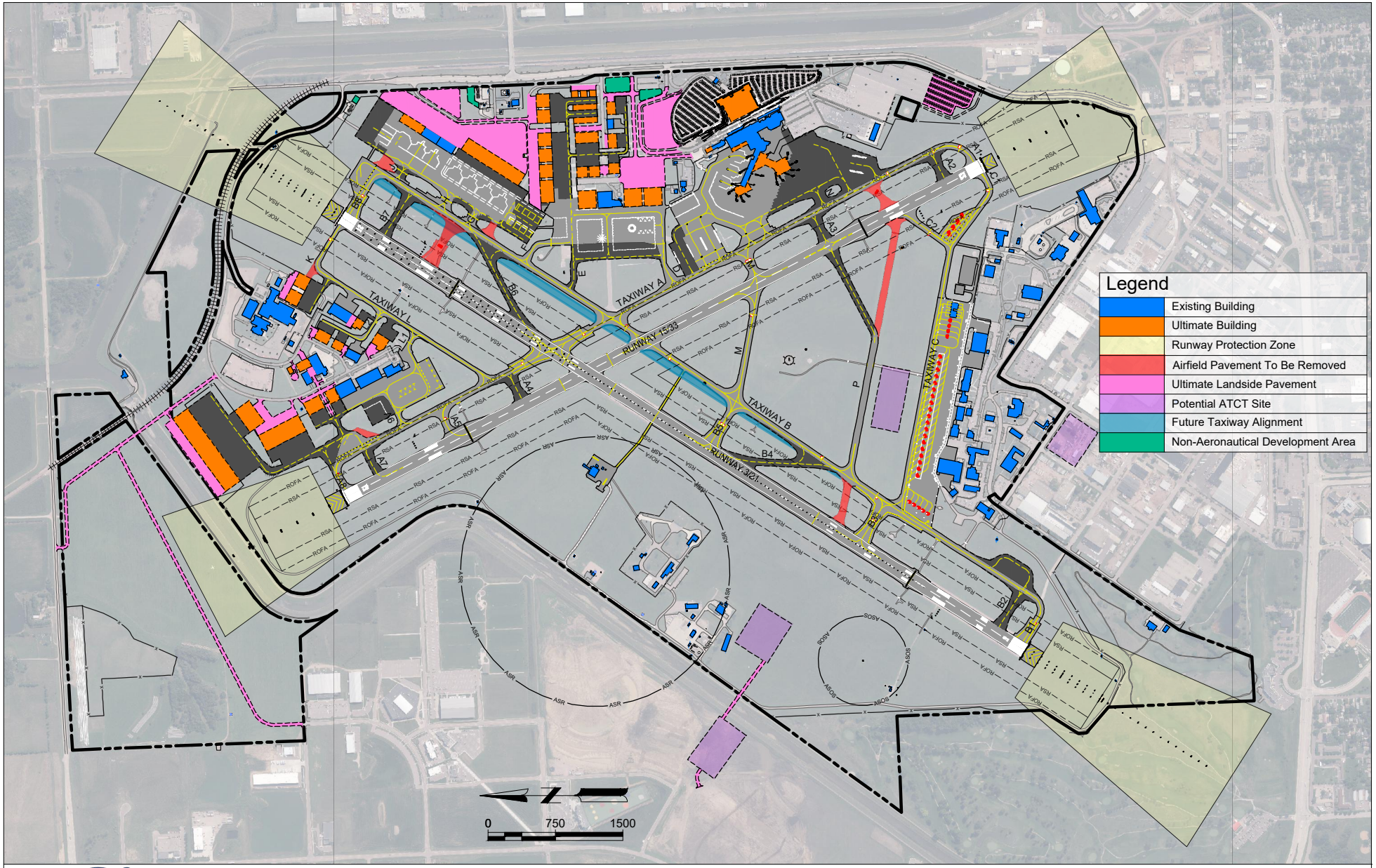
5.5.5 Access, Circulation, and Parking

Alternatives for access to the airfield across the Big Sioux River are depicted on **Figure 5-6**. Access from the north (via West 60th Street North) and west (via West 54th Street North) are shown.

5.5.6 Military Facilities

Focus group meetings with SDANG and SDARNG included discussions on potential space needs for facility expansion. Both SDANG and SDARNG indicated existing leaseholds are adequate for their respective missions.

10/17/2023 10:50:49 AM
X:\2890700\210946.01\TECH\CAD\ALP\EXHIBITS\FSD-ALP MASTER PLAN.DWG



FSD
SIOUX FALLS REGIONAL AIRPORT

SIOUX FALLS
REGIONAL AIRPORT
JOE FOSS FIELD

2890700-210946.01
OCTOBER 2023

ULTIMATE LAYOUT PLAN

Mead & Hunt

FIGURE 5-6

5.5.7 Fueling Facilities

Space adjacent to existing fuel facilities is reserved for expansion. Additional fuel facilities will be constructed by FBOs as demand arises.

5.5.8 Perimeter Fence

Adjustments to FSD's perimeter fence will be required throughout the 20-year planning horizon as expansion occurs. Potential fence locations for the ultimate configuration are depicted on recommended alternative figures. Ultimate fence locations assume the perimeter fence will tie into hangar or other building construction in development areas.

5.6 Summary

The development alternatives selected in this chapter provide FSD with options to meet demands of its users throughout the 20-year planning horizon. **Chapter 6: Facilities Implementation Plan** will provide guidance on how to implement the findings and recommendations of the Master Plan.