ARDMORE, OKLAHOMA

Study and Report

for the

Improvements to the Industrial Park
at the
Ardmore Municipal Airport

September, 2017

LOCHNER PROJ: 000013042

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1. INTRODUCTION

A. Background

The purpose of this report is to present the findings of cost and feasibility for improvements to the Industrial Park located at Ardmore Municipal Airport, hereafter referred to as the 'Industrial Park.' This engineering and planning study reports:

- Proposed street access routes, alternatives and associated costs.
- Water supply and sanitary sewer infrastructure recommendations and development costs.
- Utility corridor recommendations for water, sewer, gas, electrical, and communications and development costs.
- Identification and incorporation of site limitations due to FAA aeronautical restrictions.

Figure 1: Aerial Photograph of Project Area

The study was prepared to evaluate the existing topography and infrastructure and provide recommendations for improvements to the Industrial Park. The Ardmore Development Authority (ADA) and H. W. Lochner, Inc. entered into a contract to perform engineering and planning services to produce development recommendations and cost estimates to assess the feasibility of proposed improvements to the Ardmore Municipal Airport Industrial Park.

B. Ardmore Industrial Park Description

The Industrial Park, is located northeast of Runway 13-31 at the Ardmore Municipal Airport. The Ardmore Municipal Airport was formerly an Air Force Base and is located approximately 16 miles northeast of the central business district of the City of Ardmore, Oklahoma and seven (7) miles east of Interstate 35 (I-35) on the newly-improved State Highway 53 (SH-53). The City of Ardmore is situated in the south central portion of the state and is located approximately 90 miles equidistant from Dallas/Fort Worth and Oklahoma City, at the junction of Interstate 35 and US Highway 70. The Industrial Park includes more than 1,350 acres of developable land.

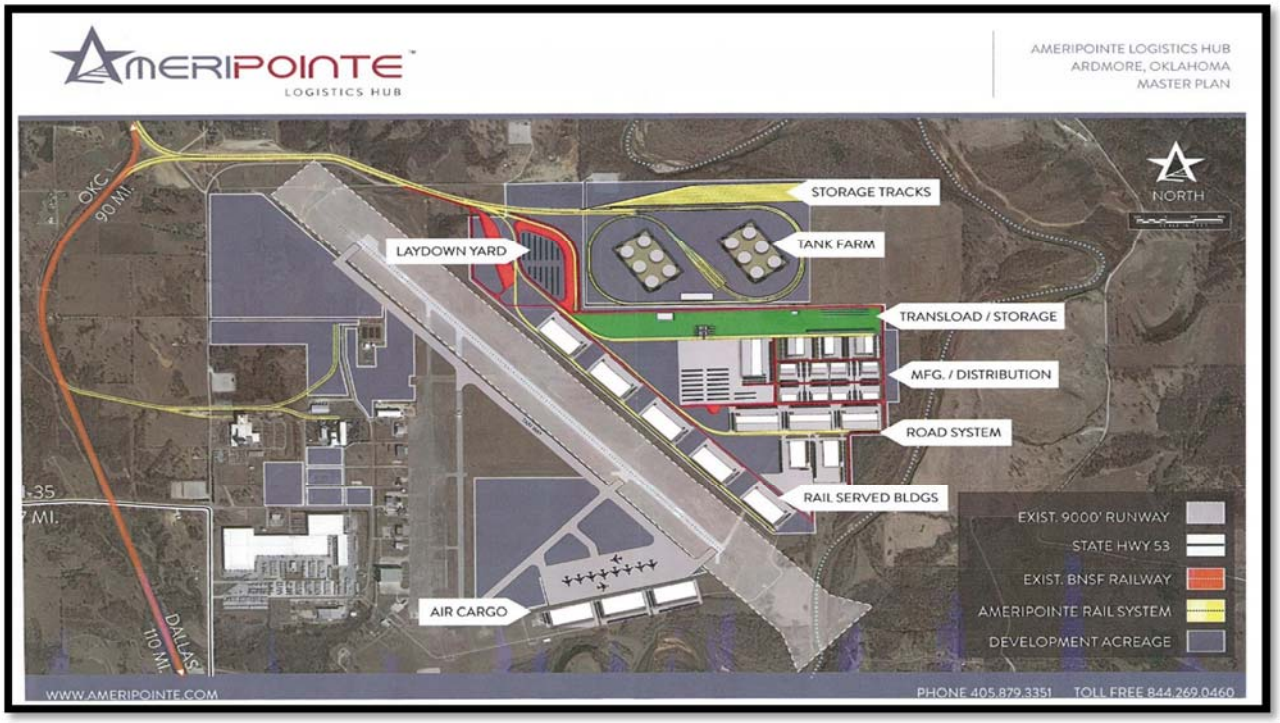
Ardmore Municipal Airport is also a part of the Industrial Park. It is a general aviation airport with over 45,000 operations annually, including military based aircraft. Ardmore Municipal Airport is a regional business airport serving the City of Ardmore and Carter County, as well as neighboring Murray and Johnston Counties. Ardmore Municipal Airport has two major runways: Runway 13-31 and Runway 17-35. These runways are 9,002 feet and 5,350 feet long, respectively, and both runways feature full instrumentation, including glide-scope, adequate flight space for flight testing, FAA Air Traffic Control Tower (ATCT), parking capacity for 100 commercial-sized aircraft, airplane wash rack and sewer

facilities, fueling and defueling station, 24/7 Aircraft Rescue and Fire Fighting (ARFF), security and two Fixed Based Operators (FBO).

A rail spur from the BNSF railroad main line currently serves the Industrial Park with 33,000 feet of industrial rail track, including a 10,900-foot loop.

2. SCOPE OF SERVICES

The scope of services includes studying and reporting of various utility services such as water, sanitary sewer, planning services for FAR Part 77 Airspace Evaluation, and civil services for the street layout for improvement of Ardmore Industrial Park.



The detailed scope of services are as follows:

- Water supply study evaluating the water demands and assist in code changes.
- Evaluate sanitary sewer collection of Industrial Park and also calculate areas to develop means to connect to
- Provide a preliminary layout for sewer system based on connection to sanitary sewer system.
- Provide layout of the street access to north of the airport.

existing water supply capabilities and future evaluation of codes and recommendation on

the existing system and future demands for the wastewater generated from the improvement the existing sanitary sewer collection system.

water distribution system and routing of sanitary existing City of Ardmore water distribution and

Industrial Park from existing streets south and

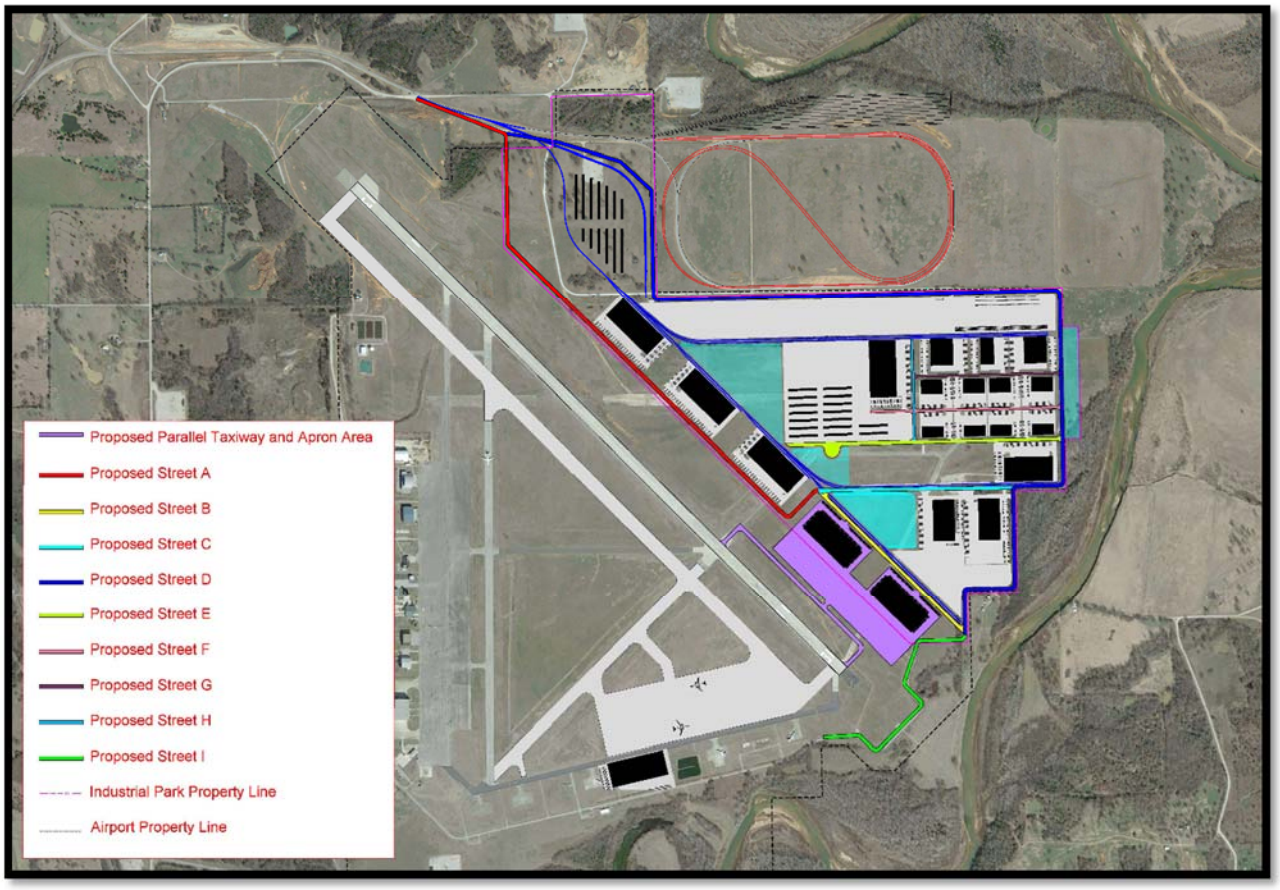


Figure 3: Overall Project Layout

- Evaluate FAR PART 77 Airspace Surface and determine the maximum top elevation of all large clear span hangars within the Industrial Park Development Area.
- Provide probable cost estimation for preliminary proposed improvement.

3. WATER SUPPLY STUDY

A. Existing Water System

Water Supply

The airport receives its water from the Southern Oklahoma Water Corporation (SOWC). The SOWC operates a water treatment plant located just north of the Industrial Park area. The SOWC pulls raw water from the City's 36" transmission line that is located next to the treatment plant. This 36" raw water transmission line runs through the Industrial Park from north to south along Lindberg Street. Treated water is pumped in to the City's distribution system through a 6" meter located next to the SOWC's treatment plant. The metering building also contains a pressure reducing valve that moderates the pressure going to the airport's distribution system.

The airport currently uses an average of 111,600 gallons per day (gpd) of water. According to information provided by City staff, the SOWC treatment plant has the capability of providing up to 125,000 gpd to the airport and the treatment plant could provide an additional 125,000 gpd with additional improvements to the plant to increase their treatment capacity.

Existing Water Distribution

The existing water distribution system is composed of numerous different pipe materials, sizes and age. The majority of the system is cast iron pipe from the 1950s, but there are areas of the system that are comprised of transite pipe and polyvinyl chloride pipe (PVC). Pipe sizes range from 6" to 12," with the majority of the system being 6" and 8".

Water distribution and storage systems for communities are generally sized and designed for providing adequate water for fire protection. These design practices are based on the premise that fire flow requirements usually exceed the normal consumptive, peak domestic, industrial and other demands imposed on the water system. Although the actual amount of water used for firefighting in a year is small, the rate of use is high. Therefore, the water distribution system should be capable of delivering the peak daily demands as well as the fire flow demands simultaneously.

A computer analysis of the water system was completed using WaterCAD V8i. Actual flow rates and pressure testing of fire hydrants were conducted at the airport by City personnel and Lochner staff. The results of the field flow rate and pressure measurements were used to simulate the water distribution system using the computer model.

Water in a distribution system has the potential for corroding the pipes, forming scale deposits in the pipes, or possibly not affecting the pipes at all due to the neutral nature of the water. Pipes that are corroded tend to have frequent water main breaks due to a loss of wall integrity. Pipes which suffer from scale accumulations have a reduced flow capacity due to the constriction of the pipe opening.

The majority of the distribution system is over 60 years old, and the City has experienced numerous main breaks in past years because of the age and condition of the pipe. The evaluation indicates that these older pipes are estimated to have lost approximately 50 to 60% of their flow capacity.

It is important to understand that factors other than scale deposits within the pipes can be responsible for apparent reduction in flows when conducting fire hydrant tests. These include such factors as partially closed and broken valves in the distribution system, old and defective hydrants, or the configuration of the distribution system being different from what is believed to exist, and therefore modeled.

Existing Fire Hydrants

The existing hydrants range in age from 30 - to over 60 years old. Table No. 1 displays measured fire hydrant flow rates and pressures along with those generated by the computer model.

Table No. 1
Measured and Modeled Fire Hydrant Flows and Pressures

LOCATION	FIRE HYDR.	MEASURED FLOW	STATIC PRESSURE (psi)		FLOW PRESSURE (psi)	
	FH	GPM	Field	Model	Field	Model
Grumman Road	FH 16	260	50	52	14	13
General & National	FH 56	855	44	44	32	36
Douglas & Wright	FH 25	634	51	51	17	0

Table 1: Measured and Modeled Fire Hydrant Flows and Pressures

Existing Water Storage

The water storage system consists of one 125,000-gallon elevated storage tank located along General Street near the west entrance to the airport.

B. Proposed Development

Water Demand

The purpose of the water distribution system analysis is to determine the potential system improvements required to provide average daily water demand, peak daily demand and fire demand to the new development area.

The development area is designated for manufacturing and warehouse use and, unfortunately, there can be a wide range of water usage associated with these types of facilities. The study considered typical water demands based on the following,

- Occupancy loading of the proposed buildings
- Type and number of fixtures in the proposed buildings
- Typical water use coefficients based on types of establishments
- Existing Industrial Park usage per acre

Occupancy loading and fixture calculations would provide an estimated domestic demand based on the number of potential employees within each building but would not take in to account water demand for non-domestic use. Therefore, these options were not considered in the evaluation.

The Oklahoma Comprehensive Water Plan, Water Demand Forecast Report prepared by CDM establishes typical nonresidential water use coefficients for various types of establishments. The report identifies the use coefficients for manufacturing and warehousing facilities as:

Manufacturing	144.5 gallons per employee per day
Warehousing	57.2 gallons per employee per day

Estimated employee numbers for some facilities were obtained from the Ardmore Comprehensive Plan from 2014. The use coefficients were multiplied by the estimated number of employees at each facility to obtain a demand for each type of facility at the airport. These demands were then used to establish the estimated demands for the proposed development areas based on building size. The water demand was calculated at 5,223 gpd/acre of building space for manufacturing and 2,296 gpd/acre of building space for warehousing. These demands were used to estimate the water demand for the development areas where proposed building sizes are known.

Additionally, the existing water demand per acre for the current developed area at the airport was calculated by dividing the existing daily demand by the acres of developed area (111,600 gpd / 320 acres = 349 gpd/acre). This demand was used to estimate the water demand for the development areas where only the proposed development acreage was known.

The proposed development areas for the airport were divided according to their general location in order to establish utility requirements for each area more appropriately. Figure 4 shows these areas. Table 2 displays the estimated water demands calculated for each area.

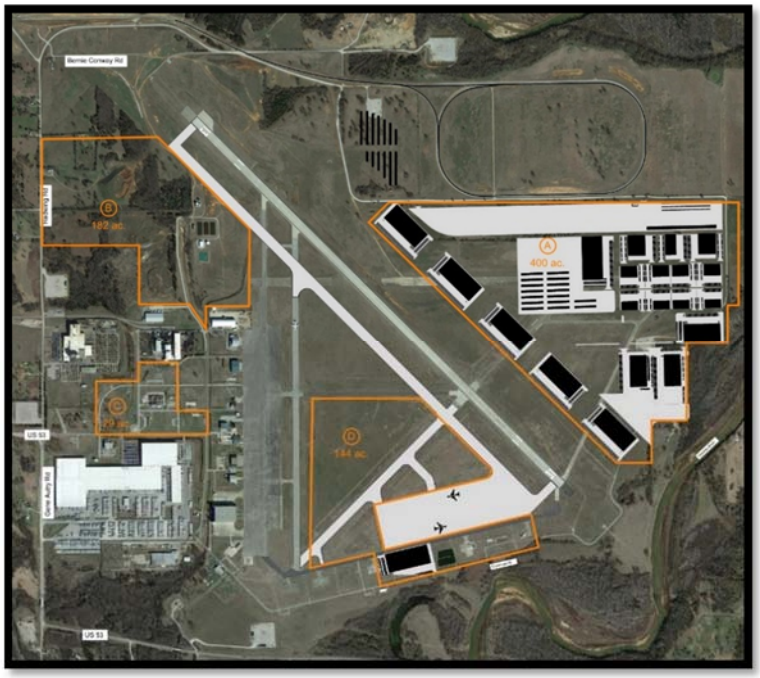


Figure 4: Proposed Development Areas

Table No. 2
Estimated Water Demands for Development Areas

Development Area	Area (ac)	Demand gpd/ac	Total (gpd)
Existing	320	350	112,000
A	400	350	139,506
B	182	350	63,475
C	29	350	10,114
D	144	350	50,222

Table 2: Estimated Water Demands for Development Areas

The total daily demand for the airport would be approximately 375,000 gpd at full development. With the SOWC's estimated capacity at 250,000 gpd supplied to the airport, the airport would utilize their maximum available water supply and additional water supply would be needed in the future as full development is realized.

Fire Flow Demands

Water distribution systems are generally sized and designed for providing adequate water for fire protection. These design practices are based on the premise that fire flow requirements usually exceed the normal consumptive, peak domestic, industrial and other demands imposed on the water system. Minimum fire flow requirements as set by the International Fire Code are based on building size and type of construction. For purposes of this study, the equations and criteria used for sizing water mains and storage reservoirs are based on those of the Insurance Service Office, using the following formula:

$$F = 18C(A)^{½}$$

In this formula, *F* is the required fire flow in gpm, *C* is a coefficient related to the type of building construction, and *A* is the approximate total floor area in square feet.

Fire flow rates are also classified according to the duration in which a fire must be fought. As a result, the total volume of water demanded is obtained by multiplying the maximum water demand by the duration of the fire. Duration requirements were determined by the International Fire Code, Appendix B. Table No. 3 shows the resulting fire flows, durations, and total water storage required for the buildings located in the proposed development using the above fire flow criteria. The building floor areas shown in the table were provided as part of the development plan. Because the IFC allows for a reduction in the minimum fire flow requirement for buildings that have automatic sprinklers, Table 3 also shows volume for this scenario.

Table No. 3
Fire Flows and Storage

Building ID	Bldg Size (sf) "A"	Type of Construction Class	"C"	Max "C"	Occupancy Factor Class	"O"	Exposure "X"	Communication "P"	Calculated Fire Flow (gpm)	IFC Fire Flow (gpm)	Duration (hr)	Volume Required (gal)	IFC Fire Flow (gpm)	Sprinkler Flow (gpm)	Duration (hr)	Volume Required (gal)
A1	236,800	Class 3	7,007	6,000	C-2	0.85	0	0	5,100	5,250	4	1,260,000	1,313	3,060	4	1,049,400
A2	236,800	Class 3	7,007	6,000	C-2	0.85	0	0	5,100	5,250	4	1,260,000	1,313	3,060	4	1,049,400
A3	236,800	Class 3	7,007	6,000	C-2	0.85	0	0	5,100	5,250	4	1,260,000	1,313	3,060	4	1,049,400
A4	236,800	Class 3	7,007	6,000	C-2	0.85	0	0	5,100	5,250	4	1,260,000	1,313	3,060	4	1,049,400
A5	236,800	Class 3	7,007	6,000	C-2	0.85	0	0	5,100	5,250	4	1,260,000	1,313	3,060	4	1,049,400
A6	236,800	Class 3	7,007	6,000	C-2	0.85	0	0	5,100	5,250	4	1,260,000	1,313	3,060	4	1,049,400
A7	236,800	Class 3	7,007	6,000	C-2	0.85	0	0	5,100	5,250	4	1,260,000	1,313	3,060	4	1,049,400
A8	236,800	Class 3	7,007	6,000	C-2	0.85	0	0	5,100	5,250	4	1,260,000	1,313	3,060	4	1,049,400
B1	250,000	Class 3	7,200	6,000	C-1	0.75	0	0	4,500	5,500	4	1,320,000	1,375	3,060	4	1,064,400
B2	100,000	Class 3	4,554	6,000	C-1	0.75	0	0	3,400	3,500	3	630,000	875	3,060	3	708,300
B3	60,000	Class 3	3,527	6,000	C-1	0.75	0	0	2,600	2,750	2	330,000	688	3,060	2	449,700
B4	100,000	Class 3	4,554	6,000	C-1	0.75	0	0	3,400	3,500	3	630,000	875	3,060	3	708,300
C1	50,000	Class 3	3,220	6,000	C-2	0.85	0	0	2,700	2,500	2	300,000	625	3,060	2	442,200
C2	50,000	Class 3	3,220	6,000	C-2	0.85	0.13	0	3,100	2,500	2	300,000	625	3,060	2	442,200
C3	50,000	Class 3	3,220	6,000	C-2	0.85	0.13	0	3,100	2,500	2	300,000	625	3,060	2	442,200
C4	50,000	Class 3	3,220	6,000	C-2	0.85	0	0	2,700	2,500	2	300,000	625	3,060	2	442,200
C5	40,000	Class 3	2,880	6,000	C-2	0.85	0	0	2,400	2,250	2	270,000	563	3,060	2	434,700
C6	40,000	Class 3	2,880	6,000	C-2	0.85	0.13	0	2,800	2,250	2	270,000	563	3,060	2	434,700
C7	40,000	Class 3	2,880	6,000	C-2	0.85	0.13	0	2,800	2,250	2	270,000	563	3,060	2	434,700
C8	40,000	Class 3	2,880	6,000	C-2	0.85	0	0	2,400	2,250	2	270,000	563	3,060	2	434,700
D1	151,200	Class 3	5,599	6,000	C-1	0.75	0	0	4,200	4,250	4	1,020,000	1,063	3,060	4	989,400
D2	151,200	Class 3	5,599	6,000	C-1	0.75	0	0	4,200	4,250	4	1,020,000	1,063	3,060	4	989,400

Table 3: Fire Flows and Storage

Notes:

1. Fire flow calculations are based on ISO Guide for Determination of Needed Fire Flow

2. Type of Construction C = 18 x 0.8 x (A)^0.5

3. Calculated Fire Flow = C x O x (1+(X + P))

4. The maximum value of C is dictated by ISO Guide for Determination of Needed Fire Flow

5. Fire flow rates and durations for Sprinkled and Non-Sprinkled buildings are based on the International Fire Code, Appendix B.

Water Storage

The largest volume of storage required for the proposed development is the amount necessary for fire demand plus peak consumptive demand for the duration in which fire flow is required. Table No. 3 shows the maximum storage required being approximately 1.35 million gallons. This would be necessary for fighting a fire at building B1 at a rate of 5,500 gpm, plus peak system consumptive demands for a four-hour period. It is assumed that only one fire will occur at any one time. The current available storage is equal to 125,000 gallons.

C. Recommendations

In order to provide the proposed development areas with an adequate water supply for both consumptive demand and fire flow demands, it is recommended to install separate systems for each within the development area.

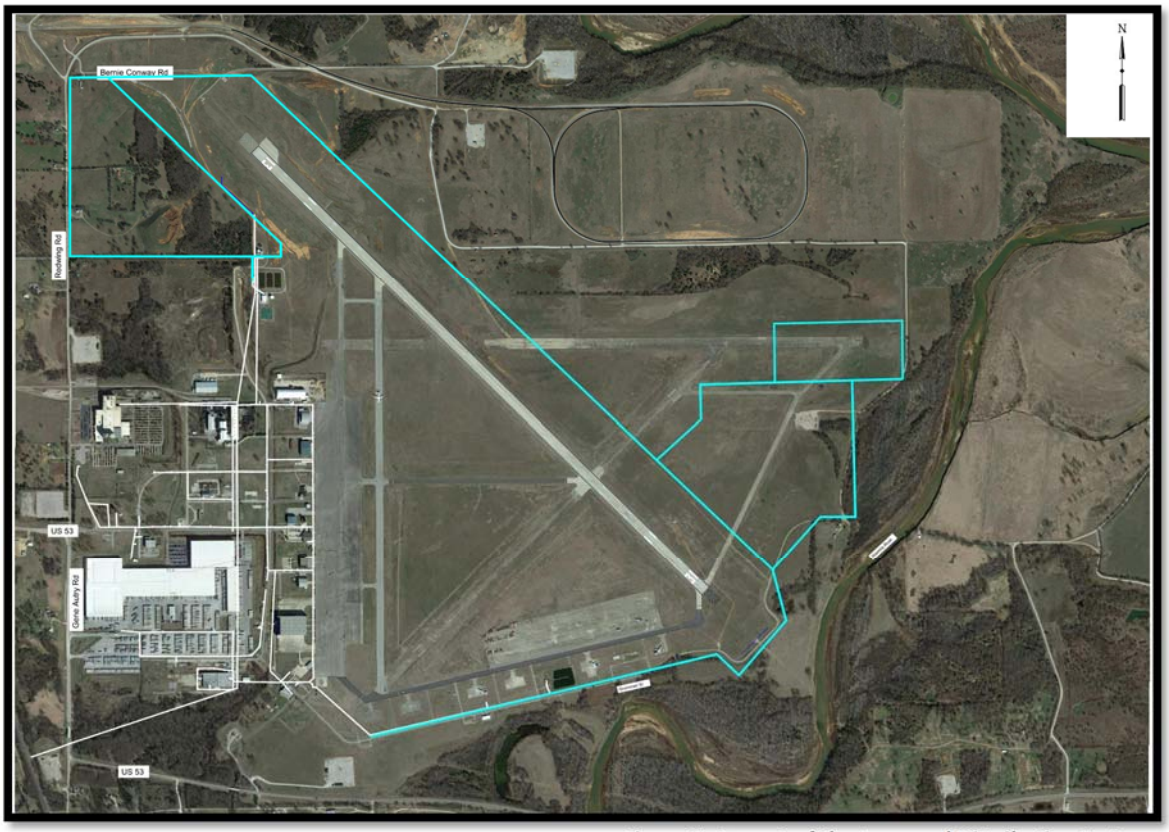


Figure 5: Layout of the Proposed Distribution System

By separating the fire flow demand from the rest of the distribution system, the distribution mains can be a standard size as opposed to the larger diameter mains that are required to carry the large fire flows. Large diameter mains that do not cycle the water through in a timely manner would have significant water quality issues because the disinfection residual will dissipate over time and the water will become stagnant. Smaller mains that can replenish the water quicker over time will help the City maintain water quality within the distribution system. It is recommended to install 8" distribution mains to the proposed development areas. These mains would connect to the existing system at the north and south ends of the existing distribution system to allow for looping of the system and to

provide multiple avenues of service. While the airport does have some underground casing pipes for utilities that cross the runway, it is believed that these casing pipes are significantly smaller in diameter than what would be required to accommodate the proposed water lines. Therefore the proposed layout does not utilize these pipes. See Figure 5 for a layout of the proposed distribution system.

Water required for fire flow demands does not require disinfection nor does it matter if the water becomes stagnant since it is only used for fire flow needs. The water mains for the fire flow system would be 14" and 16" diameter in order to deliver the flow to the area of need with minimal restrictions. A water storage tank to supply the fire flow requirements would be required at the airport along with a booster pump station to deliver the fire flow at rate and pressures needed. See Figure 6 for a layout of the proposed fire flow system.

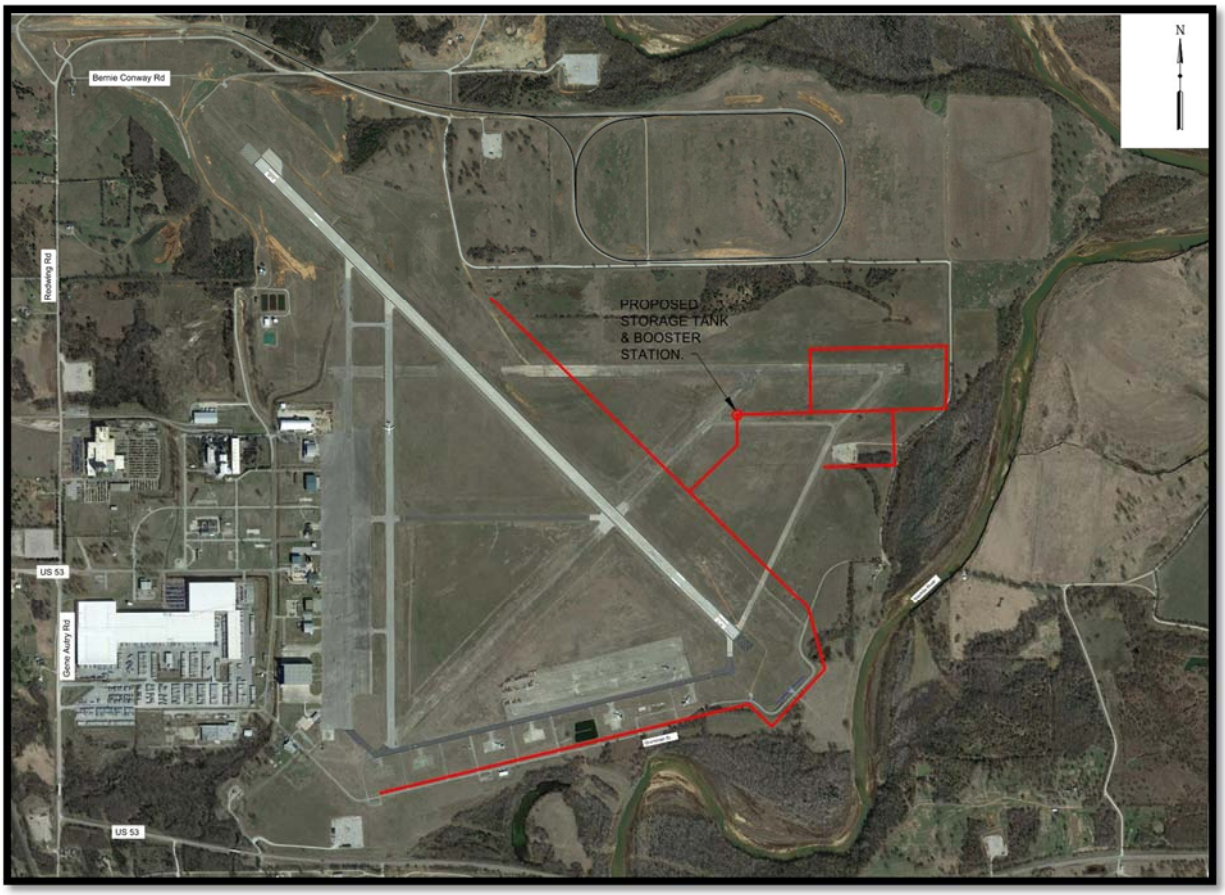


Figure 6: Layout of the Proposed Fire Flow System

While the present distribution system provides the current demands to its customers, it is recommended that the existing mains, valves and fire hydrants be replaced in a phased approach starting with the oldest or most break-prone lines to help reduce the maintenance issues associated with the aging system. As development occurs in the existing area, added demands on the system will impart additional pressure on the aging infrastructure causing more frequent maintenance issues.

Phase development of the Industrial Park Area is assumed to occur initially along and parallel to the runway with future development progressing to the north and east. Estimated construction costs for the water system are provided for serving this initial development phase parallel to the runway and the remaining system to serve the full development. Estimated construction costs for the water system improvements are in Appendix I.

4. SANITARY SEWER SYSTEM

A. Existing Sanitary Sewer System

The existing sanitary sewer system is comprised of 6", 8", 10" and 12" gravity collection pipes. A pump station located at the south end of the airport transfers the wastewater to the original treatment plant where it is then transferred to a lateral field located at the south end of the runway. The airport receives approximately 50,000 to 80,000 gpd of wastewater flow through the sanitary sewer system.

The City has indicated that they are in design of a new pump station and force main that will pump all of the airport wastewater to the City and eliminate the treatment facilities at the airport. This new pump station is to be designed for approximately 130,000 gpd flow.

The existing collection system is capable of handling the following flow rates which are adequate for the wastewater flows provided.

Table No. 4
Existing Sanitary Sewer System Capacity

Pipe Diameter (in)	Flow @ 2/3 Full (gpm)
6	140
8	273
10	386
12	561

Table 4: Existing Sanitary Sewer System Capacity

B. Proposed Development

Wastewater flows for the proposed development were evaluated using equivalent flows per acre as currently experienced in the existing developed area (80,000 gpd / 320 acres = 250 gpd/acre).

Table No. 5
Estimated Sanitary Sewer Flow for Development Areas

Development Area	Area (ac)	Demand gpd/ac	Total (gpd)
Existing	320	250	80,000
A	400	250	100,000
B	182	250	45,500
C	29	250	7,250
D	144	250	36,000

Table 5: Estimated Sanitary Sewer Flow for Development Areas

Gravity collection systems are ideal for serving sanitary sewer needs with limited operation and maintenance costs. However, to serve the proposed development areas with gravity lines only is not feasible because of the depth that would be required. The minimum slopes required for gravity lines to keep the wastewater flowing through the system would push the depth of the pipes to excessive depths. Therefore a pump station is anticipated in order to serve some of the development area.

C. Recommendations

The sanitary sewer system will consist of a gravity collection system comprised of mostly 8" diameter pipe and 4 foot diameter manholes. A new pump station would be located to minimize excavation depths of the gravity sewer. See Figure 7 for a layout of the proposed sanitary sewer system.

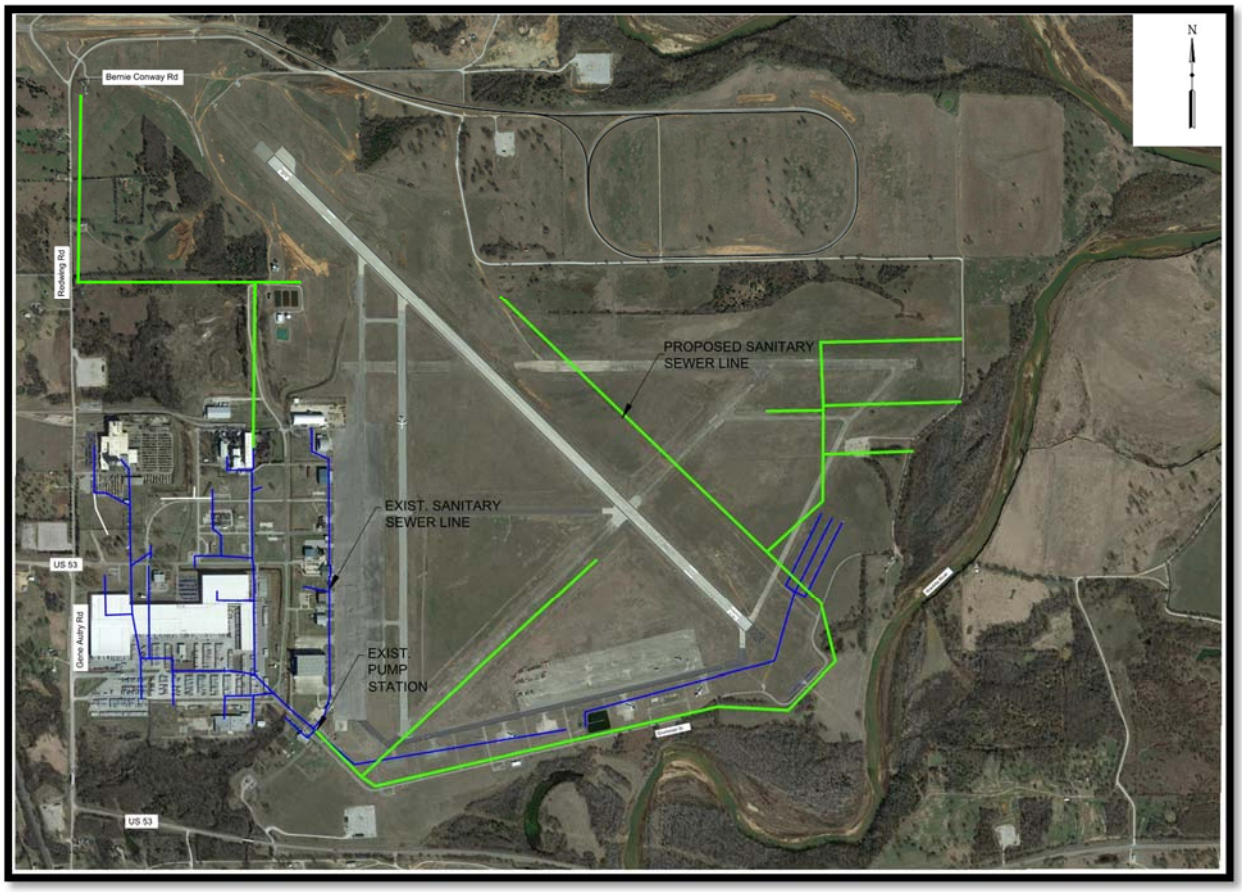


Figure 7: Layout of the Proposed Sanitary Sewer System

Phase development of the Industrial Park Area is assumed to occur initially along and parallel to the runway with future development progressing to the north and east. Estimated construction costs for the sanitary sewer system are provided for serving this initial development phase parallel to the runway and the remaining system to serve the full development. Estimated construction costs for the sanitary sewer system improvements are in Appendix I.

5. STREET ACCESS SYSTEM

A. General/Interior Road Layout

For the future development of the Industrial Park, the street access to the Industrial Park from existing roads both to the north and south ends of the airport were evaluated to provide a preliminary street layout. According to the Code of Ordinances of the City of Ardmore, since it is an Industrial Park development, the proposed roads fall under Commercial/Industrial Urban Street Category. With the anticipated use and facilities that will be developed in the area, the design vehicle is semi-trailer truck, WB-40, with the design speed of 35 mph and turning radius of 50 feet. The proposed street will be a total of 45 feet wide, with three (3) 15-foot lanes each, with two directional flow and a two way left turn median lane. The unpaved shoulder will be 10 feet wide on both sides of the street. According to the Code of Ordinance for the City of Ardmore, the minimum pavement section for Commercial/Industrial Urban Street is 8 inches of asphaltic concrete pavement placed on a compacted subgrade. For the purposes of this report, this pavement section was utilized for cost estimating. If desired, an alternative pavement section can be investigated.

Based on all the above design parameters, the street was designed using AutoCAD Civil 3D to generate cross sections of the road and ensure proper grading and earthwork calculations. The cross section of the road will be 2% slope downwards away from the center of the road pavement and 3% slope downwards on the shoulder. The pavement then connects to the existing ground with a 6:1 slope. The elevation on each road was evaluated for height restrictions of the FAR Part 77 surfaces of the Airport. The elevation of the proposed roads reflect the clearance over the approximate centerline of the road at ground level plus the 15 foot height for the recommended FAR Part 77 minimum adjusted approach surface.

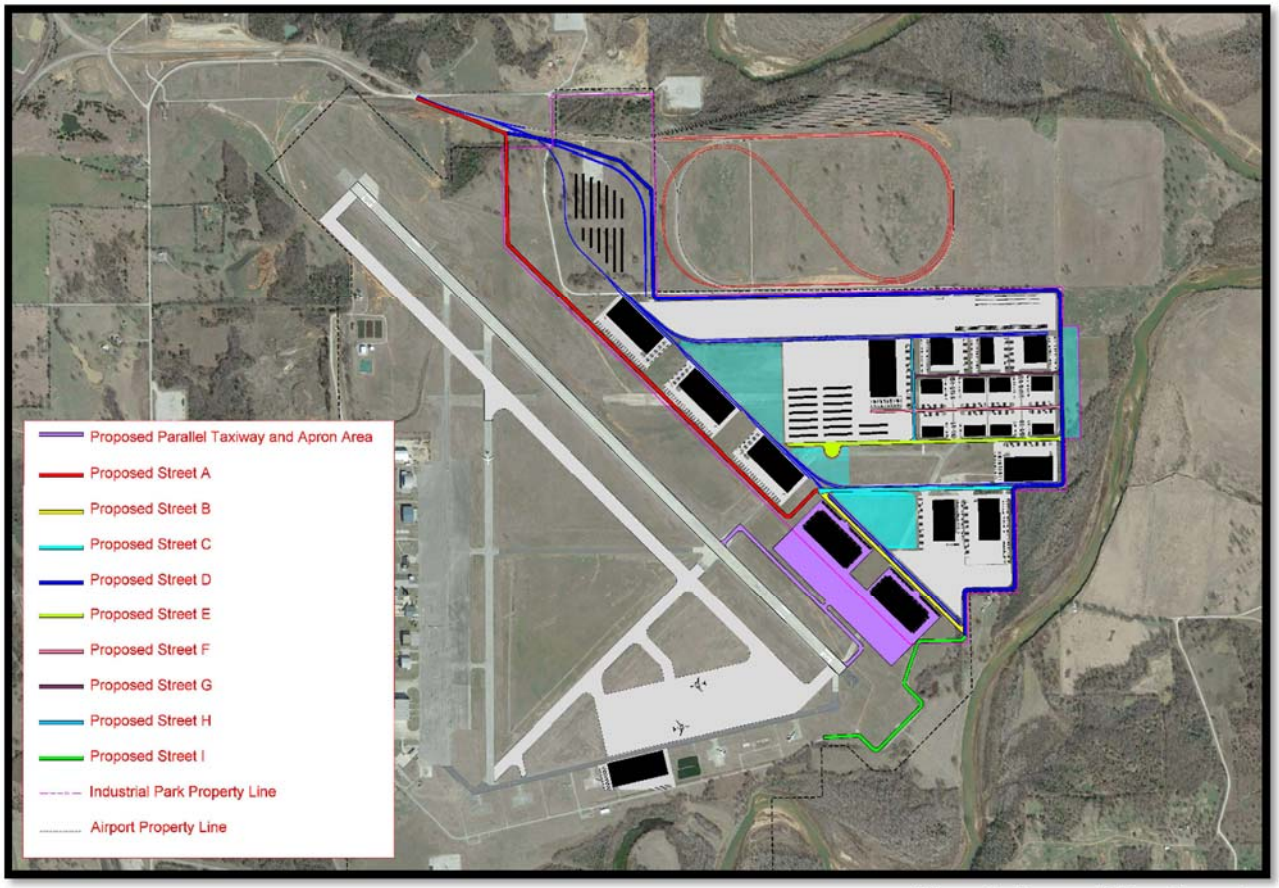


Figure 8: Proposed Street Layout

The proposed road layout as provided to Lochner from Ameripointe was used to estimate the proposed project cost and is an adequate layout for this level of investigation. One change made for this investigation was to tie the main entrance road to the road near the east side of the laydown yard. This will provide a looped road and allow vehicles to be able to exit the Industrial Park in a more efficient manner.

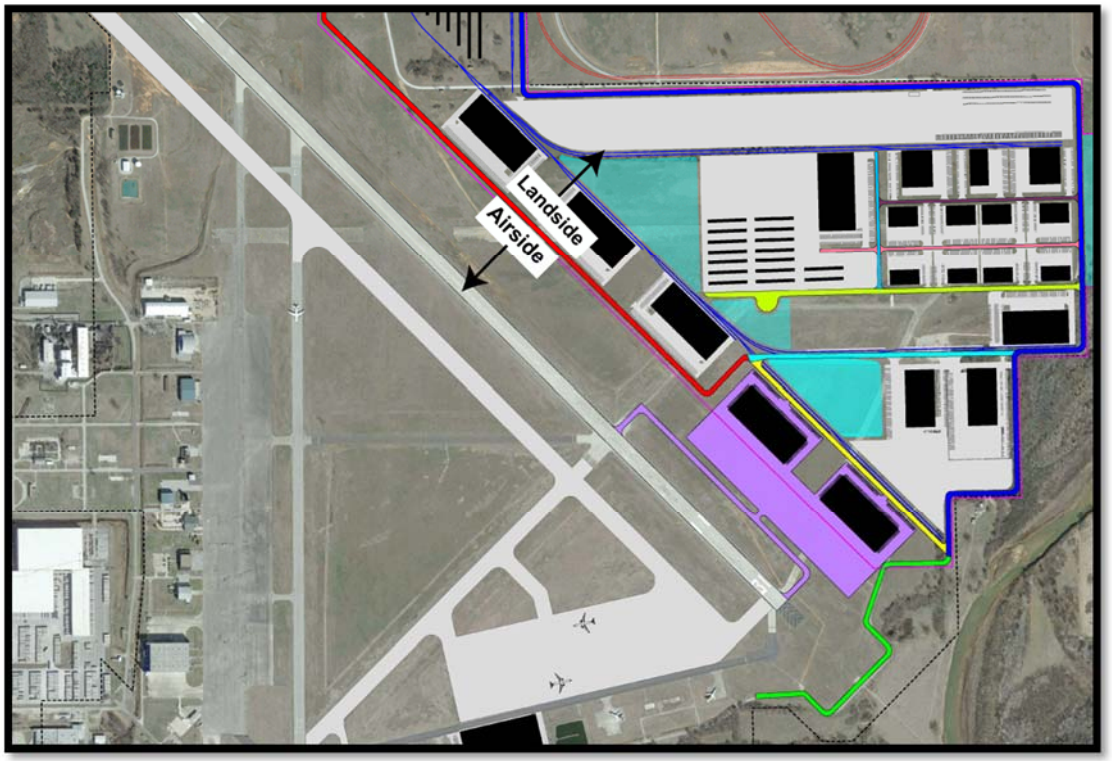


Figure 9: Airside & Landside

The proposed road layout as provided to Lochner from Ameripointe runs towards the airside that is adjacent to the airport and the proposed railroad runs towards the landside adjacent to the proposed development. The proposed road that runs through the airside will completely block off any direct access from Industrial Park to the airport. So, we recommend that the proposed road be moved at the landside allowing a possible access from Industrial Park to the Runway 13-31 for any future hangar development and utilization of airport facilities.

B. North End Connection

On the north end of the airport, the proposed street will connect the existing Bernie Conway Road and Redwing Road then run through the Industrial Park Area and circle back to the Bernie Conway Road or the main entrance road. It should be noted that neither Bernie Conway Road nor Redwing Road meets the City of Ardmore's structural street requirements, and it is recommended that these roads be upgraded in the future as the Industrial Park develops.

The proposed road connecting the north end of the airport is divided into 6 different smaller road sections and cost estimates for each individual sections were calculated separately to provide a general idea of different phase approach. A detailed drainage calculation was not performed for this study and all drainage related costs were estimated based on the engineering judgement and experience for similar road project. The cost for upgrading the existing Bernie Conway and Redwing road was not included on the project estimates.

C. South End Connection

Lochner also investigated a road that would extend Grumman Street to the east around the end of Runway 31 and connect to the Industrial Park. As shown on the Figure 9, the existing Runway Protection Zone (RPZ) extends across the Washita River. According the FAA Advisory Circular – 150/5300-13A *Airport Design*, Chapter 3 paragraph 310 section d. "*For RPZ land, the following land uses are permissible without further evaluation. (3) Airport service road, as long as they are not public road and are directly controlled by the airport operator*." Based upon this section, it is the FAA's position that no public roads are allowed within the RPZ. Based upon the FAA requirments, there is currently not enough room to place a public road on the airport side of the Washita River. A road could be extended from SH-53 to the south of the Industrial Park across the river. Because of the expense of constructing a bridge across the Washita River, it is assumed that this option is not economically feasible, and was not included in the project estimates.

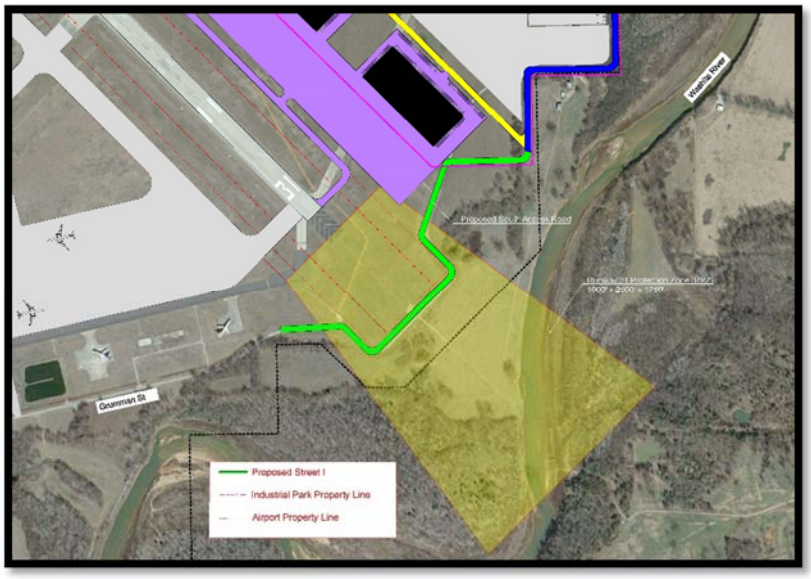


Figure 10: South End RPZ

6. FAR PART 77 AIRSPACE SURFACE EVALUATION

In order for airports to have approaches published by the FAA, the area surrounding the airport must be evaluated against Title 14, Code of Federal Regulations, Part 77, "Safe, Efficient Use, and Preservation of the Navigable Airspace" (Part 77). This requirement is to ensure the safe operation of aircraft and the general public around an airport. There are multiple imaginary surfaces analyzed as part of these requirements. These three-dimensional surfaces above and around the airport are illustrated in Figure 10. The size and slopes of these surfaces depend upon the classification of the runway and are based upon the elevation of the runway.

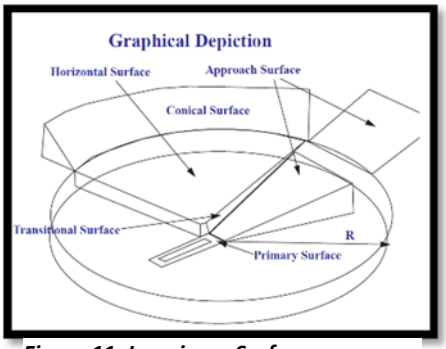


Figure 11: Imaginary Surfaces

Figure 11 shows the location of these surfaces at Ardmore Municipal and their impact upon the proposed Industrial Park improvements. Based upon our evaluations the maximum allowable building height is approximately 85 feet for the buildings nearest the runway. The maximum building elevation for that portion of the improvements within the Horizontal Surface is approximately 926.7 feet MSL. This height and elevation is based upon the lowest point of the runway, and should provide enough guidance information for future planning purposes.

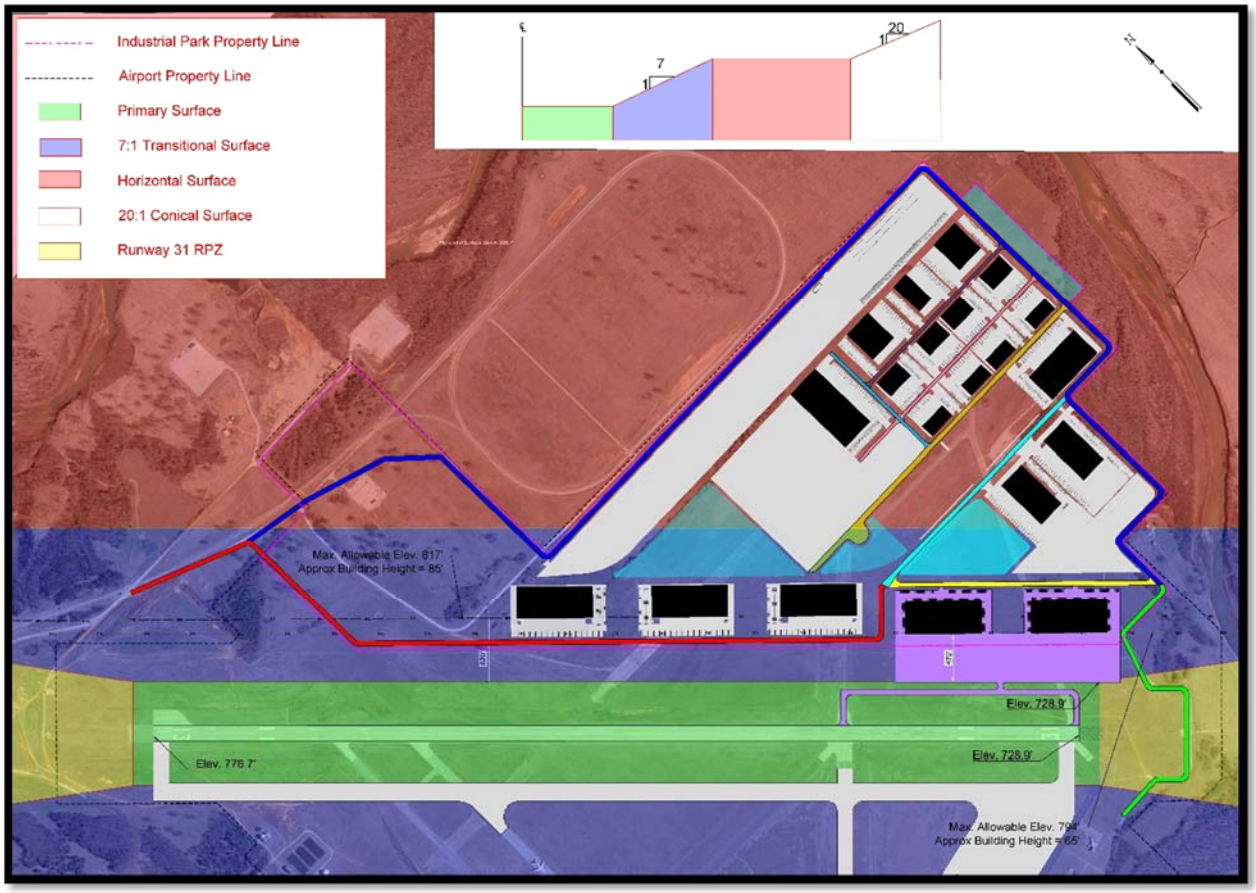


Figure 12: Part 77 Illustration

It should be noted that prior to any construction within the proposed Industrial Park, the permanent structures and any construction equipment will need to be submitted to the FAA for an Obstruction Evaluation / Airport Airspace Analysis (OE/AAA) to protect the Airport's approach category.

7. ENGINEER'S OPINION OF PROBABLE COST AND BUDGET

The Engineer's Opinion of Probable Project Cost are shown in Appendix I. The cost was developed utilizing recent bid prices for similar airport project. The costs below include estimated construction cost, engineering design fees, engineering administrative cost, and a 15% contingency cost. The preliminary opinion of probable project costs are summarized below.

- Total Estimated Phase I Project Cost ..... $ 20,800,878
- Total Estimated Phase II Project Cost ..... $ 37,832,093
- Total Estimated Phase I & Phase II Project Cost..... $ 58,632,971

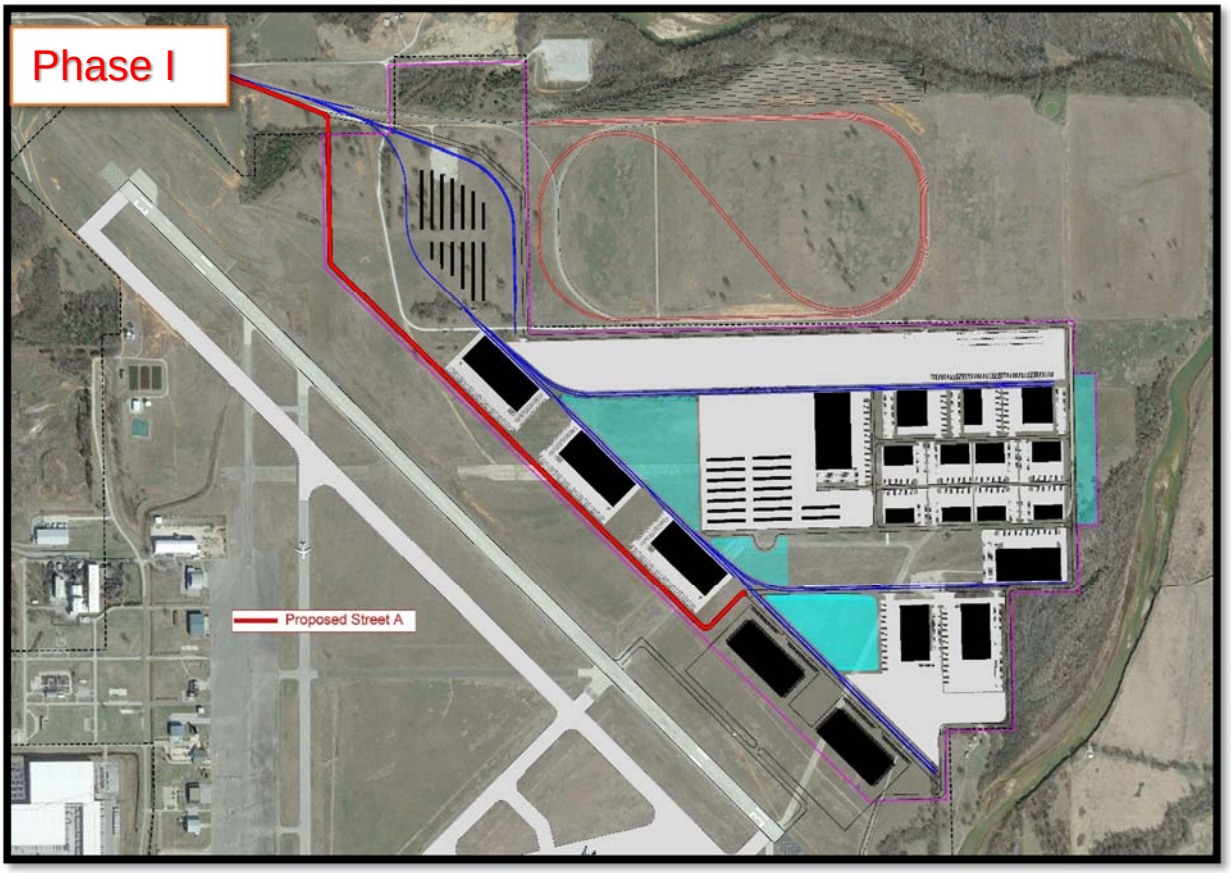


Figure 13: Phase I Street Imrpovement Cost Estimation

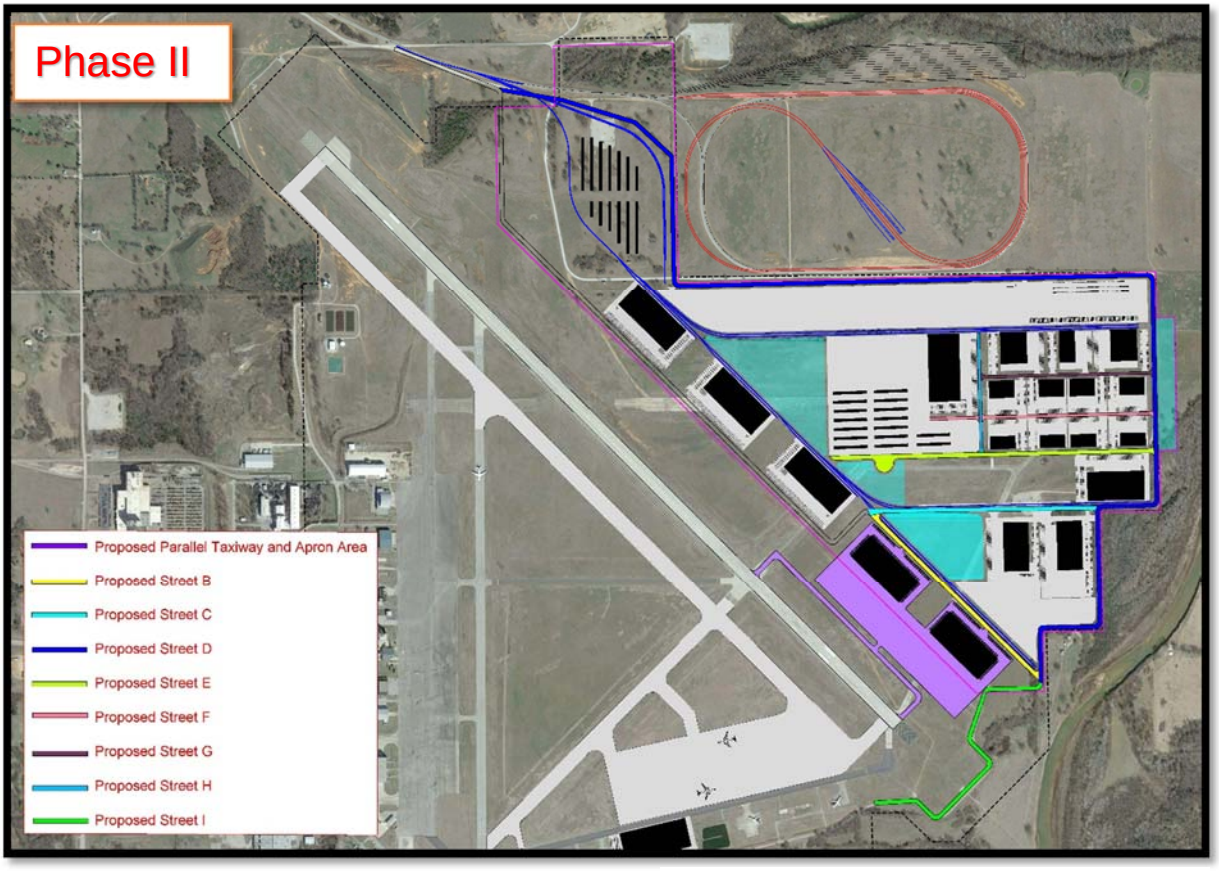


Figure 14: Phase II Street Imrovement Cost Estimation

APPENDIX I

PROJECT BUDGET AND CONSTRUCTION COST ESTIMATES

INDUSTRIAL PARK at the ARDMORE MUNICIPAL AIRPORT
ARDMORE, OKLAHOMA

ESTIMATED PROJECT COST SUMMARY

September 12, 2017

PHASE I

Water Distribution System- Existing System Subtotal:	$	2,265,300
Water Distribution System- New Development Subtotal:	$	2,101,900
Fire System Subtotal:	$	5,046,400
Sanitary Sewer System Subtotal:	$	1,635,000
Street Improvement Roadway Alignment A Subtotal:	$	4,024,500
PHASE I ESTIMATED CONSTRUCTION COST SUBTOTAL:	**$**	**15,073,100**

ESTIMATED PHASE I CONSTRUCTION COST

PHASE I ESTIMATED CONSTRUCTION COST SUBTOTAL:	$	15,885,000
CONTINGENCIES (15%):	$	2,260,965
TOTAL ESTIMATED PHASE I CONSTRUCTION COST :	**$**	**17,334,065**

ESTIMATED PHASE I PROJECT COST

TOTAL ESTIMATED ENGINEERING & ADMINISTRATION (20%):	$	3,466,813
TOTAL ESTIMATED PHASE I PROJECT COST :	**$**	**20,800,878**

PHASE II

Water Distribution System- Remaining Development Subtotal:	$	1,501,800
Fire System- Remaining Development Subtotal:	$	988,000
Sanitary Sewer System- Remaining Development Subtotal:	$	1,224,000
Street Improvement - Road Alignment B Subtotal	$	1,822,460
Street Improvement - Road Alignment C Subtotal:	$	1,822,460
Street Improvement - Road Alignment D Subtotal:	$	7,254,600
Street Improvement - Road Alignment E Subtotal:	$	1,484,240
Street Improvement - Road Alignment F Subtotal:	$	725,750
Street Improvement - Road Alignment G Subtotal:	$	560,475
Street Improvement - Road Alignment H Subtotal:	$	413,275
Apron & Taxiway	$	9,617,500
PHASE II ESTIMATED CONSTRUCTION COST SUBTOTAL:	**$**	**27,414,560**

ESTIMATED PHASE II CONSTRUCTION COST

PHASE II ESTIMATED CONSTRUCTION COST SUBTOTAL:	$	27,414,560
CONTINGENCIES (15%):	$	4,112,184
TOTAL ESTIMATED PHASE II CONSTRUCTION COST:	**$**	**31,526,744**

ESTIMATED PHASE II PROJECT COST

TOTAL ESTIMATED ENGINEERING & ADMINISTRATION (20%):	$	6,305,349
TOTAL ESTIMATED PHASE II PROJECT COST:	**$**	**37,832,093**

PHASE I & PHASE II

ESTIMATED PHASE I & II CONSTRUCTION COST		
TOTAL ESTIMATED PHASE I CONSTRUCTION COST:	$	17,334,065
TOTAL ESTIMATED PHASE II CONSTRUCTION COST:	$	31,526,744
TOTAL ESTIMATED PHASE I & II CONSTRUCTION COST:	**$**	**48,860,809**
ESTIMATED PHASE I & II PROJECT COST		
TOTAL ESTIMATED PHASE I PROJECT COST :	$	20,800,878
TOTAL ESTIMATED PHASE II PROJECT COST:	$	37,832,093
TOTAL ESTIMATED PHASE I & II PROJECT COST:	**$**	**58,632,971**

INDUSTRIAL PARK at the ARDMORE MUNICIPAL AIRPORT
ARDMORE, OKLAHOMA

SCHEDULE 1
Water System Improvements

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

September 12, 2017

I:\DAL\PRJ\000013042\PROJECT FILES\AE\REPORTS\Study\Estimates\[01 - Water Estimates.xlsx]ESTIMATE WATER

Water System Improvements

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT		UNIT COST		TOTAL
Water Distibution System- Existing System							
1	Mobilization	1	L.S.	$	100,000.00	$	100,000
2	8" Water Main	20,500	L.F.	$	80.00	$	1,640,000
3	10" Water Main	4,700	L.F.	$	100.00	$	470,000
4	Service Connection	12	EA.	$	600.00	$	7,200
5	8" Valve and Box	10	EA.	$	2,500.00	$	25,000
6	10" Valve and Box	2	EA.	$	2,800.00	$	5,600
7	Seeding	1	L.S.	$	7,500.00	$	7,500
8	Erosion Control	1	L.S.	$	10,000.00	$	10,000
			WATER DISTRIBUTION SYSTEM SUBTOTAL:			**$**	**2,265,300**
INITIAL PHASE							
Water Distribution System - New Development							
1	Mobilization	1	L.S.	$	98,500.00	$	98,500
2	Construction Staking	1	L.S.	$	29,500.00	$	29,500
3	8" Water Main	23,900	L.F.	$	80.00	$	1,912,000
4	1" Service Connection	9	EA.	$	600.00	$	5,400
5	Water Meter	9	EA.	$	1,000.00	$	9,000
6	8" Valve and Box	13	EA.	$	2,500.00	$	32,500
7	Connect to Existing Water System	2	EA.	$	2,000.00	$	4,000
8	Seeding	1	L.S.	$	5,000.00	$	5,000
9	Erosion Control	1	L.S.	$	6,000.00	$	6,000
			WATER DISTRIBUTION SYSTEM SUBTOTAL:			**$**	**2,101,900**
REMAINING DEVELOPMENT							
Water Distribution System - New Development							
1	Mobilization	1	L.S.	$	71,500.00	$	71,500
2	Construction Staking	1	L.S.	$	21,000.00	$	21,000
3	8" Water Main	16,900	L.F.	$	80.00	$	1,352,000
4	1" Service Connection	18	EA.	$	600.00	$	10,800
5	Water Meter	18	EA.	$	1,000.00	$	18,000
6	8" Valve and Box	7	EA.	$	2,500.00	$	17,500
7	Seeding	1	L.S.	$	5,000.00	$	5,000
8	Erosion Control	1	L.S.	$	6,000.00	$	6,000
			WATER DISTRIBUTION SYSTEM SUBTOTAL:			**$**	**1,501,800**

INITIAL PHASE

Fire System

1	Mobilization	1	L.S.	$	240,000.00	$	240,000
2	Construction Staking	1	L.S.	$	75,000.00	$	75,000
3	14" Water Main	14,600	L.F.	$	180.00	$	2,628,000
4	14" Valve and Box	8	EA.	$	3,800.00	$	30,400
5	Fire Hydrant	48	EA.	$	3,500.00	$	168,000
6	Water Storage Tank - Ground Level	1	L.S.	$	750,000.00	$	750,000
7	Control Valve Station	1	L.S.	$	50,000.00	$	50,000
8	Fire Pump Station System	1	L.S.	$	540,000.00	$	540,000
9	Building Piping	1	L.S.	$	140,000.00	$	140,000
10	Building Valves	1	L.S.	$	135,000.00	$	135,000
11	Fire Pump Station Building	1	L.S.	$	150,000.00	$	150,000
12	Electrical	1	L.S.	$	130,000.00	$	130,000
13	Seeding	1	L.S.	$	4,000.00	$	4,000
14	Erosion Control	1	L.S.	$	6,000.00	$	6,000
					FIRE SYSTEM SUBTOTAL:		**5,046,400**

REMAINING DEVELOPMENT

Fire System

1	Mobilization	1	L.S.	$	50,000.00	$	50,000
2	Construction Staking	1	L.S.	$	14,000.00	$	14,000
3	12" Water Main	2,850	L.F.	$	120.00	$	342,000
4	14" Water Main	2,750	L.F.	$	180.00	$	495,000
5	12" Valve and Box	2	EA.	$	3,200.00	$	6,400
6	14" Valve and Box	2	EA.	$	3,800.00	$	7,600
7	Fire Hydrant	18	EA.	$	3,500.00	$	63,000
8	Seeding	1	L.S.	$	4,000.00	$	4,000
9	Erosion Control	1	L.S.	$	6,000.00	$	6,000
					FIRE SYSTEM SUBTOTAL:		**988,000**

ESTIMATED CONSTRUCTION COST

WATER DISTIBUTION SYSTEM SUBTOTAL:	$	5,869,000
FIRE SYSTEM SUBTOTAL:	$	6,034,400
CONTINGENCIES (15%):	$	1,785,510
TOTAL ESTIMATED WATER & SEWER IMPROVEMENT CONSTRUCTION COST:	**$**	**13,688,910**

ESTIMATED PROJECT COST

TOTAL ESTIMATED ENGINEERING & ADMINISTRATION COST (20%):	$	2,737,782
TOTAL ESTIMATED WATER SYSTEM IMPROVEMENT PROJECT COST:	**$**	**16,426,692**

INDUSTRIAL PARK at the ARDMORE MUNICIPAL AIRPORT
ARDMORE, OKLAHOMA

SCHEDULE 2
Sanitary Sewer System Improvements

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

September 12, 2017

I:\DAL\PRJ\000013042\PROJECT FILES\AE\REPORTS\Study\Estimates\[02 - Sewer Estimates.xlsx]ESTIMATE SEWER

Sanitary Sewer Improvements

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT		UNIT COST		TOTAL
INITIAL PHASE							
Sanitary Sewer System							
1	Mobilization	1	L.S.	$	65,000	$	65,000
2	Construction Staking	1	L.S.	$	37,500	$	37,500
3	8" Gravity Sewer	6000	L.F.	$	50	$	300,000
4	10" Gravity Sewer	9600	L.F.	$	65	$	624,000
5	Manhole, Std 4' Dia	35	EA.	$	5,000	$	175,000
6	Manhole, Drop 4' Dia	6	EA.	$	6,500	$	39,000
7	Extra Depth Manhole	50	V.F.	$	250	$	12,500
8	Service Connections	7	EA.	$	500	$	3,500
9	Pump Station	1	L.S.	$	350,000	$	350,000
10	Seeding	1	L.S.	$	7,500	$	7,500
11	Connect to Existing Manhole	2	EA.	$	5,500	$	11,000
12	Erosion Control	1	L.S.	$	10,000	$	10,000
				SANITARY SEWER SYSTEM SUBTOTAL:		**$**	**1,635,000**
REMAINING DEVELOPMENT							
Sanitary Sewer System							
1	Mobilization	1	L.S.	$	65,000	$	65,000
2	Construction Staking	1	L.S.	$	30,000	$	30,000
3	8" Gravity Sewer	15000	L.F.	$	50	$	750,000
5	Manhole, Std 4' Dia	35	EA.	$	5,000	$	175,000
6	Manhole, Drop 4' Dia	6	EA.	$	6,500	$	39,000
7	Extra Depth Manhole	50	V.F.	$	250	$	12,500
8	16" Encasement Pipe	400	L.F.	$	300	$	120,000
9	Service Connections	18	EA.	$	500	$	9,000
10	Seeding	1	L.S.	$	8,000	$	8,000
11	Connect to Existing Manhole	1	EA.	$	5,500	$	5,500
12	Erosion Control	1	L.S.	$	10,000	$	10,000
				SANITARY SEWER SYSTEM SUBTOTAL:		**$**	**1,224,000**

ESTIMATED CONSTRUCTION COST

SANITARY SEWER SYSTEM SUBTOTAL:	$	2,859,000
CONTINGENCIES (15%):	$	428,850
TOTAL ESTIMATED WATER & SEWER IMPROVEMENT CONSTRUCTION COST:	**$**	**3,287,850**

ESTIMATED PROJECT COST

TOTAL ESTIMATED ENGINEERING & ADMINISTRATION COST (20%):	$	657,570
TOTAL ESTIMATED SANITARY IMPROVEMENT PROJECT COST:	**$**	**3,945,420**

INDUSTRIAL PARK at the ARDMORE MUNICIPAL AIRPORT
ARDMORE, OKLAHOMA

Phase 1 and 2

Street Improvements

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

September 12, 2017

I:\DAL\PRJ\000013042\PROJECT FILES\AE\REPORTS\Study\Estimates\[03 - Street Estimates.xlsx]ESTIMATE ROAD 9-7-2017 (2)

Street Improvements

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTAL
ROADWAY ALIGNMENT A					
A-1	Clearing and Grubbing	13	ACRE	$ 5,000.00	$ 66,000
A-2	Unclassified Excavation	72,000	C.Y.	$ 3.00	$ 216,000
A-3	Embankment in Place	82,000	C.Y.	$ 3.00	$ 246,000
A-4	Remove & Replace Existing Unsuitable Subgrade Material with Select Fill as Directed by the Engineer	1,150	C.Y.	$ 50.00	$ 57,500
A-5	Remove & Replace Existing Unsuitable Subgrade Material with Foundation Material as Directed by the Engineer	800	C.Y.	$ 65.00	$ 52,000
A-6	6" Lime Stabilized Subgrade	50,000	S.Y	$ 5.00	$ 250,000
A-7	Hydrated Lime for Lime Stabilized Subgrade (8%)	1,400	TON	$ 195.00	$ 273,000
A-8	8" Portland Cement Concrete	43,000	S.Y.	$ 50.00	$ 2,150,000
A-9	Roadway Signage and Marking	1	L.S.	$ 15,000.00	$ 15,000
A-10	Mobilization	1	L.S.	$ 400,000.00	$ 400,000
A-11	Traffic Control Devices	1	L.S.	$ 5,000.00	$ 5,000
A-12	Proof Rolling	200	HRS.	$ 50.00	$ 10,000
A-13	Furnish and Install Structural Geogrid Subgrade	700	S.Y	$ 20.00	$ 14,000
A-14	Drainage Improvements	1	LS	$ 250,000.00	$ 250,000
A-15	Erosion Control/Seeding	1	L.S.	$ 20,000.00	$ 20,000
				ROADWAY ALIGNMENT A SUBTOTAL:	**$ 4,024,500**
ROADWAY ALIGNMENT B					
A-1	Clearing and Grubbing	4	ACRE	$ 5,000.00	$ 20,460
A-2	Unclassified Excavation	23,000	C.Y.	$ 3.00	$ 69,000
A-3	Embankment in Place	26,000	C.Y.	$ 3.00	$ 78,000
A-4	Remove & Replace Existing Unsuitable Subgrade Material with Select Fill as Directed by the Engineer	400	C.Y.	$ 50.00	$ 20,000
A-5	Remove & Replace Existing Unsuitable Subgrade Material with Foundation Material as Directed by the Engineer	250	C.Y.	$ 65.00	$ 16,250
A-6	6" Lime Stabilized Subgrade	15,000	S.Y	$ 5.00	$ 75,000
A-7	Hydrated Lime for Lime Stabilized Subgrade (8%)	500	TON	$ 195.00	$ 97,500
A-8	8" Portland Cement Concrete	15,000	S.Y.	$ 50.00	$ 750,000
A-9	Roadway Signage and Marking	1	L.S.	$ 15,000.00	$ 15,000
A-10	Mobilization	1	L.S.	$ 400,000.00	$ 400,000
A-11	Traffic Control Devices	1	L.S.	$ 4,000.00	$ 4,000
A-12	Proof Rolling	65	HRS.	$ 50.00	$ 3,250
A-13	Furnish and Install Structural Geogrid Subgrade	200	S.Y	$ 20.00	$ 4,000
A-14	Drainage Improvements	1	LS	$ 250,000.00	$ 250,000
A-15	Erosion Control/Seeding	1	L.S.	$ 20,000.00	$ 20,000
				ROADWAY ALIGNMENT B SUBTOTAL:	**$ 1,822,460**

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT		UNIT COST		TOTAL
ROADWAY ALIGNMENT C							
A-1	Clearing and Grubbing	4	ACRE	$	5,000.00	$	20,460
A-2	Unclassified Excavation	23,000	C.Y.	$	3.00	$	69,000
A-3	Embankment in Place	26,000	C.Y.	$	3.00	$	78,000
A-4	Remove & Replace Existing Unsuitable Subgrade Material with Select Fill as Directed by the Engineer	400	C.Y.	$	50.00	$	20,000
A-5	Remove & Replace Existing Unsuitable Subgrade Material with Foundation Material as Directed by the Engineer	250	C.Y.	$	65.00	$	16,250
A-6	6" Lime Stabilized Subgrade	15,000	S.Y	$	5.00	$	75,000
A-7	Hydrated Lime for Lime Stabilized Subgrade (8%)	500	TON	$	195.00	$	97,500
A-8	8" Portland Cement Concrete	15,000	S.Y.	$	50.00	$	750,000
A-9	Roadway Signage and Marking	1	L.S.	$	15,000.00	$	15,000
A-10	Mobilization	1	L.S.	$	400,000.00	$	400,000
A-11	Traffic Control Devices	1	L.S.	$	4,000.00	$	4,000
A-12	Proof Rolling	65	HRS.	$	50.00	$	3,250
A-13	Furnish and Install Structural Geogrid Subgrade	200	S.Y	$	20.00	$	4,000
A-14	Drainage Improvements	1	LS	$	250,000.00	$	250,000
A-15	Erosion Control/Seeding	1	L.S.	$	20,000.00	$	20,000
				ROADWAY ALIGNMENT C SUBTOTAL:		**$**	**1,822,460**
ROADWAY ALIGNMENT D							
A-1	Clearing and Grubbing	24	ACRE	$	5,000.00	$	120,000
A-2	Unclassified Excavation	132,000	C.Y.	$	3.00	$	396,000
A-3	Embankment in Place	150,000	C.Y.	$	3.00	$	450,000
A-4	Remove & Replace Existing Unsuitable Subgrade Material with Select Fill as Directed by the Engineer	2,100	C.Y.	$	50.00	$	105,000
A-5	Remove & Replace Existing Unsuitable Subgrade Material with Foundation Material as Directed by the Engineer	1,500	C.Y.	$	65.00	$	97,500
A-6	6" Lime Stabilized Subgrade	87,000	S.Y	$	5.00	$	435,000
A-7	Hydrated Lime for Lime Stabilized Subgrade (8%)	2,520	TON	$	195.00	$	491,400
A-8	8" Portland Cement Concrete	78,000	S.Y.	$	50.00	$	3,900,000
A-9	Roadway Signage and Marking	1	L.S.	$	30,000.00	$	30,000
A-10	Mobilization	1	L.S.	$	720,000.00	$	720,000
A-11	Traffic Control Devices	1	L.S.	$	9,000.00	$	9,000
A-12	Proof Rolling	378	HRS.	$	50.00	$	18,900
A-13	Furnish and Install Structural Geogrid Subgrade	1,290	S.Y	$	20.00	$	25,800
A-14	Drainage Improvements	1	LS	$	420,000.00	$	420,000
A-15	Erosion Control/Seeding	1	L.S.	$	36,000.00	$	36,000
				ROADWAY ALIGNMENT D SUBTOTAL:		**$**	**7,254,600**
ROADWAY ALIGNMENT E							
B-1	Clearing and Grubbing	6	ACRE	$	5,000.00	$	29,000
B-2	Unclassified Excavation	7,000	C.Y.	$	3.00	$	21,000
B-3	Embankment in Place	1,000	C.Y.	$	3.00	$	3,000
B-4	Remove & Replace Existing Unsuitable Subgrade Material with Select Fill as Directed by the Engineer	500	C.Y.	$	50.00	$	25,000
B-5	Remove & Replace Existing Unsuitable Subgrade Material with Foundation Material as Directed by the Engineer	400	C.Y.	$	65.00	$	26,000
B-6	6" Lime Stabilized Subgrade	21,000	S.Y	$	5.00	$	105,000
B-7	Hydrated Lime for Lime Stabilized Subgrade (8%)	600	TON	$	195.00	$	117,000
B-8	8" Portland Cement Concrete	19,000	S.Y.	$	50.00	$	950,000
B-9	Roadway Signage and Marking	1	L.S.	$	15,000.00	$	15,000
B-10	Mobilization	1	L.S.	$	150,000.00	$	150,000
B-11	Traffic Control Devices	1	L.S.	$	2,000.00	$	2,000
B-12	Proof Rolling	102	HRS.	$	50.00	$	5,100
B-13	Furnish and Install Structural Geogrid Subgrade	307	S.Y	$	20.00	$	6,140
B-14	Drainage Improvements	1	LS	$	20,000.00	$	20,000
B-15	Erosion Control/Seeding	1	L.S.	$	10,000.00	$	10,000
				ROADWAY ALIGNMENT E SUBTOTAL:		**$**	**1,484,240**

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT		UNIT COST		TOTAL
ROADWAY ALIGNMENT F							
C-1	Clearing and Grubbing	4	ACRE	$	5,000.00	$	20,000
C-2	Unclassified Excavation	4,500	C.Y.	$	3.00	$	13,500
C-3	Embankment in Place	1,000	C.Y.	$	3.00	$	3,000
C-4	Remove & Replace Existing Unsuitable Subgrade Material with Select Fill as Directed by the Engineer	250	C.Y.	$	50.00	$	12,500
C-5	Remove & Replace Existing Unsuitable Subgrade Material with Foundation Material as Directed by the Engineer	200	C.Y.	$	65.00	$	13,000
C-6	6" Lime Stabilized Subgrade	10,100	S.Y	$	5.00	$	50,500
C-7	Hydrated Lime for Lime Stabilized Subgrade (8%)	300	TON	$	195.00	$	58,500
C-8	8" Portland Cement Concrete	8,500	S.Y.	$	50.00	$	425,000
C-9	Roadway Signage and Marking	1	L.S.	$	15,000.00	$	15,000
C-10	Mobilization	1	L.S.	$	75,000.00	$	75,000
C-11	Traffic Control Devices	1	L.S.	$	2,000.00	$	2,000
C-12	Proof Rolling	75	HRS.	$	50.00	$	3,750
C-13	Furnish and Install Structural Geogrid Subgrade	200	S.Y	$	20.00	$	4,000
C-14	Drainage Improvements	1	LS	$	20,000.00	$	20,000
C-15	Erosion Control/Seeding	1	L.S.	$	10,000.00	$	10,000
			ROADWAY ALIGNMENT F SUBTOTAL:			**$**	**725,750**
ROADWAY ALIGNMENT G							
D-1	Clearing and Grubbing	3	ACRE	$	5,000.00	$	15,000
D-2	Unclassified Excavation	1,000	C.Y.	$	3.00	$	3,000
D-3	Embankment in Place	1,000	C.Y.	$	3.00	$	3,000
D-4	Remove & Replace Existing Unsuitable Subgrade Material with Select Fill as Directed by the Engineer	180	C.Y.	$	50.00	$	9,000
D-5	Remove & Replace Existing Unsuitable Subgrade Material with Foundation Material as Directed by the Engineer	140	C.Y.	$	65.00	$	9,100
D-6	6" Lime Stabilized Subgrade	8,000	S.Y	$	5.00	$	40,000
D-7	Hydrated Lime for Lime Stabilized Subgrade (8%)	225	TON	$	195.00	$	43,875
D-8	8" Portland Cement Concrete	6,600	S.Y.	$	50.00	$	330,000
D-9	Roadway Signage and Marking	1	L.S.	$	15,000.00	$	15,000
D-10	Mobilization	1	L.S.	$	56,000.00	$	56,000
D-11	Traffic Control Devices	1	L.S.	$	2,000.00	$	2,000
D-12	Proof Rolling	40	HRS.	$	50.00	$	2,000
D-13	Furnish and Install Structural Geogrid Subgrade	125	S.Y	$	20.00	$	2,500
D-14	Drainage Improvements	1	LS	$	20,000.00	$	20,000
D-15	Erosion Control/Seeding	1	L.S.	$	10,000.00	$	10,000
			ROADWAY ALIGNMENT G SUBTOTAL:			**$**	**560,475**
ROADWAY ALIGNMENT H							
E-1	Clearing and Grubbing	3	ACRE	$	5,000.00	$	15,000
E-2	Unclassified Excavation	750	C.Y.	$	3.00	$	2,250
E-3	Embankment in Place	450	C.Y.	$	3.00	$	1,350
E-4	Remove & Replace Existing Unsuitable Subgrade Material with Select Fill as Directed by the Engineer	150	C.Y.	$	50.00	$	7,500
E-5	Remove & Replace Existing Unsuitable Subgrade Material with Foundation Material as Directed by the Engineer	110	C.Y.	$	65.00	$	7,150
E-6	6" Lime Stabilized Subgrade	5,500	S.Y	$	5.00	$	27,500
E-7	Hydrated Lime for Lime Stabilized Subgrade (8%)	155	TON	$	195.00	$	30,225
E-8	8" Portland Cement Concrete	4,600	S.Y.	$	50.00	$	230,000
E-9	Roadway Signage and Marking	1	L.S.	$	15,000.00	$	15,000
E-10	Mobilization	1	L.S.	$	42,000.00	$	42,000
E-11	Traffic Control Devices	1	L.S.	$	2,000.00	$	2,000
E-12	Proof Rolling	30	HRS.	$	50.00	$	1,500
E-13	Furnish and Install Structural Geogrid Subgrade	90	S.Y	$	20.00	$	1,800
E-14	Drainage Improvements	1	LS	$	20,000.00	$	20,000
E-15	Erosion Control/Seeding	1	L.S.	$	10,000.00	$	10,000
			ROADWAY ALIGNMENT H SUBTOTAL:			**$**	**413,275**

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT		UNIT COST		TOTAL
APRON & TAXIWAY							
A-1	Clearing and Grubbing	35	ACRE	$	5,000.00	$	175,000
A-2	Unclassified Excavation	180,000	C.Y.	$	3.00	$	540,000
A-3	Embankment in Place	200,000	C.Y.	$	3.00	$	600,000
A-4	Remove & Replace Existing Unsuitable Subgrade Material with Select Fill as Directed by the Engineer	3,000	C.Y.	$	50.00	$	150,000
A-5	Remove & Replace Existing Unsuitable Subgrade Material with Foundation Material as Directed by the Engineer	2,000	C.Y.	$	65.00	$	130,000
A-6	6" Lime Stabilized Subgrade	14,000	S.Y	$	5.00	$	70,000
A-7	Hydrated Lime for Lime Stabilized Subgrade (8%)	3,500	TON	$	195.00	$	682,500
A-8	8" Portland Cement Concrete	125,000	S.Y.	$	50.00	$	6,250,000
A-9	Marking	1	L.S.	$	5,000.00	$	5,000
A-10	Mobilization	1	L.S.	$	400,000.00	$	400,000
A-12	Proof Rolling	500	HRS.	$	50.00	$	25,000
A-13	Furnish and Install Structural Geogrid Subgrade	2,000	S.Y	$	20.00	$	40,000
A-14	Drainage Improvements	1	LS	$	500,000.00	$	500,000
A-15	Erosion Control/Seeding	1	L.S.	$	50,000.00	$	50,000
					APRON & TAXIWAY SUBTOTAL:	**$**	**9,617,500**

ESTIMATED CONSTRUCTION COST (PHASE I)

ROADWAY ALIGNMENT A SUBTOTAL:	**$**	**4,024,500**
CONTINGENCIES (15%)	**$**	**603,675**
TOTAL ESTIMATED PHASE I CONSTRUCTION COST	**$**	**4,628,175**
TOTAL ESTIMATED ENGINEERING & ADMINISTRATION (20%)	**$**	**925,635**
TOTAL ESTIMATED PHASE I PROJECT COST	**$**	**5,553,810**

ESTIMATED CONSTRUCTION COST (PHASE II)

ROADWAY ALIGNMENT SUBTOTAL B:	**$**	**1,822,460**
ROADWAY ALIGNMENT SUBTOTAL C:	**$**	**1,822,460**
ROADWAY ALIGNMENT SUBTOTAL D:	**$**	**7,254,600**
ROADWAY ALIGNMENT SUBTOTAL E:	**$**	**1,484,240**
ROADWAY ALIGNMENT SUBTOTAL F:	**$**	**725,750**
ROADWAY ALIGNMENT SUBTOTAL G:	**$**	**560,475**
ROADWAY ALIGNMENT SUBTOTAL H:	**$**	**413,275**
APRON & TAXIWAY SUBTOTAL:	**$**	**9,617,500**
CONTINGENCIES (15%)	**$**	**3,555,114**
TOTAL ESTIMATED PHASE II CONSTRUCTION COST	**$**	**27,255,874**
TOTAL ESTIMATED ENGINEERING & ADMINISTRATION COST (20%)	**$**	**5,451,175**
TOTAL ESTIMATED PHASE II PROJECT COST	**$**	**32,707,049**