



MAX WESTHEIMER AIRPORT
The UNIVERSITY of OKLAHOMA
Master Plan Update

Development Alternatives



04 DEVELOPMENT ALTERNATIVES

4.1 OVERVIEW

The previous chapter identified the airside and landside facility requirements needed to satisfy the forecast demand throughout the entirety of the 20-year planning period. Using the identified requirements, the following recommendations have been made to address how those requirements will be met using various development alternatives. This chapter will analyze the benefits and weaknesses associated with each alternative and provide a strategy for selecting a preferred airport development plan. Once selected, the preferred alternative will be implemented into the Airport Layout Plan (ALP) drawings.

The objective of this effort is to develop a balanced airside infrastructure and appropriate landside aircraft storage infrastructure to best serve the forecast aviation demands. Assessment of each alternative is grounded primarily in local, state, and federal planning standards; however, technical judgement must also be applied to determine the appropriate course of action, factors surrounding the development and evaluation of design options should be assessed. These factors include:

- Develop a safety-oriented and efficient aviation facility through compliance with Federal Aviation Administration (FAA) airport design standards and airspace criteria as defined in FAA Advisory Circular (AC) 150/5300-13B, *Airport Design*.
- The short- and long-term development costs of the defined alternatives.
- Compatibility with existing and proposed land uses, with respect given to zoning ordinances and neighboring off-airport uses.
- Setback, design, and safety criteria used as the basis for the layout of associated airport facilities based on the size and type of aircraft forecast to utilize and operate at the airport.
- Compatibility with the short- and long-range goals of the University of Oklahoma, Oklahoma Aeronautics Commission, and the Federal Aviation Administration.
- Minimization of environmental impacts on and off-airport.
- Recognize the ongoing discussion concerning the location of the ATCT facility. Alternative sites should help identify future facilities in consideration of the airside and development recommendations.

Alternatives to be considered will include options for both airside and landside development.

4.2 FACILITY REQUIREMENTS SUMMARY

Facility requirements are intended to compare existing facilities with current safety standards as well as the demand for new or expanded facilities. The facilities previously outlined in Chapter 3 have provided the baseline to determine the feasibility to accommodate various alternatives. In addition, airfield demand/capacity, airside facility requirements, and landside capacity have all been evaluated during the selection of alternatives. Two primary standards are considered when evaluating facility requirements. First, alternatives must meet the design requirements established by the current and

future Airport Reference Code (ARC) and second, standards identified in FAA Advisory Circular 150/5300-13B, *Airport Design* must be met.

To meet future facility requirements, Max Westheimer Airport must make provisions to accommodate future operations. The demand for additional facilities was calculated in the previous chapter and can be summarized by examining forecast-based aircraft and operations.

1. **Based Aircraft:** OUN currently accommodates 123 based aircraft; this number is expected to increase to as much as 169 by 2041. (Table 4.1)
2. **Operations:** In 2021, OUN had 48,284 operations; this is expected to rise to as much as 66,325 by 2041. (Table 4.1)

TABLE 4.1 – SUMMARY OF AVIATION OPERATIONS

Operations	2021	2026	2031	2036	2041
GENERAL AVIATION	47,684	51,672	55,990	60,664	65,725
Air Taxi	480	520	560	600	660
Single-Engine Piston	19,504	20,952	22,830	24,664	26,665
Multi-Engine Piston	7,200	7,300	7,300	7,300	7,300
Turbo-prop (SE)	2,400	3,100	4,000	4,900	5,900
Turbo-prop (ME)	4,800	5,200	5,600	6,100	6,600
Business Jet	12,000	13,100	14,100	15,300	16,600
Helicopter	1,300	1,500	1,600	1,800	2,000
MILITARY	600	600	600	600	600
TOTAL OPERATIONS	48,284	52,272	56,590	61,264	66,325
Local Operations	23,353	25,091	27,163	29,407	31,836
Itinerant Operations	24,931	27,181	29,427	31,857	34,489
Based Aircraft					
Single-Engine	91	97	104	111	118
Multi-Engine	10	10	11	11	12
Turbo-prop (SE)	1	3	4	6	8
Turbo-prop (ME)	6	7	9	11	12
Jet	7	8	9	9	10
Helicopter	8	8	8	8	9
TOTAL	123	133	144	156	169

Source: KSA

4.2.1 AIRSIDE REQUIREMENTS

Airside facilities include infrastructure that interacts with the arrival and departure of aircraft as well as their subsequent movement around the airfield to parking and storage areas. Areas of focus include runway/taxiway dimensions, aprons, navigational aids (NAVAIDS), landing aids, and dimensional standards. These criteria are considered during the development of the airside alternatives.

4.2.2 LANDSIDE REQUIREMENTS

Various landside improvements are recommended to accommodate current and forecast aviation activity throughout the planning period at Max Westheimer Airport. As stated in Chapter 3, *Facility Requirements*, areas of particular focus include:

- Provide additional aircraft storage hangars of various size
 - Conventional/Box Hangars
 - T-hangars
- Expanded automobile parking
- Increased fuel storage capacity
- Preservation of land for expansion and/or development

These facility requirements are developed from the analysis of the demand capacity and capacity requirements and based on standards established by FAA Advisory Circular 150/5300-13B, *Airport Design*. Each of these proposed alternatives will incorporate these improvements while following compliance with FAA Airport Design Standards with regards to the following landside development.

The following improvements outlined in **Table 4.2** were recommended in the previous chapter and are intended to meet future design requirements as well as enhance the efficiency of the airfield. Each of the proposed alternatives will incorporate these improvements while ensuring compliance with FAA Airport Design standards.

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TABLE 4.2 – SUMMARY OF FACILITY REQUIREMENTS

Facility	Planning Considerations	Justification
Airport Reference Code	C-II – existing and ultimate time frame unless change in fleet mix dictates	Safety and Capacity
Runway 18/36	Maintain existing 5,199' with ultimate option for extension to 6,971'	Capacity
Runway 3/21	Maintain existing 4,748'	Capacity
Taxiways	Maintain existing 35' width, eliminate hotspots	Safety and Capacity
Pavement Strength	90,000 lbs. Dual Wheel	Capacity
Runway / Taxiway Lighting	Maintain existing LED MITL, MIRL, and MALSR	Safety and Capacity
Hangar Space	A variety of hangars will be necessary during the planning period and will vary depending on size and market needs.	Airport revenue enhancement (FAA grant assurances).
Aircraft Parking Apron	Maintain existing apron area.	Capacity
Terminal Building Space	Maintain existing sq. ft.	Capacity
Parking	Auto parking expansion to 170 spaces	Access
Fuel	Long-term – Install 12,000-gallon Jet-A tank	Capacity
Security Fencing	Maintain current fencing; add as necessary	Safety/Security

Source: KSA

4.3 DEVELOPMENT ALTERNATIVES EVALUATION

The following section will evaluate three development alternatives representing a variety of airside and landside options. As outlined in the *Inventory of Existing Conditions* chapter, Max Westheimer Airport is based on a dual-runway system. Runway 18/36 is 5,199' by 100' and Runway 3/21 is 4,748' by 100'. To help determine terminal support area facilities for future planning periods, landside capacity and future demand were evaluated for itinerant and based aircraft parking aprons, aircraft storage facilities, automobile parking, fuel storage, and support area requirements. Both conventional and T-hangars are needed during all phases of the planning period.

Development strategies were explored at Max Westheimer Airport based on the following criteria:

- Market Position
- Regional economic development opportunities
- SWOT analysis results from stakeholders

According to the forecast based-aircraft counts, expected increases in local and itinerant operations are anticipated. Alternative development options have been established to accommodate the projected demand for the 20-year planning period. It should be noted that future development of aircraft storage facilities is demand-based and market-dictated.

The number, size, and location of these facilities will vary depending on the demand for the specific type and flexibility to accommodate a variety of users. Additionally, there are important development guidelines that the airport sponsor should consider when making hangar placement determinations at the airport, which include:

- Each executive hangar should be supplied with taxiway access that is separated from automobile access and adjacent automobile parking. This is most efficiently accomplished when a row of hangars is developed and provided with taxiway access on one side and automobile access and parking on the other side.
- Each T-hangar should be nested and developed with taxiway access to both sides of the hangar. Controlled automobile access should be provided to the taxiway/apron area near the T-hangars, and a public access parking area should be provided near the T-hangar facilities to accommodate both users and visitors.

The following alternatives have been assembled to provide a full range of design options. These alternatives are based on the forecasts of aviation activity, facility requirement needs, and potential expansions at the airport. Additionally, these alternatives include hangar, apron, and access taxiway development improvements based on input received from airport personnel and stakeholders, coupled with the projected aircraft storage improvements that will be needed to serve the aviation user. It is important to recognize the ultimate build-out of the various aviation development areas presented far exceeds that which is projected for the 20-year planning period of this study.

There are several commonalities between each alternative that will be discussed prior to analyzing specific alternatives. In all alternatives, the University-owned areas immediately to the east of the Terminal Building have been depicted as aviation development and non-aviation institution educational development areas. The landside alternatives section of this chapter will discuss this area in further detail. A 39-acre Through-the-Fence development area has also been depicted to the west of Runway 18/36, on land that is currently not owned by the Airport or the University. A new full-length parallel taxiway to the west of Runway 18/36 has also been depicted in each alternative. This taxiway would only serve users of private through-the-fence development and therefore will only be constructed if a private entity chooses to fund it. Each alternative also depicts three approximate potential locations for a new Air Traffic Control Tower, for which a concurrent siting study is being conducted.

4.3.1 AIRSIDE ALTERNATIVE ONE

Graphically depicted in **Exhibit 4.1**, Airside Alternative One recommends lengthening Runway 18/36 to 6,530 feet, with no length alteration made to Runway 3/21. The primary objective for this airside alternative is to maximize the length of Runway 18/36 while keeping all associated enhancements within the confines of current airport property. Due to the limitations imposed by the existing road layout, there is no perfect way to accomplish this, as lengthening is only feasible to the south, which leads either to an intersection with Runway 3/21, or requires the shortening of Runway 3/21.

Airside Design Considerations Summary

- Extend Runway 18/36 1,331 feet to the south, resulting in an ultimate length of 6,530 feet. This length was derived by extending the runway as far as possible while keeping the Runway Protection Zone (RPZ) entirely on airport property. No alteration is made to Runway 3/21.
- The proposed extension creates a confusing intersecting point between Taxiway A1, the threshold of Runway 36, and Runway 3/21. To eliminate this, a section of Taxiway A and A1 is proposed to be demolished, and a new End Around Taxiway (EAT) constructed to allow access to the threshold of Runway 3. An EAT visual screen is constructed between Runway 18/36 and the EAT. This screen's purpose is to create a visual barrier between aircraft landing or departing on Runway 18 and aircraft taxiing on the EAT. Without this barrier, it is possible for pilots to see a taxiing aircraft and falsely believe it is crossing the runway, leading to unnecessary go-arounds or aborted takeoffs. The localizer for Runway 18 would need to be relocated as part of this project.

- Remove a section of pavement between the ramp and Taxiway A, near the intersection with Taxiways D and E, to eliminate the Hot Spot caused by direct access from the ramp to Runway 3/21. Add taxiway lighting to the new taxiway edge.
- Retain C-II design standards for both runways.
- Construct a new full-length west side parallel taxiway with connectors for Runway 18/36.
- Acquire or obtain aviation easements for approximately 60 acres of property underlying existing Runway 18, 3, and 21 RPZs.

Pros

- An extended Runway 18/36 will be able to accommodate much of the general aviation fleet on a wide range of missions in various environmental conditions.
- Alternative One will retain airport enhancements, including relocated RPZs, within current airport property.
- This alternative will retain a two-runway operational system including a crosswind runway.

Cons

- This layout will create crossing runway geometry, which is ideally avoided to minimize the risk of runway incursions.
- The Runway 18 localizer will have to be relocated.
- The End Around Taxiway will increase the cost of improvements.

Estimated Pavement Construction and Removal Costs

The following **Table 4.3** presents estimated costs of construction and removal of runway and taxiway pavement for Airside Alternative One based on estimated rates of \$150 per square yard of runway constructed, \$135 per square yard of taxiway constructed, and \$40 per square yard of taxiway or runway removed. These estimated rates include associated engineering, design, and administrative costs, in addition to the installation of non-pavement elements such as lighting.

TABLE 4.3 – AIRSIDE ALTERNATIVE ONE ESTIMATED COSTS

	Sq. yds.	Cost
Runway pavement added	14,791.53	\$2,218,729.50
Runway pavement removed	0	\$0.00
Taxiway pavement added	26,883.72	\$3,629,302.20
Taxiway pavement removed	8,258.29	\$330,331.60
Total Cost		\$6,178,363.30

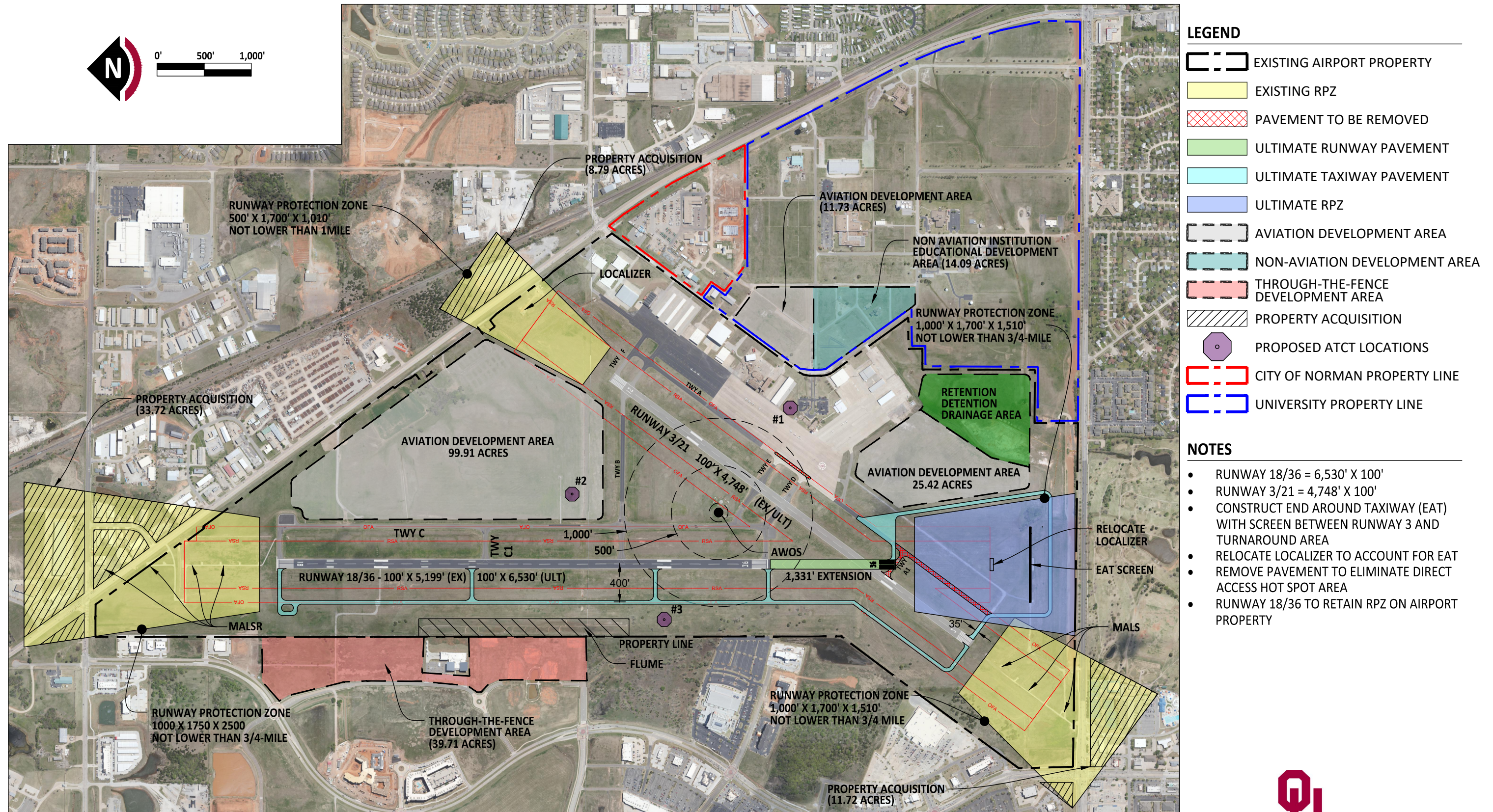


EXHIBIT 4.1 - AIRSIDE ALTERNATIVE ONE

4.3.2 AIRSIDE ALTERNATIVE TWO

Airside Alternative Two, as depicted in **Exhibit 4.2**, maintains a similar airport layout to Airside Alternative One. The major difference between the two is that Alternative One extends Runway 18/36 to 6,530 feet, keeping the runway's RPZ on airport property, while Alternative Two extends the Runway to 6,971 feet, which places some portions of the RPZ over Robinson Street and Westwood Park Golf Course. This additional length results in a negligible pavement construction cost difference of approximately \$174,000 while allowing the Airport to handle more frequent operations by larger corporate jets, like Bombardier Global Expresses, as reflected in the Balanced Field Length calculations performed in *Facility Requirements*.

Airside Design Considerations Summary

- Extend Runway 18/36 1,772 feet to the south, resulting in an ultimate length of 6,971 feet. This length was derived by extending the runway as much as possible while maintaining the minimum separation between the runway threshold and the current placement of Runway 18's localizer, as dictated by the Runway Safety Area and Runway Object Free Area lengths of 1,000 feet beyond the threshold.
- The above extension creates an intersecting point of non-standard geometry between Taxiways A and A1, the threshold of Runway 36, and Runway 3/21. To eliminate this, a section of Taxiway A and A1 is proposed to be demolished, and a new End Around Taxiway (EAT) is constructed to allow access to the threshold of Runway 3.
- Remove a section of pavement between the ramp and Taxiway A, near the intersection with Taxiways D and E, to eliminate the hot spot caused by direct access from the ramp to Runway 3/21. Add taxiway lighting to the new taxiway edge.
- Construct a new full-length west side parallel taxiway with connectors, serving Runways 18/36 and 3/21.
- Retain C-II design standards for both runways.
- Acquire or obtain avigation easement for 14.26 acres of property to account for Runway 36 RPZ shift.
- Acquire or obtain avigation easements for approximately 60 acres of property underlying existing Runway 18, 3, and 21 RPZs.

Pros

- An extended Runway 18/36 will be able to accommodate much of the general aviation fleet on a wide range of missions in various environmental conditions.
- This alternative will retain a two-runway operational system including a crosswind runway.
- The localizer will not have to be relocated.

Cons

- This layout will create crossing runway geometry, which is ideally avoided to minimize the risk of runway incursions.
- Runway 36 RPZ is shifted off of airport property.
- Runway 18/36 extension could increase noise to the south as some larger aircraft could be lower later in their departure.
- The End Around Taxiway will increase the cost of improvements.

Estimated Pavement Construction and Removal Costs

The following **Table 4.4** presents estimated costs of construction and removal of runway and taxiway pavement for Airside Alternative Two based on estimated rates of \$150 per square yard of runway constructed, \$135 per square yard of taxiway constructed, and \$40 per square yard of taxiway or runway removed. These estimated rates include associated engineering, design, and administrative costs, in addition to the installation of non-pavement elements such as lighting.

TABLE 4.4 – AIRSIDE ALTERNATIVE TWO ESTIMATED COSTS

	Sq. yds.	Cost
Runway pavement added	19,690.43	\$2,953,564.50
Runway pavement removed	0	\$0.00
Taxiway pavement added	22,280.01	\$3,007,801.35
Taxiway pavement removed	9,767.07	\$390,682.80
Total Cost		\$6,352,048.65

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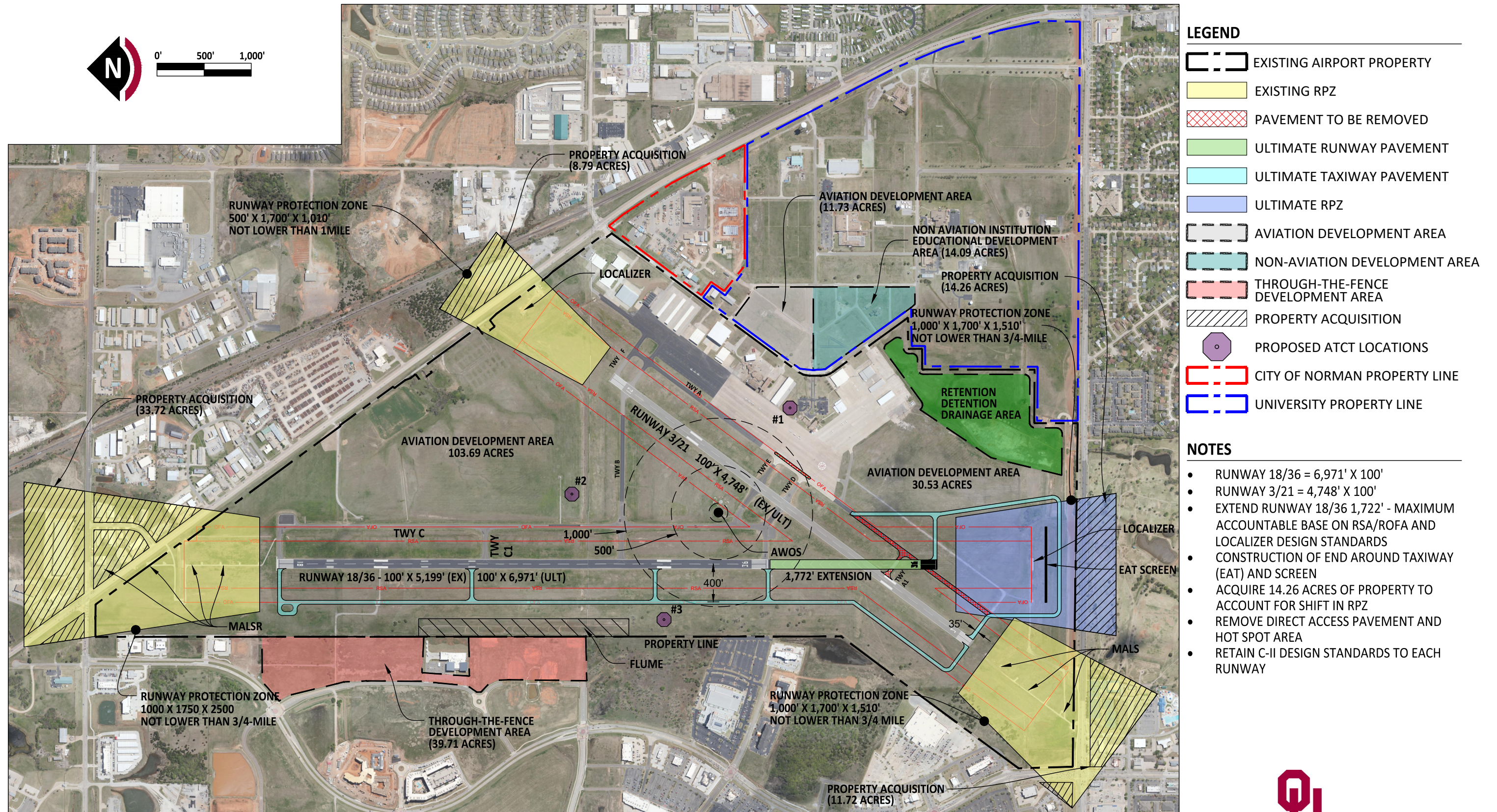


EXHIBIT 4.2 - AIRSIDE ALTERNATIVE TWO

4.3.3 AIRSIDE ALTERNATIVE THREE

Exhibit 4.3 illustrates Airside Alternative Three, which aims to lengthen Runway 18/36 while eliminating the need for an End Around Taxiway by avoiding intersecting runways. In doing so, this alternative shortens Runway 3/21 to 3,256 feet and changes the Runway's airport design code from C-II to B-II. By doing this, Runway 18/36 can be extended to 6,530 feet without intersecting Runway 3/21.

Airside Design Considerations Summary

- Extend Runway 18/36 1,331 feet to the south, resulting in an ultimate length of 6,530 feet. This length was derived by extending the runway as far as possible while keeping the Runway Protection Zone (RPZ) entirely on airport property.
- Runway 3/21 is redeveloped to be 75 feet wide and 3,256 feet long. This is accomplished by extending the runway 946 feet to the north and removing 2,438 feet from the south.
- Revising ARC C-II to B-II design standards for Runway 3/21.
- Decommission MALS and localizer for Runway 3/21.
- Remove a section of pavement between the ramp and Taxiway A, near the intersection with Taxiways D and E, to eliminate the hot spot caused by direct access from the ramp to Runway 3/21. Add taxiway lighting to the new taxiway edge.
- Construct a new full-length west side parallel taxiway with connectors for Runway 18/36.
- Acquire or obtain avigation easement for 9.49 acres of property to account for Runway 21 RPZ shift to the north.
- Acquire or obtain avigation easement for approximately 34 acres of property underlying existing Runway 18 RPZ.

Pros

- Operations can continue to be conducted on a non-intersecting dual runway layout.
- Avoids the costly construction and additional taxi time of an End Around Taxiway.

Cons

- Removes improvements from FAA grants over the last 10 years.
- Runway 21 RPZ is shifted further off airport property.
- The reduced length of Runway 3/21 could have operational impacts in the event of a closure of Runway 18/36, especially to larger aircraft.
- Removal of Runway 3 localizer approach decreases instrument approach options for arriving aircraft.
- Overall cost of improvements.

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Estimated Pavement Construction and Removal Costs

The following **Table 4.5** presents estimated costs of construction and removal of runway and taxiway pavement for Airside Alternative Three based on estimated rates of \$150 per square yard of runway constructed, \$135 per square yard of taxiway constructed, and \$40 per square yard of taxiway or runway removed. These estimated rates include associated engineering, design, and administrative costs, in addition to the installation of non-pavement elements such as lighting.

TABLE 4.5 – AIRSIDE ALTERNATIVE THREE ESTIMATED COSTS

	Sq. yds.	Cost
Runway pavement added	22,676.01	\$3,401,401.50
Runway pavement removed	25,155.53	\$1,006,221.20
Taxiway pavement added	19,588.24	\$2,644,412.40
Taxiway pavement removed	11,580.97	\$463,238.80
Total Cost		\$7,515,273.90

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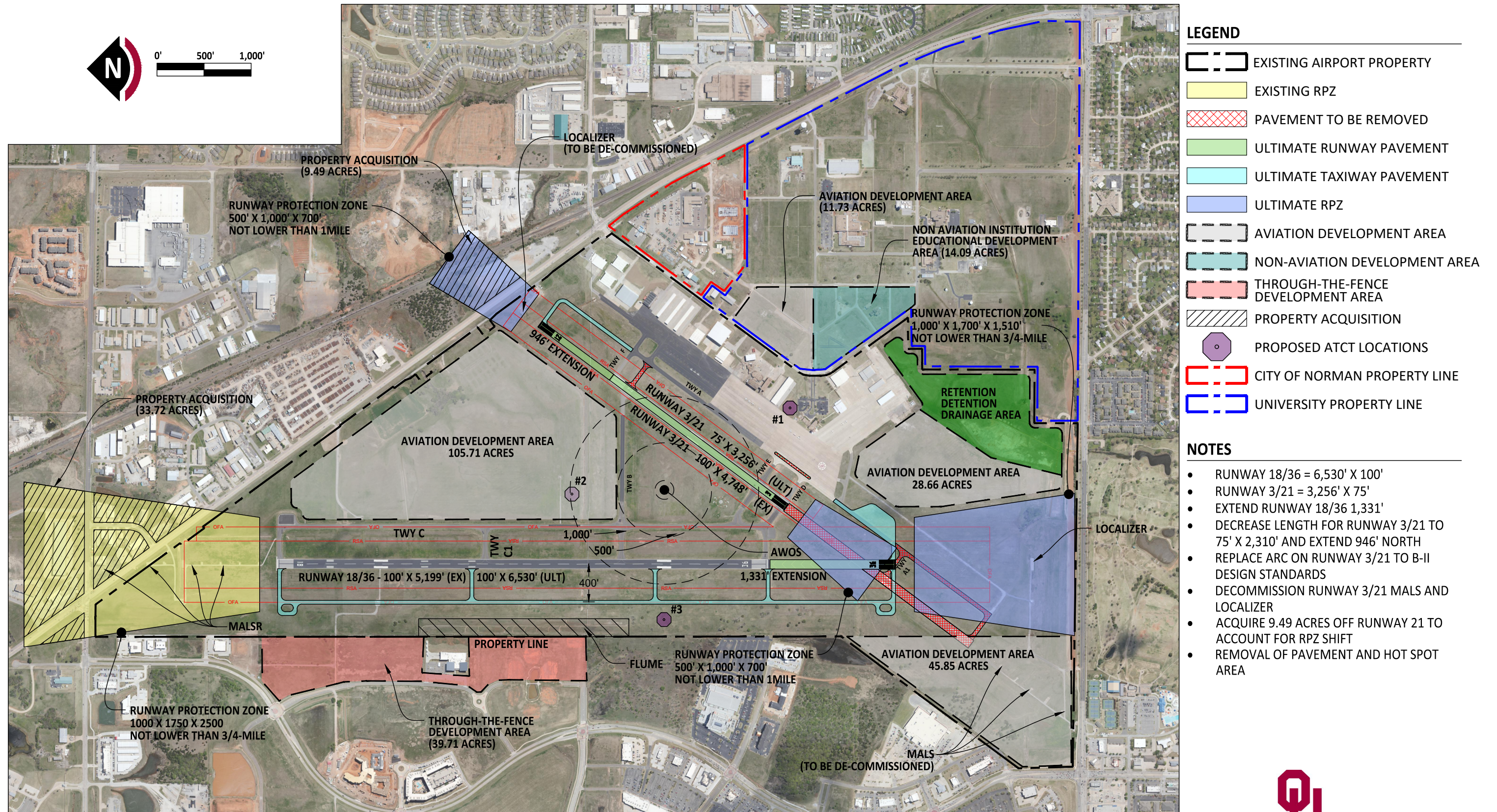


EXHIBIT 4.3 - AIRSIDE ALTERNATIVE THREE

4.3.4 AIRSIDE ALTERNATIVE FOUR

Airside Alternatives Four and Five differ significantly from the other airside alternatives in that they alter the airport's runway configuration more drastically in order to create the ideal airport layout for future growth. Eliminating nonstandard geometry is a major goal in airfield planning, and Alternatives Four and Five emphasize this effort. The major difference between the two is that Airside Alternative Four retains the Runway 36 RPZ on airport property, while Airside Alternative Five extends the RPZ further to the south. **Exhibit 4.4** depicts Airside Alternative Four.

Airside Design Considerations Summary

- Extend existing Runway 18/36 1,331 feet to the south, resulting in an ultimate length of 6,530 feet. This length was derived by extending the runway as far as possible while keeping the Runway Protection Zone (RPZ) entirely on airport property.
- Construct new parallel runway, Runway 18L/36R, to the east of the existing Runway 18/36. The existing runway's designation would change to 18R/36L. The new parallel Runway 18L/36R will be 5,000 feet long and 75 feet wide with ARC B-II design standards. The parallel runways will have a separation of 700 feet, the minimum distance required for simultaneous operations under visual flight rules (VFR).
- Close and remove Runway 3/21. Decommission MALS and localizer for Runway 3/21. Demolish associated taxiway infrastructure.
- Construct a new full-length parallel taxiway with connectors for Runway 18L/36R.
- Construct a new full-length west side parallel taxiway with connectors for Runway 18R/36L.
- Relocate AWOS equipment.
- Designate all areas between the existing ramp and the parallel taxiway for Runway 18L/36R as aviation development area, allowing the landside areas to fill in with standard geometry to the runways.
- Acquire approximately 34 acres of property underlying existing Runway 18 RPZ.

Pros

- Parallel runway layout simplifies operations, and overall airport geometry will mitigate confusion and maximize efficiency.
- Retains dual runway system.
- Expands area available for aeronautical development on the northeast side of the Airport.
- Retains all improvements and associated RPZs within airport property.

Cons

- Large cost associated with constructing entirely new runway.
- Removal of Runway 3 localizer approach decreases instrument approach options for arriving aircraft.
- Operators of small aircraft (less than 12,500 pounds) may lose some operational capability with loss of crosswind runway.

Estimated Pavement Construction and Removal Costs

The following **Table 4.6** presents estimated costs of construction and removal of runway and taxiway pavement for Airside Alternative Four based on estimated rates of \$150 per square yard of runway constructed, \$135 per square yard of taxiway constructed, and \$40 per square yard of taxiway or runway removed. These estimated rates include associated engineering, design, and administrative costs, in addition to the installation of non-pavement elements such as lighting.

TABLE 4.6 – AIRSIDE ALTERNATIVE FOUR ESTIMATED COSTS

	Sq. yds.	Cost
Runway pavement added	56,455.56	\$8,468,334.00
Runway pavement removed	52,851.71	\$2,114,068.40
Taxiway pavement added	44,154.21	\$5,960,818.35
Taxiway pavement removed	36,689.38	\$1,467,575.20
Total Cost		\$18,010,795.95

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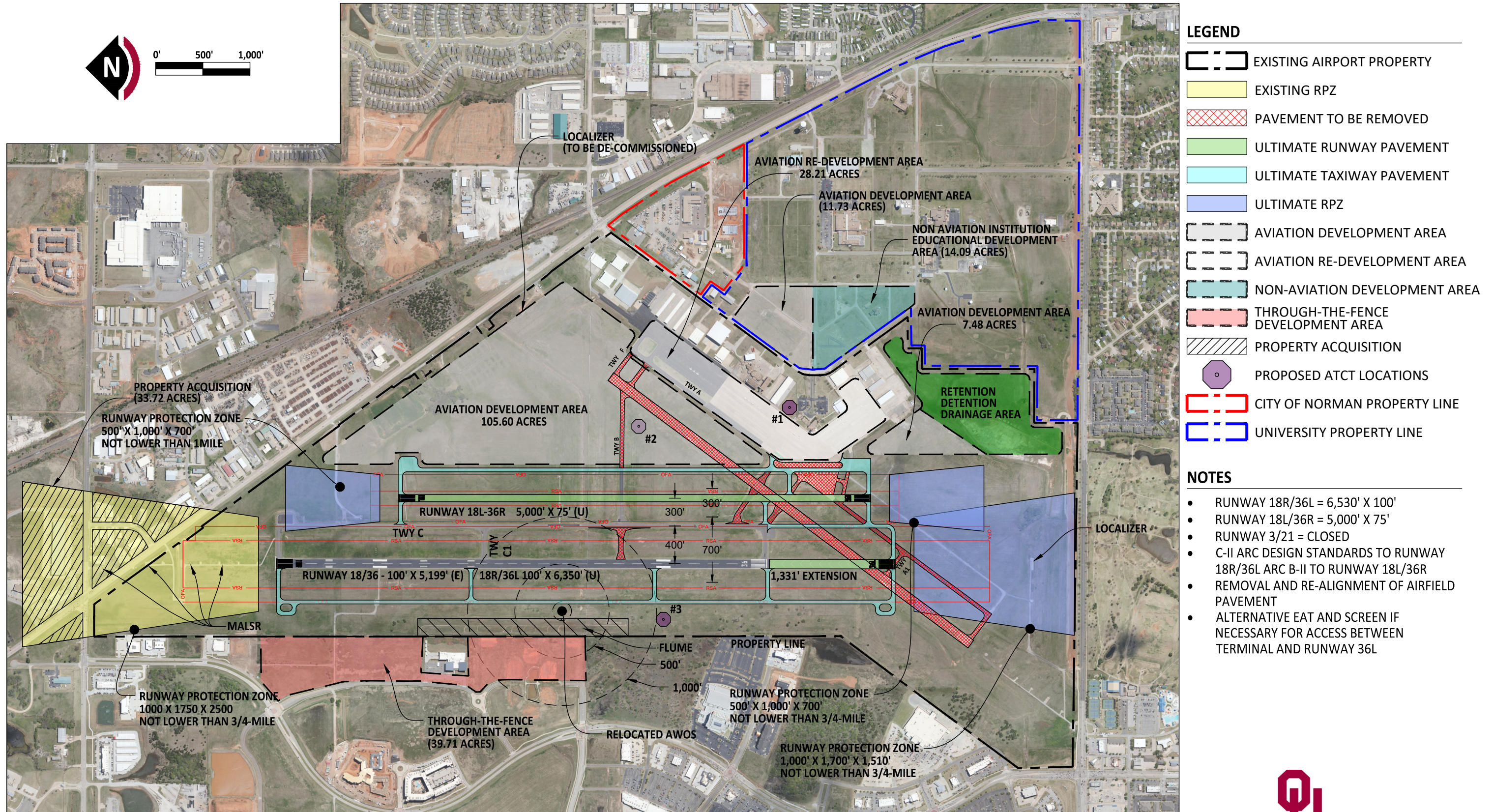


EXHIBIT 4.4 - AIRSIDE ALTERNATIVE FOUR

4.3.5 AIRSIDE ALTERNATIVE FIVE

Airside Alternatives Four and Five differ significantly from the other airside alternatives in that they alter the airport's runway configuration more drastically in order to create the ideal airport layout for future growth. Eliminating nonstandard geometry is a major goal in airfield planning, and Alternatives Four and Five emphasize this effort. The major difference between the two is that Airside Alternative Four retains the Runway 36 RPZ on airport property, while Airside Alternative Five extends the RPZ further to the south. **Exhibit 4.5** depicts Airside Alternative Five.

Airside Design Considerations Summary

- Extend existing Runway 18/36 1,772 feet to the south, resulting in an ultimate length of 6,971 feet. This length was derived by extending the runway as much as possible while maintaining the minimum separation between the runway threshold and the current placement of Runway 18's localizer, as dictated by the Runway Safety Area and Runway Object Free Area lengths of 1,000 feet beyond the threshold.
- Construct new parallel runway, Runway 18L/36R, to the east of the existing Runway 18/36. The existing runway's designation would change to 18R/36L. The new parallel Runway 18L/36R will be 5,000 feet long and 75 feet wide with ARC B-II design standards. The parallel runways will have a separation of 700 feet, the minimum distance required for simultaneous operations under visual flight rules (VFR).
- Close and remove Runway 3/21. Decommission MALS and localizer for Runway 3/21. Demolish associated taxiway infrastructure.
- Construct a new full-length parallel taxiway with connectors for Runway 18L/36R.
- Construct a new full-length west side parallel taxiway with connectors for Runway 18R/36L.
- Relocate AWOS equipment.
- Designate all areas between the existing ramp and the parallel taxiway for Runway 18L/36R as aviation development area, allowing the landside areas to fill in with standard geometry to the runways.
- Acquire or obtain avigation easement for 14.26 acres of property to the south to accommodate shift of Runway 36L RPZ.
- Acquire approximately 34 acres of property underlying existing Runway 18 RPZ.

Pros

- Parallel runway layout simplifies operations, and overall airport geometry will mitigate confusion and maximize efficiency.
- Retains dual runway system.
- Expands area available for aeronautical development on the northeast side of the Airport.

Cons

- Large cost associated with constructing entirely new runway.
- Shifts Runway 36L RPZ outside of airport property.
- Operators of small aircraft (less than 12,500 pounds) may lose some operational capability with loss of crosswind runway.
- Removal of Runway 3 localizer approach decreases instrument approach options for arriving aircraft.

- Runway 18/36 extension could increase noise to the south as some larger aircraft could be lower later in their departure.

Estimated Pavement Construction and Removal Costs

The following **Table 4.7** presents estimated costs of construction and removal of runway and taxiway pavement for Airside Alternative Five based on estimated rates of \$150 per square yard of runway constructed, \$135 per square yard of taxiway constructed, and \$40 per square yard of taxiway or runway removed. These estimated rates include associated engineering, design, and administrative costs, in addition to the installation of non-pavement elements such as lighting.

TABLE 4.6 – AIRSIDE ALTERNATIVE FIVE ESTIMATED COSTS

	Sq. yds.	Cost
Runway pavement added	61,357.10	\$9,203,565.00
Runway pavement removed	52,851.71	\$2,114,068.40
Taxiway pavement added	43,252.90	\$5,839,141.50
Taxiway pavement removed	36,689.38	\$1,467,575.20
Total Cost		\$18,624,350.10

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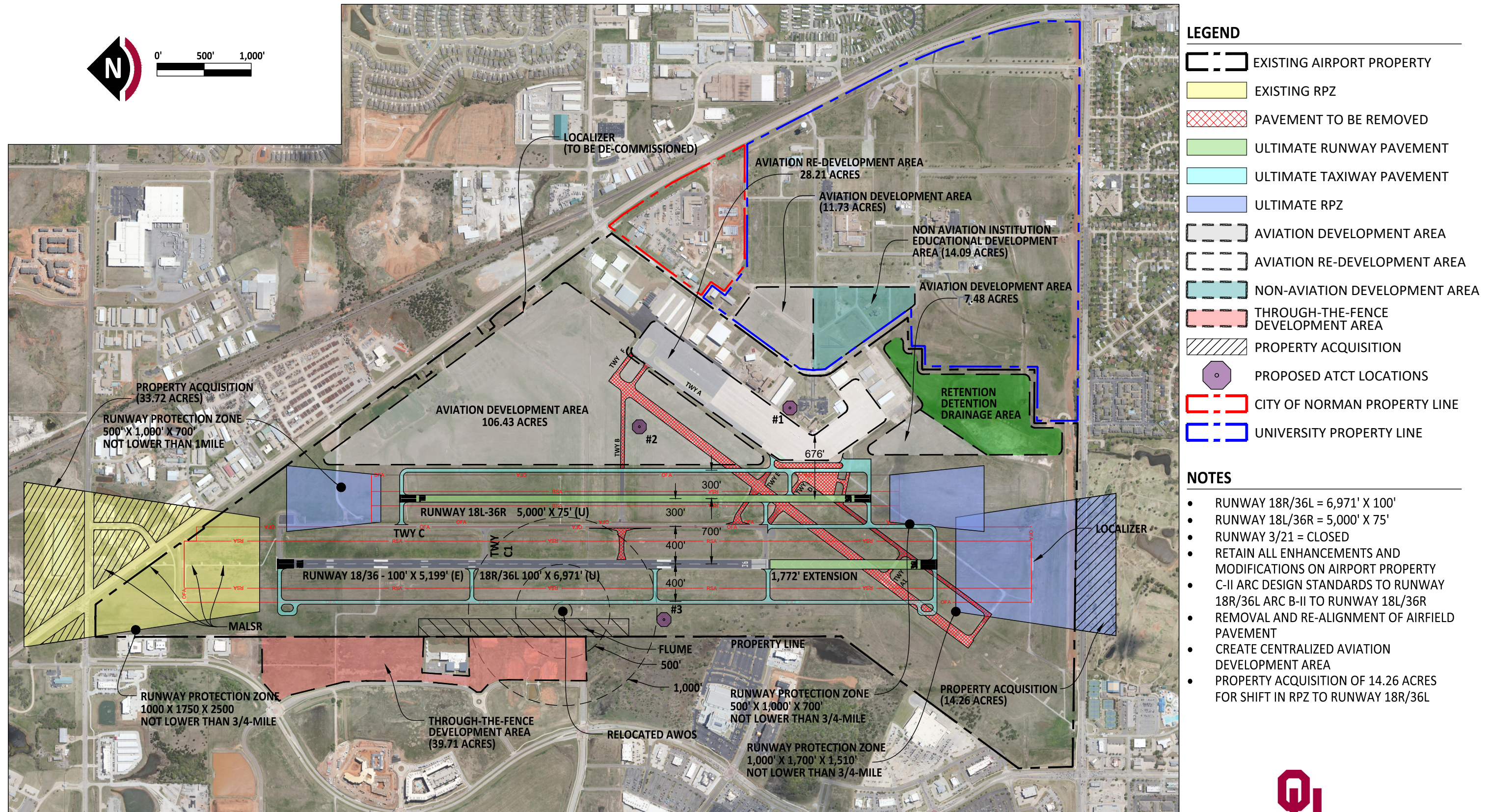


EXHIBIT 4.5 - AIRSIDE ALTERNATIVE FIVE

Table 4.7 offers a comparison of the five airside alternatives in terms of estimated runway and taxiway construction and removal costs.

TABLE 4.7 – COMPARISON OF AIRSIDE ALTERNATIVE ESTIMATED COSTS

	Cost
Airside Alternative One	\$ 6,178,363.30
Airside Alternative Two	\$ 6,352,048.65
Airside Alternative Three	\$ 7,515,273.90
Airside Alternative Four	\$ 18,010,795.95
Airside Alternative Five	\$ 18,624,350.10

4.3.6 LANDSIDE ALTERNATIVES

Four landside alternatives have been developed for this report. They depict the potential development of aprons, hangars, road access, and automobile parking at OUN. As stated previously, future development of aircraft storage facilities is demand-based, and market dictated. Landside Alternatives One and Two depict potential development on the north side of the airfield, between existing runways 18/36 and 3/21. They both include T-hangars, box hangars, and larger corporate/executive hangars, with road access and designated parking areas for all hangars. Both alternatives have new security gates along Flood Avenue, allowing for easier access for hangar tenants and their guests. Landside Alternative Two also depicts a potential future terminal building, FBO, or other aviation business with associated parking lots.

Landside Alternative Three illustrates development south of existing landside development. Development in this area is currently limited by a deep retention/detention area and Runway 18/36's RPZ. An extension of this runway and the associated RPZ shift would open up more area for hangar construction.

Landside Alternative Four serves as a more detailed graphical depiction of the existing terminal area facilities in addition to marking where future development for aeronautical and non-aeronautical use could take place to the east of the existing terminal building. A portion of Goddard Avenue could be closed to accommodate direct access from these development areas to the existing airfield. In this scenario, Lexington Avenue would become the primary access road to the terminal area.

The four landside alternatives are depicted in **Exhibits 4.6** through **4.9**.



EXHIBIT 4.6 - LANDSIDE ALTERNATIVE ONE





EXHIBIT 4.7 - LANDSIDE ALTERNATIVE TWO





	EXISTING AIRPORT PROPERTY
	EXISTING BRL
	ULTIMATE ROAD PAVEMENT
	ULTIMATE TAXIWAY PAVEMENT
	ULTIMATE BUILDINGS
	ULTIMATE RPZ - NO RUNWAY EXTENSION
	ULTIMATE RPZ - WITH RUNWAY EXTENSION
	FENCE
	PAVEMENT TO BE REMOVED

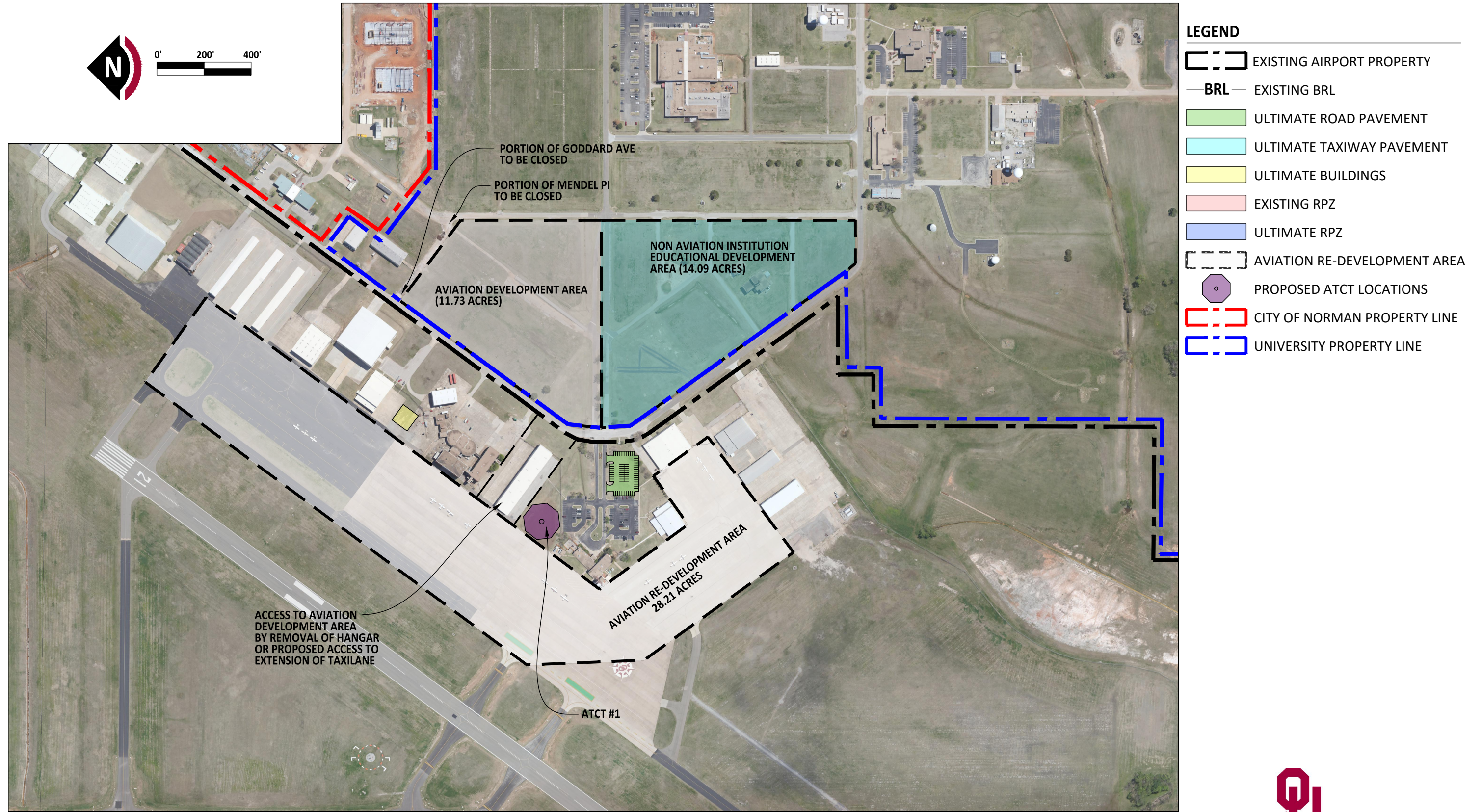


EXHIBIT 4.9 - LANDSIDE ALTERNATIVE FOUR

4.4 RECOMMENDED DEVELOPMENT PLAN

The overall Recommended Development Plan takes aspects from Airside Alternatives Two and Three while combining Landside Alternatives Two, Three, and Four. Each alternative's most feasible and relevant portions are included to give one consolidated overview of what development should occur at the Airport. Understanding what projects should be expected during the planning period is essential to meet FAA design standards and user needs and provide adequate services. This recommended plan will be included in the Airport Layout Plan (ALP) for approval and will be the basis of the implementation and Capital Improvement Program (CIP) moving forward.

4.4.1 AIRSIDE

The airside portion of these recommendations considers improvements to areas including the runway and taxiway infrastructure, focused on safety, planning, design criteria, and capability to accommodate OUN's existing and future operational needs. Operational activity at the Airport is forecasted to increase throughout the 20-year planning timeframe, serving a full range of general and business aviation users. Major airside improvements addressed in the recommended plan, depicted in **Exhibit 4.10**, include:

- Extend existing Runway 18/36 1,772 feet to the south, resulting in an ultimate length of 6,971 feet. This length was derived by extending the runway as much as possible while maintaining the minimum separation between the runway threshold and the current placement of Runway 18's localizer, as dictated by the Runway Safety Area and Runway Object Free Area lengths of 1,000 feet beyond the threshold.
- Remove a section of pavement between the ramp and Taxiway A, near the intersection with Taxiways D and E, to eliminate the hot spot caused by direct access from the ramp to Runway 3/21. Add taxiway lighting to the new taxiway edge.
- Revise Runway 3/21 design standards from C-II to B-II and narrow to 75 feet wide.
- Extend Runway 3/21 873 feet to the north, resulting in an ultimate length of 5,621 feet.
- Construct a new full-length parallel west side taxiway with connectors for Runway 18/36.
- Acquire or obtain avigation easement for 10.44 acres of property to account for Runway 36 RPZ shift.
- Acquire or obtain avigation easement for 8.12 acres of property to account for Runway 21 RPZ shift.
- Acquire or obtain avigation easement for 25.23 acres of property underlying existing Runway 18 RPZ.
- Acquire or obtain avigation easement for 15.71 acres of property underlying existing Runway 3 RPZ.
- Increase weight bearing capacity of Runway 18/36.

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Table 4.8 shows the estimated costs for construction and removal of runway and taxiway pavement for each airside alternative as well as the recommended alternative.

TABLE 4.8 – COMPARISON OF AIRSIDE ALTERNATIVE ESTIMATED COSTS, INCLUDING RECOMMENDED

	Cost
Recommended Alternative	\$ 8,214,803.95
Airside Alternative One	\$ 6,178,363.30
Airside Alternative Two	\$ 6,352,048.65
Airside Alternative Three	\$ 7,515,273.90
Airside Alternative Four	\$ 18,010,795.95
Airside Alternative Five	\$ 18,624,350.10

4.4.2 LANDSIDE

The primary goal of these landside recommendations is to provide the Airport with adequate terminal and aircraft storage facilities while maximizing operational efficiencies. Landside components include the terminal facility, hangars, and automobile parking. Major landside issues addressed in this recommended plan include:

- Promote south hangar development. Graphic depicts box and corporate/executive hangars to the south of the School of Aviation ramp.
- Promote north hangar development. Graphic depicts a variety of T-hangars, box hangars, corporate/executive hangars, and large aeronautical facilities.
- Construct secure access gates, road networks, and parking areas to serve these hangars.
- Construct a new Air Traffic Control Tower.
- Preserve the approximately 25 acres of land between Westheimer Drive and Priestly Avenue for aeronautical and non-aeronautical development.
- Add 12,000-gallon Jet-A fuel tank and 12,000-gallon 100LL fuel tank.

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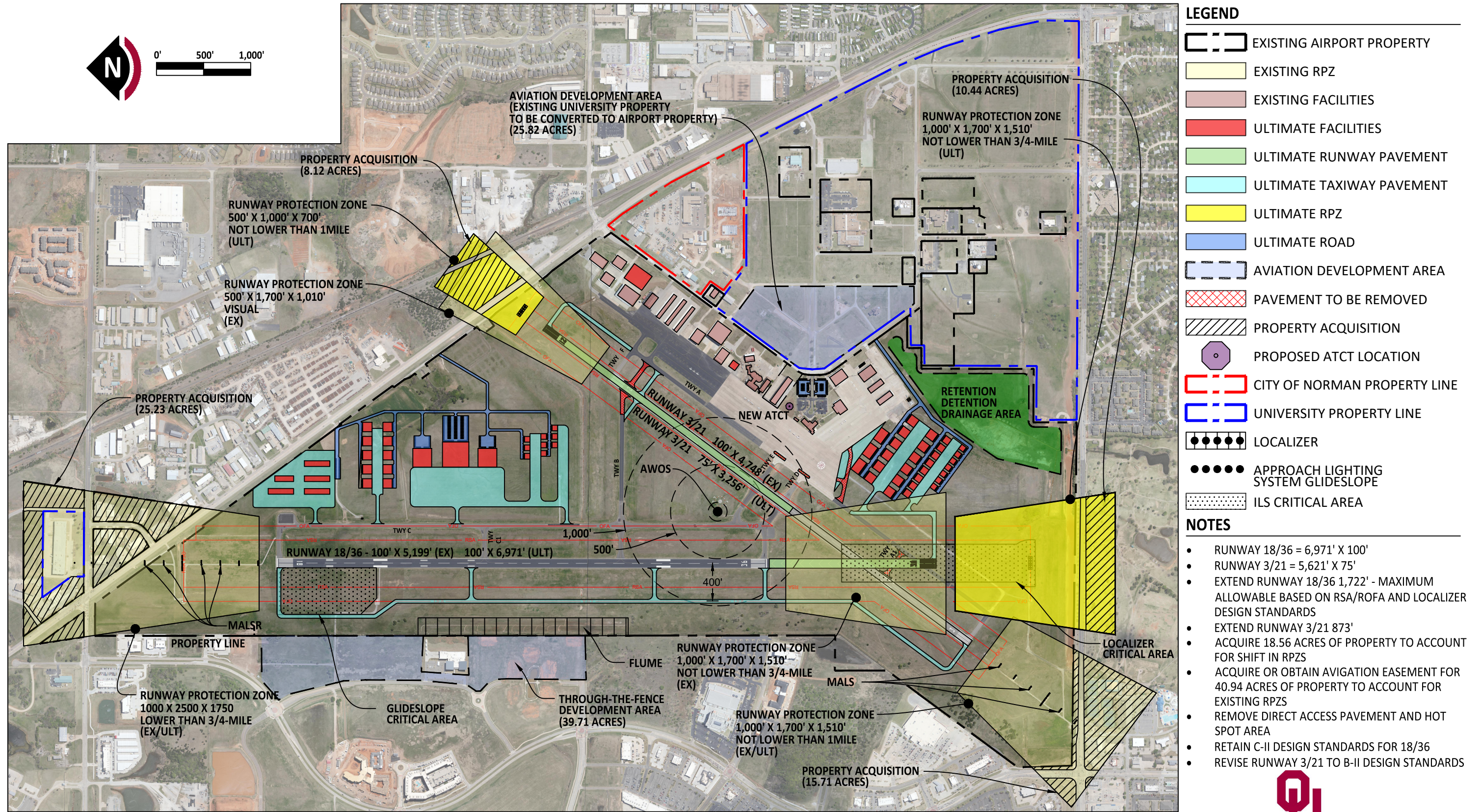


EXHIBIT 4.10 - RECOMMENDED DEVELOPMENT PLAN