DAYTON INTERNATIONAL AIRPORT

2008 MASTER PLAN REPORT

PREPARED BY:

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1. BACKGROUND AND INTRODUCTION

1.1 BACKGROUND

In December 1999, Landrum & Brown prepared the Strategic Master Plan Update Study Technical Report with the goal of assuring that the airport and region are significant players in the 21st century global economy. The findings of this report demonstrated an immediate need for increased runway capacity due to the current air cargo demand and its anticipated future growth, in conjunction with an anticipated annual two percent increase in passenger growth.

The original Master Plan forecast was completed in 1999 based on 1998 base year data and was approved by the FAA on March 7, 2000. Emery Forwarding had its principal domestic cargo hub located at Dayton International Airport (DAY) and was experiencing operational delays. These delays would continue to increase as a result of an anticipated average annual growth of 4.7 percent in total cargo tonnage and 6.2 percent in cargo operations over the 20 year planning period. Much of the long-term cargo growth was due to the United States Postal Service (USPS) expanding its use of contract air mail handlers, with Emery being expected to win a significant number of these contracts. In 2001 the USPS canceled their daytime bulk mail contract with Emery Forwarding. The daytime bulk mail contract was awarded to FedEx who transferred this operation to its existing air cargo facilities in Indianapolis and Memphis.

In February 2003 Emery Forwarding announced that it would change its name to Menlo Worldwide Forwarding, which was completed by January 2004. In December 2004, UPS acquired Menlo Worldwide Forwarding and decided to close the air cargo hub at DAY in June 2006. As a result, air cargo operations have declined significantly at DAY. In a letter dated November 17, 2005, the FAA recommended that the Environmental Impact Statement (EIS) process be terminated due to the lack of Purpose and Need of the proposed airport development projects. Shortly thereafter the Airport and FAA agreed to cancel the current EIS process. The 1999 Strategic Master Plan Update was never approved by the FAA Detroit ADO. However, the Dayton International Airport Department of Aviation continued to proceed with the master planning process to determine what their long-term goals and needs will be at DAY. This 2008 Master Plan Report presents this process and the proposed Airport Development Program.

1.2 INTRODUCTION

This 2008 Master Plan Report provides a summary of the long-term Airport studies and proposed development projects that are currently being recommended since the 1999 Strategic Master Plan Update and EIS process were terminated back in early 2006. These studies include the following:

- New Air Traffic Control Tower (ATCT) Site Selection Study – September 5, 2002 (see **Attachment A**)
- New ATCT Siting Study Addendum No. 1 – May 20, 2003 (see **Attachment A**)

- Runway Length Requirement Analysis – February 9, 2005 (see **Attachment B**)
- Runway 18-36 Relocation and Extension Feasibility Study – February 15, 2005 (see **Attachment C**)
- 6R/24L Runway Safety Area (RSA) Alternatives Analysis - April 3, 2006 (see **Attachment D**)
- Alternative Runway 6R/24L Extension Analysis – April 19, 2007 (see **Attachment E**)
- Updated Aviation Activity Forecast - November 27, 2007 (see **Attachment F**)

A complete version of each of these studies is provided in an Attachment at the end of this 2008 Master Plan Report.

The annual forecast enplaned passenger and aircraft operations activity levels in the Draft 2007 Terminal Area Forecast (TAF) for years 2008 through 2025 have been adopted for the current Updated Aviation Activity Forecast. Values for 2026 and 2027 were extrapolated using the TAF growth rates from 2020 to 2025. The FAA Detroit ADO has approved the updated aviation activity forecast for DAY in their approval letter dated December 3, 2007.

The Future Airport Layout Plan (ALP) drawings dated June 22, 2007 depict the proposed long-range Airport development projects that will be necessary to meet the forecast demand over the next 20-30 year period. These ALP drawings will be updated to address the FAA Detroit ADO comments dated April 17, 2008, Airspace Case Number 07-AGL-972-NRA. Some of the major projects include:

- Runway Safety Area Modifications to 6R/24L
- Extension of Runway 6R/24L from 7,000 feet to 8,500 feet)
- Relocation of Runway 18-36 to the north
- Extension of Runway 6L/24R from 10,900 feet to 12,600 feet
- North Dixie Drive Tunnel Under Runway 24L Extension
- New Parking Garage/Consolidated Rental Car Complex
- New Air Traffic Control Tower

These Master Plan projects are proposed to be developed over the next 20 to 30 year time period and will be based on various Planning Activity Levels (PALs). Such as, airfield development will be based on future aircraft operations; while terminal expansion projects will be based on future passenger activity. Section 9 of this report presents the proposed Program Implementation Plan for the future Master Plan projects.

The land area for the passenger terminal has sufficient size to handle forecast growth in enplaned passenger and aircraft operations. The rehabilitation of the Concourse D gates will provide additional capacity in the future. DAY will initiate a separate detailed study of the terminal area that will examine the specific configuration of expanded facilities that will accommodate both forecast growth and long-term needs.

2. AVIATION ACTIVITY FORECAST UPDATE

The purpose of this section is to present the Dayton International Airport (DAY) aviation activity forecast that is being used to support the planning efforts in the 2008 Master Plan. This Aviation Activity Forecast dated November 27, 2007 was approved by the FAA on December 3, 2007. A complete version of the forecast is presented in **Attachment F** of this report.

Passenger air traffic after September 11, 2001 rebounded much faster at DAY than the typical U.S. airport. Enplanements increased 6.1 percent in 2002, 14.3 percent in 2003, and 10.1 percent in 2004. In 2005, however, enplanements declined almost 16 percent at DAY due to Delta's implementation of its "SimpliFare" program which resulted in significant fare discounting at its Cincinnati hub (CVG). By 2006, much of the fare stimulus at CVG had abated and traffic returned to an upward trend at DAY, increasing 6.9 percent in 2006. Estimates for 2007 suggest that demand for air travel from DAY will continue to be relatively robust in the near term, with enplanements projected to increase 9.5 percent over 2006 levels.

The annual forecast enplaned passenger and aircraft operations activity levels in the Draft 2007 Terminal Area Forecast (TAF) for years 2008 through 2025 have been adopted for this forecast. Values for 2026 and 2027 were extrapolated using the TAF growth rates from 2020 to 2025.

Table 2-1 presents the updated enplaned passenger forecast. The forecast 2007-2027 average annual growth rate of 1.4 percent is slightly less than half of the 1998 to 2007 growth rate of 3.0 percent. The average annual growth rate from 1998 to 2007 is relevant because in addition to locally-generated traffic, Dayton enjoys significant leakage from northern Cincinnati residents.

The forecast split between air carrier and regional airline enplanements reflects, particularly in the near term: (1) AirTran's new service to Las Vegas and increased frequency to Baltimore-Washington, and (2) Frontier's planned shift to an all air carrier A319 fleet at DAY.

Table 2-2 presents the assumptions on the average size of aircraft (seats per departure) that will be used by the passenger airlines and the average percentage of seats that will be filled (load factor). The average size of air carrier aircraft is expected to grow gradually as AirTran shifts to a higher percentage of B737-700 operations and legacy carriers replace ageing MD80 aircraft with somewhat higher seating capacity B737-800 aircraft. Regional airlines are expected to continue to shift to a higher percentage of 50-70 seat regional jet operations and either reduce or eliminate smaller regional jet and turboprop service over the forecast period. Air carrier load factors are expected to remain relatively high at DAY versus historical standards for both air carrier and commuter operators, reflecting the need for greater aircraft utilization mainly due to continued high oil prices.

Table 2-3 presents the updated aircraft operations forecast. The passenger aircraft operations are calculated based upon the forecast enplaned passengers and the assumed average seats per departure and load factor. Due to the increase in average passenger aircraft gauge and maintenance of the average load factor, passenger aircraft operations will increase at a slower rate than passenger enplanements.

In December 2004, UPS acquired Menlo Worldwide which operated an air cargo hub at DAY and subsequently decided to close the hub in June 2006. As a result, air cargo operations have declined significantly at DAY. The forecast of operations assumes that no air cargo operator will establish a significant hubbing presence at DAY over the forecast period; however the Airport is pursuing an aggressive marketing program with several domestic and international cargo carriers. The Airport is hopeful that by 2012, one or more carriers will operate 20 flights (10 arrivals and 10 departures) per day, during the nighttime hours. It is the DAY Airport's goal to have a minimum of five cargo operations by 2009, and increase this by five cargo operations per year through 2012.

Non-commercial operations (non-commercial air taxi, general aviation and military operations) are projected to grow at approximately 1.4 percent per year on average after 2007. Forecast annual total operations tie to the draft 2007 TAF at an average annual growth rate of 1.4 percent from 2007 to 2027.

Table 2-4 presents the forecast fleet mix for passenger aircraft. The air carrier fleet is projected to remain a narrow-body fleet. Older aircraft such as MD80s will be phased out and replaced by newer generation Boeing 737-800 equipment. The Boeing 717 has become and is expected to remain the dominant aircraft for air carrier airlines.

Today, the regional carrier fleet is dominated by 50-seat regional jets. Over the forecast horizon, the regional carriers are expected to phase out all of the turboprop aircraft in favor of regional jets ranging in size from 32 to 70 seats.

2.1 STATE SYSTEM PLAN FORECAST COMPARISON

A comparison of the current Ohio State Airport System Plan[1] forecast and critical aircraft was performed as prescribed in the current FAA ALP Checklist (Narrative Report, Item A.8). The Ohio State Airport System Plan is based on the 2004 FAA TAF, while the approved DAY Aviation Forecast is based on the Draft 2007 TAF.

Table 2-5 presents a comparison of the forecast commercial service aircraft operations at DAY. As shown, the commercial aircraft operations forecast for the DAY aviation forecast (Draft 2007 TAF) are 32-35 percent less than the Ohio State Airport System Plan. The main reason for the large discrepancy in the comparison of commercial operations is due to the outdated State information. In addition, air carrier operations have continued to decline since 2002 due to the reduction in larger aircraft and the move towards small commuter and regional jets. The commuter and air taxi operations reached their peak in 2004 and have been slowly declining since that time. The airlines have been reducing their frequency to some destinations as a means of increasing their load factors.

1 Ohio State Airport System Plan, May 2006.

The Airport Reference Code (ARC) for DAY is the same under both planning studies. The critical aircraft is the B-747, which falls within the D-V airport reference code for future planning purposes. Long-range planning at DAY calls for upgrading various airfield components to Group V design standards. Currently the airport is designed to Group IV standards.

TABLE 2-1
ENPLANED PASSENGER FORECAST

	Year	Air Carrier	Regional	Total	Annual Change
Actual	1998	797,710	298,903	1,096,613	8.5%
	1999	811,985	314,178	1,126,163	2.7%
	2000	840,273	343,289	1,183,562	5.1%
	2001	712,192	371,769	1,083,961	-8.4%
	2002	625,922	524,495	1,150,417	6.1%
	2003	577,238	737,868	1,315,106	14.3%
	2004	627,518	820,423	1,447,941	10.1%
	2005	458,667	763,596	1,222,263	-15.6%
	2006	534,471	771,766	1,306,237	6.9%
Estimate	2007	631,000	799,000	1,430,000	9.5%
Forecast	2008	620,100	782,949	1,403,049	-1.9%
	2009	634,400	791,007	1,425,407	1.6%
	2010	649,000	799,178	1,448,178	1.6%
	2011	663,900	807,471	1,471,371	1.6%
	2012	679,200	815,793	1,494,993	1.6%
	2013	694,900	824,152	1,519,052	1.6%
	2014	711,000	832,559	1,543,559	1.6%
	2015	727,500	841,021	1,568,521	1.6%
	2016	744,300	849,647	1,593,947	1.6%
	2017	761,700	858,147	1,619,847	1.6%
	2018	779,400	866,831	1,646,231	1.6%
	2019	797,600	875,507	1,673,107	1.6%
	2020	816,200	884,287	1,700,487	1.6%
	2021	829,600	898,779	1,728,379	1.6%
	2022	843,300	913,494	1,756,794	1.6%
	2023	857,200	928,544	1,785,744	1.6%
	2024	871,300	943,937	1,815,237	1.7%
	2025	885,700	959,586	1,845,286	1.7%
	2026	900,300	975,393	1,875,693	1.6%
	2027	915,200	991,401	1,906,601	1.6%
Average Annual Growth Rates					
	1998-2007	-2.6%	11.5%	3.0%	
	2007-2012	1.5%	0.4%	0.9%	
	2012-2027	2.0%	1.3%	1.6%	
	2007-2027	1.9%	1.1%	1.4%	

TABLE 2-2
PASSENGER AIRCRAFT AND LOAD FACTOR ASSUMPTIONS

		Air Carrier		Regional	
	Year	Gauge	Load Factor	Gauge	Load Factor
	2003	131.4	79.9%	40.2	71.7%
	2004	132.9	72.8%	46.8	66.7%
	2005	127.3	65.9%	50.0	64.0%
	2006	125.3	76.5%	50.7	73.2%
Estimate	2007	125.7	78.2%	50.3	74.0%
Forecast	2012	128.4	78.0%	50.4	75.0%
	2017	129.0	78.0%	51.4	75.0%
	2027	130.4	78.0%	53.4	75.0%

Notes: Gauge equals average seats per departure
Load factor equals average percentage of seats filled

TABLE 2-3
AIRCRAFT OPERATIONS FORECAST

	Year	Passenger Air Carrier	Passenger Regional	Cargo	Other	Total	Annual Change
Actual	1998	24,148	31,398	42,540	53,393	151,479 \1	
	1999	24,239	30,330	38,987	58,448	152,004 \1	0.3%
	2000	25,540	33,466	35,118	51,277	145,401 \2	-4.3%
	2001	21,795	40,114	22,706	47,994	132,609 \2	-8.8%
	2002	16,210	42,108	16,078	50,821	125,217 \2	-5.6%
	2003	11,264	50,587	14,963	49,033	125,847 \2	0.5%
	2004	12,982	52,588	10,784	47,717	124,071 \2	-1.4%
	2005	10,944	47,710	9,028	53,414	121,096 \2	-2.4%
	2006	11,162	41,582	4,022	52,887	109,653 \2	-9.4%
Estimate	2007	12,836	42,871	600	50,837	107,144	-2.3%
Forecast	2008	12,400	42,400	600	53,685	109,085	1.8%
	2009	12,700	42,500	1,900	53,463	110,563	1.4%
	2010	13,000	42,600	3,200	53,267	112,067	1.4%
	2011	13,300	42,900	4,500	52,894	113,594	1.4%
	2012	13,600	43,200	5,800	52,545	115,145	1.4%
	2013	13,900	43,400	5,900	53,520	116,720	1.4%
	2014	14,200	43,700	6,000	54,422	118,322	1.4%
	2015	14,500	44,000	6,100	55,352	119,952	1.4%
	2016	14,800	44,300	6,200	56,306	121,606	1.4%
	2017	15,100	44,500	6,300	57,390	123,290	1.4%
	2018	15,500	44,800	6,400	58,304	125,004	1.4%
	2019	15,900	45,100	6,500	59,244	126,744	1.4%
	2020	16,200	45,300	6,600	60,413	128,513	1.4%
	2021	16,500	45,900	6,700	61,213	130,313	1.4%
	2022	16,700	46,500	6,800	62,142	132,142	1.4%
	2023	17,000	47,100	6,900	63,002	134,002	1.4%
	2024	17,200	47,700	7,000	63,994	135,894	1.4%
	2025	17,500	48,300	7,100	64,919	137,819	1.4%
	2026	17,700	48,900	7,200	65,960	139,760	1.4%
	2027	18,000	49,500	7,300	66,927	141,727	1.4%
Average Annual Growth Rates							
	1998-2007	-6.8%	3.5%	-37.7%	-0.5%	-3.8%	
	2007-2012	1.2%	0.2%	57.4%	0.7%	1.5%	
	2012-2027	1.9%	0.9%	1.5%	1.6%	1.4%	
	2007-2027	1.7%	0.7%	13.3%	1.4%	1.4%	

Notes: Other Operations includes military, non-commercial air taxi, and general aviation.
Forecast update November 9, 2007
\1 Total from FAA TAF
\2 Total from Airport records

TABLE 2-4
PASSENGER AIRCRAFT FLEET MIX

Air Carrier Aircraft	Seats	2005	2007	2012	2017	2027
738	146	0.0%	0.0%	5.0%	13.0%	26.0%
M80	140	40.7%	12.2%	11.5%	6.0%	0.0%
M88	142	0.0%	16.3%	13.0%	10.5%	0.0%
M83	140	1.2%	3.2%	1.0%	0.0%	0.0%
320	138	1.3%	0.7%	1.0%	1.0%	1.0%
73G	137	0.0%	4.4%	10.0%	12.5%	17.0%
319	128	0.6%	4.9%	15.0%	17.0%	19.0%
733	120	1.8%	3.8%	0.0%	0.0%	0.0%
318	118	0.0%	7.1%	2.0%	2.0%	2.0%
717	117	50.2%	44.6%	39.0%	38.0%	35.0%
735	110	4.3%	2.6%	2.5%	0.0%	0.0%
D9S	100	0.0%	0.2%	0.0%	0.0%	0.0%
Total		100.0%	100.0%	100.0%	100.0%	100.0%
Total Operations		10,944	12,836	13,600	15,100	18,000

Regional Aircraft	Seats	2005	2007	2012	2017	2027
146	100	1.2%	0.0%	0.0%	0.0%	0.0%
CR9	70	0.0%	0.7%	2.0%	3.2%	6.6%
CR7/E70	69	12.9%	13.1%	9.0%	11.0%	14.0%
CRJ/ERJ	50	66.3%	70.3%	72.0%	71.0%	67.0%
DH3	50	0.0%	0.0%	0.0%	0.0%	0.0%
ERD	44	4.2%	4.7%	6.0%	6.0%	5.5%
ER3	37	2.3%	2.8%	3.0%	3.0%	2.5%
SF3/DH8/DH2	34	10.7%	3.9%	3.0%	1.0%	0.0%
FRJ	32	0.0%	4.0%	5.0%	4.8%	4.4%
J41	27	0.0%	0.0%	0.0%	0.0%	0.0%
BE1	19	2.3%	0.5%	0.0%	0.0%	0.0%
Total		100.0%	100.0%	100.0%	100.0%	100.0%
Total Operations		47,710	42,871	43,200	44,500	49,500

TABLE 2-5
COMMERCIAL AIRCRAFT OPERATIONS COMPARISON

Year	MP Forecast[2]	State System Plan[3]	Percent Difference
2004	65,570 (actual)	86,699	32%
2009	68,377	92,299	35%
2014	72,989	98,021	34%

[2] Based on Draft 2007 FAA TAF
[3] Based on 2004 FAA TAF

3. 6R/24L RUNWAY SAFETY AREA ALTERNATIVES ANALYSIS

On October 1, 1999, the FAA issued Order 5200.8, RSA Program, which requires the FAA to collect and maintain data on the RSA for each runway at federally obligated airports and airports certified under Federal Aviation Regulation (FAR) Part 139. In September of 2000, the FAA determined that, at that time, "the Runway 6R/24L safety area at DAY does not meet the current standards contained in Advisory Circular 150/5300-13, *Airport Design*, but it is practicable to improve the RSA so that it will meet current standards."

In response to the FAA's findings, DAY undertook an RSA alternatives analysis to evaluate options for addressing the deficiencies at each end of Runway 6R/24L. This analysis looked at on-airport alternatives only. This Master Plan Report Update provides an overview of the 2006 6R/24L RSA analysis. For more detailed information regarding the analysis and its underlying assumptions, see the complete 6R/24L *Runway Safety Area Alternatives Analysis*, dated Final April 3, 2006 by Landrum & Brown in **Attachment D** of this report.

3.1. RSA DEFICIENCIES

Table 3-1 below provides a summary of RSA deficiencies for Runway 6R/24L as per the FAA's determinations.

TABLE 3-1
CURRENT RUNWAY 6R/24L RSA DEFICIENCIES

Runway End 6R	**Runway End 24L**
Windsock	Windsock
Airport service road	Security fence
Runway End Identifier Lights	Airport service road
PAPI and PAPI power unit	North Dixie Drive
Concrete slabs for trap launchers and pads (currently removed)	
Trap shoot access roads (2) and walkways	
Drainage swale	
Natural gas line markers	

Source: FAA Detroit ADO

3.2. RSA ALTERNATIVES

The first alternative to be considered is the construction of a traditional graded RSA surrounding the runway. Where it is not practicable to obtain the entire safety area in this manner, as much as possible should be acquired. The optimum RSA alternative should maximize the usable runway length to accommodate the existing and future aircraft fleet mix, while also providing the highest level of operational safety. It should enable the airport to proceed with the proposed airfield development program in the current master plan when demand warrants.

Maintaining current operational capability during takeoff and landing operations is imperative at this airport, and runway length is a driving factor. The City of Dayton desires to maintain, at a minimum, the existing 7,000-foot runway length for aircraft operations. Based on the draft February 9, 2005 *Runway Length Requirements Analysis*, none of the current air carrier and cargo fleet, and a substantial majority of the larger regional jets, will be able to depart at maximum takeoff weight from Runway 6R/24L at a length of 7,000 feet.

The *Final 6R/24L Runway Safety Area Analysis* evaluated several viable options for addressing the RSA deficiencies at each runway end:

- Do nothing to improve the RSA deficiencies (the "no action" alternative);
- Relocate, shift, or realign the runway;
- Reduce runway length where the existing runway length exceeds that which is required for the existing or projected design aircraft;
- Implement a combination of runway relocation, shifting, grading, realignment, or reduction in length;
- Use declared distance criteria;
- Extend the runway; and
- Use Engineered Materials Arresting Systems (EMAS).

Other alternatives to remove RSA deficiencies that combine potential solutions for both runway ends were presented and discussed. Six proposed composite RSA alternatives were prepared and evaluated based on the following criteria:

- Operational Impacts
- RSA Standard Compliance
- Construction Cost/Impacts
- Site Constraints
- Long-Term Development Compatibility
- Level of Safety
- Timeliness

These alternatives were rated on a scale of 1 to 3, with 3 being the best and 1 being the worst score. Overall scores ranged from 15 to 21 for the six composite alternatives. At the time this study was being conduced, the construction cost estimates for the composite RSA alternatives ranged from just over $1.8 million to nearly $130 million in 2005 dollars.

3.3. PREFERRED RSA ALTERNATIVE

The RSA evaluation determined that the combined Alternative 3F, as shown in **Exhibit 3-1**, was the preferred RSA solution for Runway 6R/24L. The FAA approved this RSA recommendation and the project is currently under design. Based on the current RSA design, the following major projects will be undertaken:

Runway 6R End

- Extend the Runway 6R end 285 feet
- Extensive re-grading of the runway safety area
- Reconstruction of the existing 6R threshold area to meet drainage requirements
- Demolish approximately 600 lineal feet of the airport service road
- Relocate the windsock and place on a three-inch frangible mount
- Install new PAPI system
- Relocate runway distance marker signs
- Demolish approximately 540 lineal feet of the previous ATA service road
- Reconstruction of the drainage areas
- Relocate the 8-inch and 12-inch natural gas

Runway 24L End

- Relocate the windsock and place on a three-inch frangible mount.

With the preferred RSA Alternative 3F, the 24L threshold would remain in its current location and the use of declared distance criteria would be necessary in order to maintain a minimum of 7,000 feet for takeoff and landing operations. Also, an area measuring nine feet by five feet at the southwest corner of the 6R RSA would have a proposed airside service road running through it. The proposed service road can not be moved farther outward due to the existing right-of-way for U.S. Highway 40. Therefore, a Modification of Standard (MOS) to the 6R RSA requirements would need to be submitted for FAA approval. In addition, possible operational restrictions for vehicle movements may be imposed on this section of the service road. The 285-foot extension of 6R would compensate for the loss of takeoff and landing length on the 24L end. It would also mean that no modifications to the Runway 24L end would be necessary to provide the runway length and RSA requirements. **Table 3-2** summarizes the runway lengths that would be provided with the use of declared distance criteria.

TABLE 3-2
RUNWAY 6R/24L DECLARED DISTANCES

Runway End	TORA (ft.)	TODA (ft.)	LDA (ft.)	ASDA (ft.)
6R	7,285	7,285	7,000	7,000
24L	7,285	7,285	7,000	7,000

TORA: Take Off Runway Available
TODA: Take Off Distance Available
LDA: Landing Distance Available
ASDA: Accelerated-Stop Distance Available

Impacts

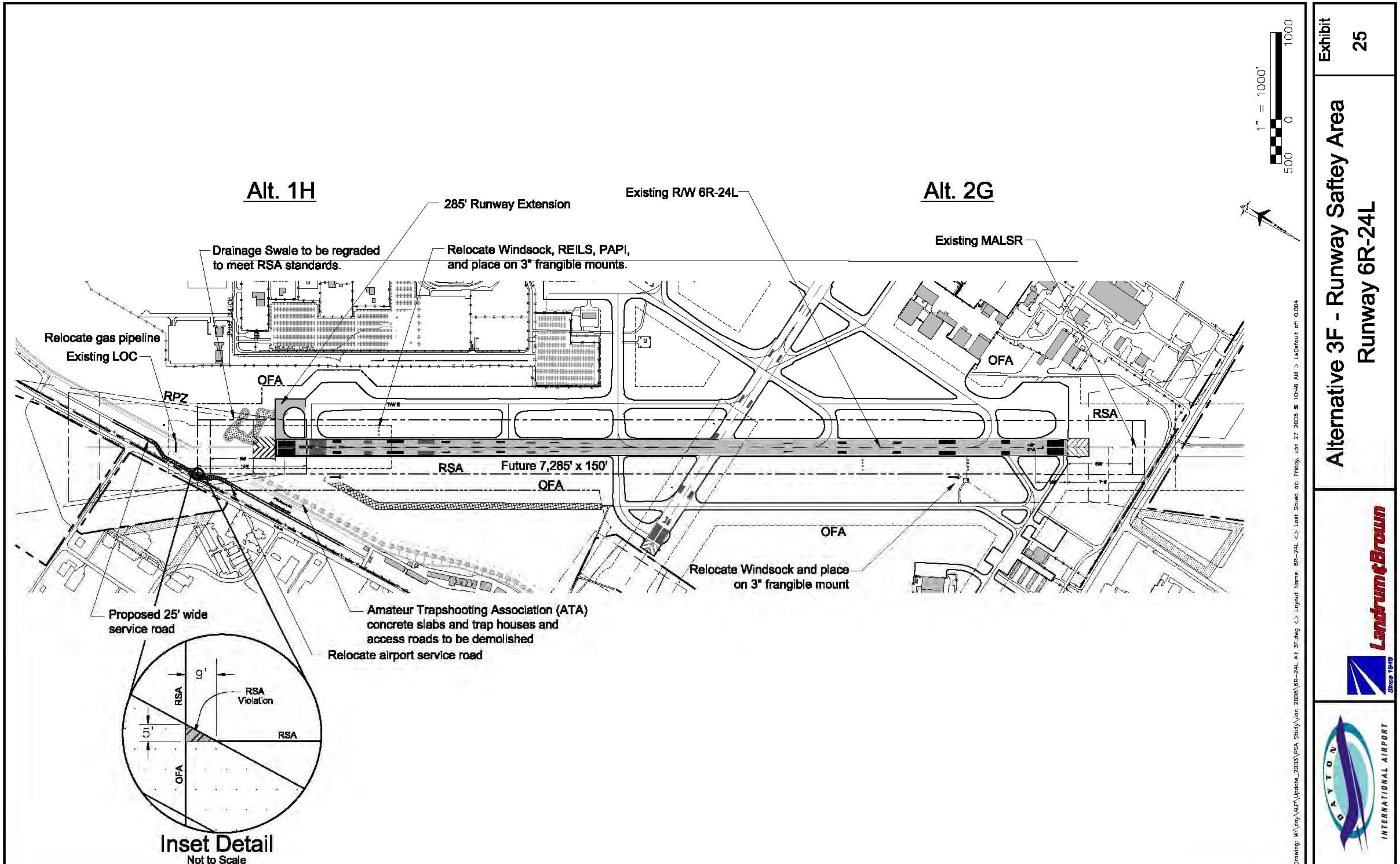
The positive and negative attributes of the preferred RSA Alternative 3F as they pertain to the evaluation criteria are presented below.

- *Operational Impacts*: This alternative will continue to provide the full 7,000-foot runway length and current operational capability upon completion of the RSA project.
- *RSA Standard Compliance*: This alternative complies with the standard RSA guidelines and provides a clear area 500 feet wide by 1,000 feet long that is void of any objects. It will require a MOS from the FAA due to a proposed service road traversing a small five foot by nine foot rectangular area in the southwest corner of the 6R RSA.
- *Construction Cost/Impacts*: This alternative has the lowest construction cost and anticipated lower maintenance costs than many of the other RSA alternatives. The cost to construct the preferred alternative is approximately $1.82 million (2005 dollars). It should be noted that upon completion of the 65 percent design and engineering, the cost to construct the preferred RSA alternative increased to approximately $5.25 million (2008 dollars).
- *Site Constraints*: This alternative has no site constraints since it is within the current airport property boundary.
- *Long-Term Development Compatibility*: This alternative tied for the highest score with respect to compatibility with the proposed long-term airport development program. It represents the beginnings of, or in total, the airport's proposed long-term airfield development program.
- *Level of Safety*: This alternative would provide a greater level of safety than what currently exists on Runway 6R/24L.
- *Timeliness*: This alternative was given a higher score because it is contained within the boundaries of existing airport property and should require less time to design and construct.

3.4. PREFERRED RSA SUMMARY

Overall, the preferred RSA Alternative 3F would provide the most feasible and cost effective means of rectifying the RSA deficiencies for Runway 6R/24L. It includes full RSA's for both runway ends that are in compliance with current FAA standards, while staying within the current property boundary. This alternative would also maintain the current 7,000-foot length for landing and takeoff operations. The current cost to construct the preferred alternative is approximately $5.25 million in 2008 dollars based on the 65 percent design drawings.

Exhibit 3-1
PREFERRED 6R/24L RSA ALTERNATIVE 3F



4. RUNWAY LENGTH ANALYSIS

In accordance with FAA Advisory Circular 150/5325-4B and the aircraft manufacturers' characteristics manuals, Landrum & Brown conducted an analysis to determine the runway length requirements for passenger air carrier, commuter, and cargo aircraft operating at DAY. This 2008 Master Plan Report provides an updated summary of this analysis to reflect current long-term planning recommendations. For more information and underlying assumptions regarding the original runway length determinations, refer to the complete *DRAFT Runway Length Requirements Analysis*, dated February 9, 2005 and located in **Attachment B** of this report.

Runway length requirements are based on individual aircraft performance charts that consider both airport statistics (such as elevation, average temperature and runway conditions) and aircraft statistics (such as operating weight and engine type). This initial analysis did not account for local conditions such as environmental, noise, topographical (except for runway gradient), physical, land use, political and economic factors. However, these factors were taken into consideration for determination of the proposed runway lengths as depicted on the draft Future ALP dated June 20, 2007.

FAA Advisory Circular 150/5325-4B, *Runway Length Requirements for Airport Design,* dated July 1, 2005 notes that "Runway length for additional primary runway should be 100 percent of the primary runway." In addition, "Runway length for crosswind runway equals 100 percent of the primary runway length for scheduled flight service."[4] These criteria were taken into consideration when conducting the runway length analysis.

The forecast of aircraft activity used for the runway length analysis is the FAA approved *Aviation Activity Forecasts*, dated February 20, 2004 and updated on November 27, 2007. The anticipated aircraft fleet mix is similar for these two forecasts.

4.1. TAKEOFF RUNWAY LENGTH REQUIREMENTS BY AIRCRAFT TYPE

Air Carrier Aircraft Requirements

Takeoff runway length requirements were determined from the "standard day" aircraft manufacturers charts (59 degrees Fahrenheit) for aircraft operating at DAY. The following criteria were used in this analysis:

- Mean daily high temperature of 85 degrees Fahrenheit
- Airport elevation of 1009
- Density altitude at 85°F is approximately 3,000 feet

[4] FAA AC 150/5325-4B, Runway Length Requirements for Airport Design, Table 1-2.

Using these performance charts for the anticipated fleet at DAY, the required runway length for air carrier aircraft was found to range from 7,600 feet to 12,800 feet at 100 percent Maximum Takeoff Weight (MTOW).

Commuter Aircraft Requirements

Runway length requirements for commuter regional jets and turboprop aircraft were taken from the *Jane's All The World Aircraft* manuals based on maximum takeoff weight and standard day temperature (15 degrees Celsius). According to these specifications, commuter aircraft operating at DAY require between 5,000 and 9,350 feet of runway length at 100 percent MTOW.

Cargo Aircraft Requirements

Cargo aircraft takeoff length requirements were calculated in the same manner as the air carrier aircraft. Likewise, it is desirable to accommodate 100 percent of the cargo aircraft payload for maximum revenue potential. Cargo aircraft will require a runway length ranging from 8,000 feet for the B-757-200 and 13,900 feet for the B-727-200 aircraft.

4.2. LANDING RUNWAY LENGTH REQUIREMENTS BY AIRCRAFT TYPE

Landing runway length requirements were also determined for the air carrier, commuter and cargo aircraft at DAY. All air carrier aircraft should be able to land on a 7,000-foot long runway under wet conditions, while all of the commuter aircraft should be able to land on a 6,400-foot long runway under wet conditions. In addition, all cargo aircraft should be able to land on an 8,900-foot long runway under wet conditions. The landing runway lengths are not the critical metric for determining optimum runway length requirements, since aircraft landings require less runway length than takeoffs.

The FAA is asking that turbojet operators to voluntarily comply with the elements of the Safety Alert for Operators (SAFO) 06012 issued on August 31, 2006. This SAFO is based on the FAA's policy statement published in the Federal Register on June 7, 2006. An additional SAFO 08003 was issued on January 17, 2008 that provides additional guidance material that all operators are encouraged to incorporate into their standard operating procedures to mitigate the risk of landing operations on contaminated runways. This landing length analysis does not include the additional 15 percent as recommended by these SAFO materials.

The SAFO urgently recommends that operators of turbojet airplanes develop procedures for flight crews to assess landing performance based on conditions actually existing at time of arrival, as distinct from conditions presumed at time of dispatch. Those conditions include weather, runway conditions, the airplane's weight, and braking systems to be used. Once the actual landing distance is determined an additional safety margin of at least 15 percent should be added to that distance. Except under emergency conditions flight crews should not attempt to land on runways that do not meet the assessment criteria and safety margins as specified in the SAFO.

4.3. RUNWAY LENGTH REQUIREMENTS BY RUNWAY

Runway 6L/24R

Due to the anticipation of heavy use by cargo aircraft, the Runway 6L/24R takeoff length is justified at 13,900 feet in order to serve adequately the entire anticipated fleet of cargo aircraft at 100 percent MTOW, Also, all of the air carrier and commuter aircraft fleet would be able to use a 13,900-foot long runway at 100 percent MTOW. It should be noted that in December 2004, UPS acquired Menlo Worldwide and subsequently decided to close the hub in June 2006. However, the Airport is aggressively pursuing additional cargo operators to begin service at DAY. It is hopeful that by 2012, one or more carriers will operate 20 flights per day (nighttime hours). It is the DAY Airport's goal to have a minimum of five cargo operations by 2009, and increase this by five cargo operations per year through 2012.

The Future ALP proposes a length of 12,600 feet for Runway 6L/24R. This runway length is shorter than the 13,900 feet justified by the FAA Advisory Circular guidelines due to various local factors. The 24R threshold has been moved 1,478 feet to the southwest in order to provide a full 1,000-foot safety area, as well as a new parallel taxiway and service road on the west side of Runway 18-36. The 6L threshold has been extended 3,178 feet to the southwest and will have no impact on the existing U.S. Highway 40 geometry.

The proposed runway length of 12,600 feet can accommodate the cargo aircraft fleet at 100 percent MTOW with the exception of the A300-B4, B-727-200, DC-10-30 and DC-8-62 aircraft. The worst case is the DC-8-62 aircraft with a 97.3 percent MTOW.

Runway 6R/24L

In accordance with Advisory Circular 150/5325-4B, the length of parallel runways should be based on the aircraft that will use them. Further, they should be approximately equal in length. Therefore, based on these planning criteria, it is justifiable for Runway 6R/24L to be 13,900 feet since it has been demonstrated that Runway 6L/24R should be at this length. A 13,900 foot runway would accommodate all of the existing and future aircraft fleet mix at 100 percent MTOW.

Though 13,900 feet is a justifiable length for Runway 6R/24L, the Future June 20, 2007 ALP proposes 8,500 feet due to various local factors. The proposed runway length of 8,500 feet can accommodate the air carrier fleet having a 95 percent or greater MTOW with the exception of the B-737-800, B-737-900 and DC-9-32 aircraft. The flight range distance for each aircraft is also adequate to serve the current commercial markets at DAY. The proposed length of 8,500 feet is based on the premise that both parallel 6-24 runways are in operation at the same time.

During peak landing periods, the proposed 8,500-foot long Runway 6R/24L would be capable of accommodating all of the cargo aircraft with the exception of the MD-11F for landing under wet conditions.

Runway 18-36

It is anticipated that Runway 18-36 will mainly be used by air carrier and commuter aircraft, with some use by cargo aircraft when wind and weather dictate. Based on recent radar data, Runway 18-36 is used approximately 10.6 percent annually, even though an analysis of wind and weather conditions suggests it is needed no more than about 2 percent of the time.

The Future June 20, 2007 ALP proposes to maintain the current length of 8,500 feet for Runway 18-36. This runway length is shorter than what could be justified at a length of 11,120 feet. The proposed runway length of 8,500 feet can accommodate the air carrier fleet with a 95 percent or greater MTOW with the exception of the B-737-800, B-737-900, and DC-9-32 aircraft. In addition, the flight range distance for each aircraft is adequate to serve the current commercial markets at DAY.

4.4. SUMMARY

Table 4-1 summarizes the calculated takeoff and landing lengths for runways at DAY based on the forecast fleet mix through the year 2027. These calculations assume 100 percent MTOW and are broken down by aircraft category.

TABLE 4-1
RUNWAY LENGTH REQUIREMENTS

Aircraft Category	Takeoff Length at MTOW (ft.)	Landing Length (ft., wet)
Air Carrier	12,800	7,000
Commuter	9,350	6,400
Cargo	13,900	8,900

Table 4-2 summarizes both the justifiable runway lengths based on FAA Advisory Circular planning standards, and the proposed runway lengths as depicted on the June 20, 2007 Future ALP.

TABLE 4-2
PROPOSED TAKEOFF RUNWAY LENGTHS

Runway	Justified Runway Length (ft.)	Proposed Runway Length (ft.)
6L/24R	13,900	12,600
6R/24L	13,900	8,500
18-36	11,120	8,500

In summary, the proposed runway lengths are justifiable based on the existing and future aircraft fleet mix and anticipated runway use. As mentioned, the proposed runway lengths are shorter than what is justified per the FAA Advisory Circular planning standards due to local considerations such as land use, noise, and cost benefits.

The proposed runway lengths will provide adequate aircraft takeoff and landing performance based on current markets being served from DAY. However, as future markets are added and as travel distances increase, it may be necessary to increase one or more of the runway lengths to assure maximum efficiency and utilization of the airport runway system.

5. ULTIMATE RUNWAY 6R/24L EXTENSION ANALYSIS

The 6R/24L Runway Safety Area (RSA) Study results as presented in Section 3 of this report will be the runway configuration used as the bases for the ultimate Runway 6R/24L geometry analysis. In addition, the City of Vandalia has indicated that they intend to pursue commercial development of approximately 252 acres of land between Peters Pike and the Airport Access Road, just south of U.S. 40. These factors will also be taken into consideration when analyzing the ultimate future geometry and length of Runway 6R/24L.

5.1 RUNWAY 6R EXTENSION ALTERNATIVE

Due to the proposed City of Vandalia commercial development area south of U.S. 40, it will not be possible to extend the Runway 6R threshold beyond its proposed 285 feet as presented in Section 3. It is proposed to ultimately upgrade the 6R approach to Category I capability to provide additional poor weather airfield capacity in the future. The following modifications will be necessary to achieve this capability:

- Displace the 6R threshold 260 feet to maintain clearance over U.S. 40;
- Install a glide slope, RVR, and MALSR approach light system;
- Future avigation easement areas;
- Impose height restrictions within the future FAR Part 77 surface areas;
- Relocate runway markings, lighting, and guidance signage; and
- Use of declared distance criteria.

Based on these proposed modifications, it should be possible to achieve full Category I approach capability for Runway 6R landings. This is all predicated on having no penetrations to the TERPS approach surfaces and Inner Approach OFZ surface. Additional analysis may be required to provide detailed information pertaining to the proposed ILS upgrade to Runway 6R. At this time, there are no other alternative extension recommendations for the Runway 6R threshold.

5.2 RUNWAY 24L EXTENSION ALTERNATIVES

Due to the anticipated inability to extend the Runway 6R threshold it will be necessary to look at the possibility of extending the Runway 24L threshold to the northeast to achieve the desired ultimate runway length of 8,500 feet. This section will present two possible runway extension alternatives for Runway 24L.

5.2.1 Runway 24L – Proposed 2,300' Extension

Based on a preliminary analysis, it appears that the maximum extension possible of the Runway 24L threshold is approximately 2,300 feet. This Runway 24L threshold extension length is similar to that proposed by Tipp City in their *Draft Analysis of Proposed Runway Development for Dayton International Airport*, dated October 17, 2001.

This runway extension will result in a runway length of 9,585 feet and will cross over the existing North Dixie Drive. The following modifications would be required:

- Extend the 24L threshold 2,300 feet northeast;
- Displace 6R threshold 260 feet;
- Extend Taxiway 'F' 2,300 feet northeast;
- Extend Taxiway 'H' 2,300 feet northeast;
- Relocate aircraft hold pad;
- Relocate railroad tracks;
- Relocate or tunnel North Dixie Drive;
- Relocate airside service road and security fence;
- Relocate existing MALSR approach light system, Runway Visual Range, Glide Slope, PAPI and Windsock facilities;
- Land acquisition of approximately 21 acres;
- Future avigation easement areas;
- Potential demolition of structures within the future Runway Protection Zone (RPZ) area;
- Impose height restrictions within the future FAR Part 77 surface areas;
- Relocate runway markings, lighting, and guidance signage;
- Relocate off airport utility lines (gas, water, telephone, electric, etc.); and
- Potential environmental remediation of the area within to the existing railroad track right-of-way and Delphi land parcel.

In combination with the Runway 6R proposed upgrades (285' extension), **Table 5-1** presents the landing and takeoff runway lengths that would be available for this alternative:

TABLE 5-1
RUNWAY 6R/24L DECLARED DISTANCE LENGTHS – 2,300' EXTENSION

Runway End	TORA (ft.)	TODA (ft.)	ASDA (ft.)	LDA (ft.)
6R	9,585	9,585	9,585	9,325
24L	9,585	9,300	9,585	9,585

TORA: Take Off Runway Available
TODA: Take Off Distance Available
ASDA: Accelerated-Stop Distance Available
LDA: Landing Distance Available

Based on a runway takeoff length of 9,585 feet, the current air carrier fleet will be able to operate with a maximum takeoff weight of no less than 90.1 percent (B-737-900).

5.2.2 Runway 24L – Proposed 1,215' Extension

A shorter extension of 1,215 feet for Runway 24L is proposed under this alternative. This runway extension will result in a runway length of 8,500 feet and will cross over the existing North Dixie Drive. The following modifications will be required:

- Extend the 24L threshold 1,216 feet northeast;
- Displace 6R threshold 260 feet;
- Extend Taxiway 'F' 1,215 feet northeast;
- Extend Taxiway 'H' 1,215 feet northeast;
- Relocate aircraft hold pad;
- Relocate or tunnel North Dixie Drive;
- Relocate airside service road and security fence;
- Relocate existing MALSR approach light system, Runway Visual Range, Glide Slope, PAPI and Windsock facilities;
- Land acquisition of approximately 7 acres;
- Future avigation easement areas;
- Potential demolition of structures within the future Runway Protection Zone (RPZ) area;
- Impose height restrictions within the future FAR Part 77 surface areas;
- Relocate runway markings, lighting, and guidance signage;
- Relocate off airport utility lines (gas, water, telephone, electric, etc.); and
- Potential environmental remediation of the area within to the existing railroad track right-of-way and Delphi land parcel.

In combination with the Runway 6R proposed upgrades, **Table 5-2** presents the landing and takeoff runway lengths that will be available for this alternative:

TABLE 5-2
RUNWAY 6R/24L DECLARED DISTANCE LENGTHS – 1,215' EXTENSION

Runway End	TORA (ft.)	TODA (ft.)	ASDA (ft.)	LDA (ft.)
6R	8,500	8,500	8,500	8,240
24L	8,500	8,215	8,500	8,500

TORA: Take Off Runway Available
TODA: Take Off Distance Available
ASDA: Accelerated-Stop Distance Available
LDA: Landing Distance Available

Based on a runway takeoff length of 8,500 feet, the current air carrier fleet will be able to operate with a maximum takeoff weight of no less than 86.7 percent (B-737-900).

5.3 PROPOSED RUNWAY 6R/24L EXTENSION

The City of Dayton Department of Aviation proposes to extend existing Runway 6R/24L from 7,000 feet to 8,500 feet in length when demand dictates. This project will include a 285-foot extension of the Runway 6R threshold to the southwest, and a 1,215-foot extension of the Runway 24L to the northeast.

5.4 PROJECT NEED

The primary objectives of the DAY 2008 Master Plan Update is to enhance safety, reduce delays, increase airfield operational flexibility and diminish environmental impacts. The proposed Runway 6R/24L extension project will meet the following airport needs:

- Assure that the Airport and region are significant players in the 21st century global economy.
- The need to provide sufficient runway length to accommodate the existing and future aircraft fleet mix during all weather operations.
- The need to enhance the RSA's of the airport by providing an airfield layout that meets current FAA design standards.
- The need to balance airfield capacity to meet future demand levels during all weather conditions.

The Department of Aviation proposes to extend existing Runway 6R/24L when demand dictates. The complete *Alternative Runway 6R/24L Extension Analysis* dated April 19, 2007 is provided in **Attachment E** of this report.

6. RUNWAY 18-36 RELOCATION ANALYSIS

The City of Dayton Department of Aviation proposed to relocate existing Runway 18-36 a distance of 3,000 feet to the north while still maintaining its current length of 8,500 feet. This relocation would eliminate the existing intersection of Runways 18-36 and 6R/24L.

6.1. EXISTING CONDITIONS

DAY has two parallel runways in the 6-24 direction, and one crosswind runway in the 18-36 direction. Runway 18-36 is 8,500 feet in length and intersects with Runway 6R/24L approximately 1,066 feet from the Runway 36 threshold. Runway 18 has Category I ILS approach capability and Runway 36 has non-precision approach capability. The runway intersection and inability to conduct land-and-hold-short operations (LAHSO) has significantly reduced the utilization of Runway 18-36 and the ability to conduct simultaneous arrivals on Runway 18 and 24L. The intersecting runways also reduce the ability to conduct simultaneous arrivals on Runway 6R and departures on Runway 36.

6.2. PROJECT NEED

The primary objectives of the 2008 Master Plan are to enhance safety, reduce delays, increase airfield operational flexibility and diminish environmental impacts. The proposed Runway 18-36 relocation project will meet the following airport needs:

- The need to provide sufficient runway length to accommodate the existing and future aircraft fleet mix during normal operations and when Runway 18-36 is needed exclusively due to wind and weather
- The need to decouple Runways 6R/24L and 18-36 to enhance the flow of aircraft movements and reduce the number of aircraft runway crossings
- The need to enhance the RSA's of the airport by providing an airfield layout that meets current FAA design standards
- The need to enhance the flow and safety of the on-airport service road system by eliminating all vehicle runway crossings
- The need to increase airfield capacity to meet future demand levels during all weather conditions

6.3. EVALUATION OF PROJECT ELEMENTS AND BENEFITS

The forecast of aircraft activity used for this runway extension feasibility study is the FAA approved *Aviation Activity Forecasts* dated February 20, 2004 and the updated November 27, 2007 forecasts.

Decoupling of Runways 18-36 and 6R/24L

The decoupling of Runways 18-36 and 6R/24L by shifting Runway 18-36 to the north and eliminating the intersection of these runways would provide several benefits:

- A 28 percent increase in VMC capacity during non-peak arrival and departure periods;
- A 58 percent reduction in aircraft runway crossings during takeoff operations;
- A 64 percent reduction in aircraft runway crossings during landing operations;
- Reduced taxi times, operational delays, and potential for runway incursions;
- Reduced taxi distances equating to approximately $10,358 daily savings in airline operating costs (plus improved air quality due to lower emissions); and
- Flight time and fuel cost savings equating to approximately $242,506 per year, realized by changes in airspace routes during southwest flow conditions.

This proposed runway reconfiguration could accommodate the anticipated 2024 design day flight schedule in conjunction with the increased utilization of Runway 18-36 when wind direction and speed require its exclusive use.

Runway 36 Airside Service Road

Relocation of the Runway 36 threshold will provide ample room for an "at grade" airside service road with a short and direct route between the east services area and the terminal gates. Benefits of this new service road include:

- Unrestricted access by approved airside vehicles and personnel;
- Elimination of 78 percent of all airfield runway crossings;
- Elimination of all vehicle crossings of Runway 18-36;
- Minimize verbal contact with control tower personnel;
- Reduced potential for runway incursions;
- Reduced air traffic controller workload;
- Reduced vehicle travel distance;
- Improved worker productivity; and
- Reduced vehicle operating costs by about $476 per day, based on fuel costs and personnel time.

6.4. ANALYSIS OF DEMAND, CAPACITY, AND DELAY

Operational Considerations

The primary Air Traffic Control (ATC) procedures are determined based on cloud ceiling and visibility and can be grouped into two categories: visual meteorological conditions (VMC) and instrument meteorological conditions (IMC). At DAY, VMC procedures take place about 86.6 percent of the time and IMC procedures take place about 13.4 percent of the time.

The predominant direction of aircraft flow at DAY is to the southwest, with a combined VMC and IMC occurrence of approximately 77.7 percent of the time. Northeast flow provides an additional 21.3 percent coverage. Flows in the north and south directions occur approximately 1.0 percent of the time.

Airfield Demand, Capacity and Delay

Runway 18-36 is not intended to provide a significant increase in airfield capacity. Its primary purpose is to provide arrival and departure capability for those times when the primary runways do not meet the crosswind limitations. When a runway orientation provides less than 95 percent wind coverage for any aircraft forecasted to use the airport on a regular basis, a crosswind runway is recommended. The 95 percent wind coverage is computed on the basis of the crosswind not exceeding the following:

- 10.5 knots for ARC A-I and B-I
- 13 knots for ARC A-II and B-II
- 16 knots for ARC A-III, B-III, and C-I through D-III
- 20 knots for ARC A-IV through D-VI

The capacity at the airport will change as runway use and weather minimums vary during the day. Analysis of the aircraft fleet mix and historical activity at DAY, in conjunction with FAA regulations regarding aircraft spacing, shows that a dedicated-use runway can accommodate either 41 arrivals or 40 departures per hour during Visual Meteorological Conditions (VMC). A mixed-use runway has a capacity of approximately 50 operations per hour (25 arrivals and 25 departures). Based on these typical runway capacities, the parallel 6-24 runways can accommodate the anticipated 2024 hourly arrival and departure operations under VMC procedures. However, when the parallel runways are outside an aircraft's crosswind limitations, it is important that Runway 18-36 be available to accommodate the necessary arrival or departure demand.

The following sections discuss the operational use of Runway 18-36 under both its current configuration and its relocation to the north.

Existing Airfield Geometry

Operation of Runway 18-36 in its current configuration is dependent on operations of the 6-24 parallel runways. Runway 18-36 provides minimal additional peak hour arrival or departure capacity and therefore would be minimally used.

Proposed Airfield Geometry

The decoupling of Runways 18-36 and 6R/24L will allow Runway 6L/24R to run mixed operations while Runways 18-36 and 6R/24L can run dedicated arrival or departure operations based on the wind and traffic flow direction. This would provide a 28 percent increase in VMC capacity during non-peak arrival and departure periods.

6.5. SUMMARY

The decoupling of Runways 18-36 and 6R/24L will provide a 28 percent increase in VMC capacity during non-peak arrival and departure periods. The Runway 36 threshold will be closer to the terminal gate area, thus requiring minimal taxi distance for air carrier departures. The new location of the Runway 18 threshold will place aircraft closer to the terminal area during arrivals.

From the standpoints of safety and controller workload, there will be a full 1,000-foot safety area on both runway ends. The number of vehicle runway crossings will be reduced, thereby avoiding unnecessary communications between the control tower and ground vehicles. The number of aircraft runway crossings will be reduced and improve the operational safety of the airfield geometry. In short, the proposed relocation and extension of Runway 18-36 will enhance the overall safety of aircraft and vehicular movements and reduce operating costs to the airlines and other airport users. The complete *Runway 18-36 Relocation and Extension Feasibility Study* dated February 15, 2005 is provided in **Attachment C** of this report.

7. AIR TRAFFIC CONTROL TOWER SITE SELECTION STUDY

The existing control tower is 41-years old and the cab size is not sufficient to accommodate the new technology equipment, additional work-stations and counter space. Based on these deficiencies, an Air Traffic Control Tower (ATCT) Site Selection Study was initiated to determine the optimum location and height for a new control tower.

A series of draft review reports were prepared at the 50, 75, and 90 percent levels for discussion and review by the Airport and FAA personnel. Throughout the course of the tower siting study there were ten sites identified and evaluated for possible location of the new tower and TRACON facilities. In the *Final ATCT Site Selection Study* dated September 5, 2002, Site #6A was identified as the preferred location for the new tower and was verified at the FAA Airways Facility Technical Institute Lab (AFTIL) in Atlantic City. The *Final ATCT Site Selection Study* and Addendum No. 1 are located in **Attachment A** in this report.

The FAA completed a preliminary airspace review (2002-AGL-50-NR) of the proposed ATCT site with a maximum elevation of 1280 msl. The following adverse IFR effects on Standard Instrument Approach Procedures (SIAP) were noted:

- ILS on Runway 24R will increase the minimum descent altitude from 1198 msl / 200 feet to 1248 msl / 250 feet, with a maximum to avoid elevation of 1260 msl.
- Straight-in localizer on Runway 24R will increase the minimum descent altitude from 1340 msl to 1420 msl, with a maximum to avoid elevation of 1218 msl.
- ASR on Runway 6L will increase the minimum descent altitude from 1380 msl to 1400 msl, with a maximum to avoid elevation of 1274 msl.
- ASR on Runway 36 will increase the minimum descent altitude from 1420 msl to 1480 msl, with a maximum to avoid elevation of 1227 msl.
- Straight-in localizer on Runway 6L will increase the minimum descent altitude from 1360 msl to 1400 msl, with a maximum to avoid elevation of 1254 msl.
- Lateral RNAV (GPS) on Runway 6L will increase the minimum descent altitude from 1380 msl to 1440 msl, with a maximum to avoid elevation of 1228 msl.

Based on the above operational impacts, it was recommended to lower the maximum tower height to an elevation of 1260 msl. On May 15, 2003 a line-of-sight impact study was conducted at the FAA-AFTIL facility to identify any impacts on the existing and proposed airfield "movement areas." The 360-degree view from the proposed tower cab did not produce any significant shadows and it was determined that an eye-level elevation of 1231 msl would provide an adequate line-of-sight to all existing and proposed airfield movement areas.

A Letter of Agreement was prepared and signed by the appropriate FAA ANI-440, Dayton Air Traffic Management, Dayton National Air Traffic Controllers Association (NATCA) and Dayton International Airport Department of Aviation representatives. A second airspace review conducted by the FAA indicates that there will be no impact on the existing instrument flight rule procedures, but will have the following impact on non-precision instrument procedure minimums:

- Straight-in localizer on Runway 24R will increase the minimum descent altitude from 1340 msl to 1380 msl, with a maximum to avoid elevation of 1221 msl.
- ASR on Runway 36 will increase the minimum descent altitude from 1420 msl to 1480 msl, with a maximum to avoid elevation of 1227 msl.
- Straight-in localizer on Runway 6L will increase the minimum descent altitude from 1360 msl to 1400 msl, with a maximum to avoid elevation of 1254 msl.
- Lateral RNAV (GPS) on Runway 6L will increase the minimum descent altitude from 1380 msl to 1440 msl, with a maximum to avoid elevation of 1228 msl.

All parties agreed that the new ATCT would include the following details:

- The location of the tower site shall remain as Site #6A with the coordinates of Latitude 39^0 54' 00.26" and Longitude 84^0 13' 31.71".
- The 1st floor elevation shall be approximately 1002 msl.
- The maximum to avoid elevation shall be approximately 1260 msl (258 feet above the 1st floor elevation).
- The cab floor elevation shall be approximately 1226 msl (224 feet above the 1st floor elevation).
- The cab eye elevation shall be approximately 1231 msl (229 feet above the 1st floor elevation).

The FAA has begun construction of the new ATCT with an anticipated completion date in 2009. The tower will not be fully commissioned until 2010. It is recommended that a new ATCT line-of-sight shadow study be conducted based on the proposed new tower eye-level height and the proposed new runway threshold locations. This study should be conducted if and when the proposed runway extensions are undertaken.

8. PUBLIC PARKING GARAGE AND RENTAL CAR READY RETURN

The current planning for a new joint-use public parking garage and rental car ready return facility will occupy the same footprint as the current short-term surface parking lot. There will be no elevated connector bridge and will be developed based on the following two possible options:

Parking Garage - Option 1

- Two level structure (one ground and one elevated) with canopy
- Exterior ramping
- 1,600 maximum parking spaces with 700 spaces dedicated to rental car ready/return use
- Extend the existing terminal canopy on the ground level
- Rehabilitation of the existing exit plaza
- Cost per space is approximately $15,000 which includes design, construction and inspection

Parking Garage - Option 2

- Three level structure (one ground and two elevated) with canopy
- Exterior ramping
- 2,100 maximum parking spaces with 700 spaces dedicated to rental car ready/return use
- Extend the existing terminal canopy on the ground level
- Rehabilitation of the existing exit plaza
- Cost per space is approximately $15,000 which includes design, construction and inspection

These two design options are currently under review and will be determined based on available funding. The rental car storage and maintenance facilities will remain in their current location on Valet Circle. Long-term planning calls for a Consolidated Rental Car complex that will be located in the southwest corner of the Terminal Drive and Boeing Drive intersection.

9. AIRPORT DEVELOPMENT PROGRAM IMPLEMENTATION PLAN

The section presents the long-term physical development program necessary to accommodate the forecast aviation needs at DAY. The airport's long-term development program, made up of capital projects recommended in this document, is referred to as the "Program" in this section. The Program is subject to any number of future variables. The Master Plan proposes a conceptual physical plan that can accommodate forecast growth in aircraft operations, passenger enplanements, cargo volume, and other aviation related demands. If the growth does not occur as forecast or if the growth occurs in different areas than forecast, changes to the phasing plan would be necessary.

Elements of the Program can be accelerated or deferred as needed to meet operational requirements, financial considerations, or fluctuations in forecast activity levels. The expectation is that future capital projects will be constructed only when demand exists and financial resources are available to fund the cost of construction. The key factor insuring the financial feasibility of the Program is the assumption that future capital projects will only be constructed on an incremental basis as needs clearly dictate.

The Program is divided into four planning development phases and will be implemented based on specific Planning Activity Levels (PALs). **Table 9-1** presents the anticipated four development phase timeframes and PALs.

TABLE 9-1
PROPOSED AIRORT DEVELOPMENT PROGRAM

		Planning Activity Level (PALs)	
Phase	**Year**	**Aircraft Operations**	**Passenger Enplanements (million)**
	2005	121,096	1.22
	2006	109,653	1.31
1	2008-2010	140,000-143,300	1.44-1.47
2	2011-2015	144,500-150,200	1.49-1.56
3	2016-2020	151,800-158,600	1.57-1.65
4	2021+	158,600+	1.65+

9.1 PHASE 1 PROGRAM DEVELOPMENT

The following projects are anticipated to be undertaken during the Phase 1 timeframe (2008-2010):

- New Air Traffic Control Tower – The FAA has started construction of the new ATCT with an anticipated completion date in 2009. The tower will not be fully commissioned until 2010.

- 6R/24L Runway Safety Area – This RSA project has been approved by the FAA and is currently at the 65 percent design level. The work is scheduled to be started and completed in 2008.
- New Public Parking Garage/Rental Car Ready Return - The existing short-term and long-term public parking lots continue to be at or near capacity during peak days of the week (Tuesday through Thursday). The parking garage will have approximately 1,600 to 2,100 spaces at daily and short-term parking rates. Of these parking spaces, 700 will be dedicated to the rental car ready/return operation. The garage will be constructed within the area currently occupied by the short-term surface parking lot during the 2009-2010 timeframe.
- Airport Terminal Drive Reconfiguration – The Airport Terminal Drive configuration will need to be modified to accommodate the proposed public parking garage entrance and exit ramps and geometry of the surface lots. In addition, new traffic signage and landscaping will be undertaken during this timeframe. The majority of this work was completed in 2007 with the remainder of the roadway modifications to take place when the parking garage is constructed in the 2009-2010 timeframe.

9.2 PHASE 2 PROGRAM DEVELOPMENT

The following projects are anticipated to be undertaken during the Phase 2 timeframe (2011-2015).

9.2.1 Consolidated Rental Car Complex

The main focus of the Phase 2 projects will be development of a consolidated rental car facility in the area west of Boeing Drive and south of Terminal Drive. This facility will encompass approximately 45 acres and be comprised of a single customer service building providing access to each of the rental car company's customer service area. A ready/return area will be located immediately adjacent to the customer service building. The 700 rental car ready/return spaces in the parking garage will be eliminated at this time. The ready/return area will be a surface lot where customers pick-up and return vehicles. In addition, service facilities for up to six rental car companies will be provided and linked to the ready/return area. The service area will house facilities for the cleaning, fueling, repair, and storage of rental car vehicles.

9.2.2 Terminal Apron Expansion

The terminal apron area south of Concourse A will be expanded to accommodate a larger mix of aircraft at the south side gates. The additional apron will provide for a deeper gate parking area and taxilane for aircraft maneuvering. Development of this apron area will occur as demand dictates.

9.2.3 Economy Public Parking Lot Expansion

The economy surface parking lot will be expanded into the vacated rental car area on the south side of Valet Circle. This area is approximately 10 acres and will accommodate 1,600 additional parking stalls. Development of the additional economy public parking facilities will occur as demand dictates.

9.3 PHASE 3 PROGRAM DEVELOPMENT

The following projects are anticipated to be undertaken during the Phase 3 timeframe (2016-2020):

- Terminal Expansion – As passenger and operational demand increases, it will be necessary to provide additional passenger, airline, concessionaire and security facilities to meet this demand within the terminal and concourse areas. This terminal expansion program will only be undertaken when user demand warrants.
- Cargo Apron Expansion – Additional cargo ramp expansion capability is provided for the existing cargo operators and potential future cargo operators. This development will only be undertaken when user demand warrants.
- Terminal Apron/Taxiway/Deicing Expansion – The terminal area apron area is proposed to be expanded to accommodate additional aircraft gate/hardstand parking positions to accommodate future long-term demand. A dual taxiway system is provided to the east of the terminal apron area to minimize taxi delays and provide increased taxi flow capability. In addition, a remote deicing apron will be provided to accommodate all aircraft departure deicing requirements. A centralized deicing apron will provide increased control of fluid runoff and retention.
- Relocated Airport Firefighting and Rescue Station – The relocated ARFF station is based on the timing and need for the proposed relocation and extension of Runway 18-36 as presented in the Phase 4 program. The ARFF will be relocated to the west side of the airfield and will have landside access to the terminal building, along with airside access to the airfield.
- Corporate Hangar Facilities – Additional corporate hangar facilities will be provided in the southeast section of the airport near the Center 1 complex. These facilities will be developed when user demand warrants.

9.4 PHASE 4 PROGRAM DEVELOPMENT

The proposed Phase 4 airport development projects mainly consist of airfield runway modifications. These projects will be constructed when specific Project Action Limits are achieved, and are presented below.

9.4.1 Runway 24L Extension and Runway 6R ILS Upgrade

The main focus of the Phase 4 projects will be to complete the proposed 1,215-foot extension of the Runway 24L threshold. This runway extension will extend across North Dixie Drive and into the gravel parking area used during the annual Airshow. Runway 6R/24L will have an ultimate length of 8,500 feet with full RSA's on both ends. In order to complete this runway extension, a portion of North Dixie Drive must be tunneled under the runway and parallel taxiway extension. In addition, the following projects will be undertaken:

- Relocate airside service road
- Relocate MALSR approach light system
- Relocate navigational aids (glide slope, RVR, localizer)
- Land acquisition (approximately 7 acres)
- Acquire avigation easements
- Upgrade runway and taxiway guidance signage, marking and lighting

The following Planning Activity Levels (PALs) have been used to determine the approximate time frame for development of the proposed Runway 6R extension:

- 10-15 minutes of aircraft delay
- 35 peak hour northeast departure operations during IFR conditions, or 50 peak hour southwest departure operation during VFR/IFR conditions
- 25 peak hour northeast arrival operation during IFR conditions

Dual Instrument Meteorological Conditions (IMC) arrival capability in both directions is vital to maintaining the aviation forecast and time critical cargo operations. Providing all weather capability in both operating directions is particularly important if an air carrier hubbing operation were to return to DAY.

It is the short-term goal of DAY to aggressively market another cargo tenant(s) to replace the UPS operation within the next 10 years at their 2004 operational levels, with a long-term average annual growth rate of 3.3 percent. At this cargo growth rate it is anticipated that the Runway 6R extension and full ILS instrumentation will be needed around the year 2020 to 2025 timeframe when peak hour aircraft departure delays (IFR) begin to reach 10-15 minutes (parallel 6-24 operations). This amount of delay will be reached when peak hour northeast departure operations (IFR) exceed 35 to 40, and when peak hour southwest departure operations (VFR/IFR) exceed 50 to 55. In addition, peak hour northeast arrival delays will reach 6 minutes when demand exceeds 25 peak hour arrivals. Arrival delays are due to Runway 6R not having full ILS capability and adequate runway length.

The additional runway length and ILS instrumentation on Runway 6R will be sufficient to accommodate the existing and future commercial and cargo fleet mix during all weather conditions.

9.4.2 Runway 18-36 Relocation

The main focus of the Phase 4 projects will be the relocation of Runway 18-36 to the north by 2,975 feet along its current alignment. The runway will remain at its current 8,500-foot length. Runway 18-36 is not anticipated to provide a significant increase in airfield capacity. Its primary purpose is to provide arrival and departure capacity for those times when the primary runway(s) do not meet the crosswind limitations. Additional benefits of the runway relocation include full 1,000-foot safety areas on each end, accommodate future fleet mix (commercial and cargo), reduced runway crossings (aircraft and vehicles), and reduced aircraft taxi times during arrivals and departures. Implementation of this project will be based on a reduction in airline operating costs, cancelled flights, and safety of aircraft and vehicle movements. It is anticipated that this will occur when the cost of airline delays and lost revenue can justify the project cost or when operational safety becomes an issue due to runway incursions.

The addition of full ILS instrumentation on both runway ends will be sufficient to accommodate the existing and future commercial and cargo fleet mix during all weather conditions.

When Runway 18-36 is the only runway available due to crosswind limitations on the parallel 6-24 runways the following utilization of Runway 18-36 will be necessary:

- Air carrier and large commuter aircraft will be approximately 1.07 percent of the time;
- Cargo aircraft will be approximately 0.2 percent of the time; and
- 2.1 percent of the time for other aircraft type (small commuter, general aviation).

Based on actual Automated Radar Terminal System (ARTS) data from December 2003 through January 2004, Runway 18-36 was used approximately 11 percent of the time. The majority of these operations consisted of arrivals on Runway 18 and departures on Runway 36.

9.4.3 Runway 6L Extension

The main focus of the Phase 4 projects will be a 3,178-foot extension of Runway 6R and a 1,478-foot relocation of the Runway 24R threshold to the south, for a total runway length of 12,000 feet. Implementation of the proposed Runway 6L extension will be based on the need for an airline operator (commercial or cargo) to require a runway length of 12,600 feet to serve a specific market destination at maximum takeoff weight. A Benefit-Cost Analysis will need to determine the number of daily operations (1 to 3) that justify the runway extension.

9.4.4 Additional Phase 4 Program Projects

Additional major airfield projects associated with the Phase 4 Program include the following:

- Taxiway 'A' Relocation – Existing Taxiway 'A' is located 400 feet west of Runway 18-36 and is proposed to be relocated to a distance of 600 feet from the runway centerline. Upon completion of this project, Runway 18-36 will have full Group V design standards.
- North Dixie Drive Tunnel – Also in conjunction with the proposed Runway 24L extension will be a tunnel for North Dixie Drive. Approximately 2,100 feet of North Dixie Drive between McCauley Drive and Northwoods Blvd. will be tunneled under the runway extension.
- Design Group V Upgrade – Upgrade all of the airfield runways, taxiways and apron areas to design Group V planning standards.
- Land Acquisition – Approximately 7 acres of land will need to be acquired in support of the Runway 24L extension. This land will encompass the proposed airside service road, security fence, and navigational critical areas.
- Taxiway Extensions – The following taxiways will be extended in support of the proposed runway and airfield projects; Taxiways F, H, R, W, and A. In addition, various new runway exits (angled and 90-degree) will be constructed to reduce runway occupancy time.

9.5 CAPITAL DEVELOPMENT PHASING COSTS

Table 9-2 presents the cost estimates for the proposed four phases of airport development. The program at DAY is subject to any number of future variables. Inflation will change actual project costs and may affect the implementation schedule over the planning horizon. The project costs are presented in constant 2007 dollars. The cost of construction itself is also subject to significant variance depending on competition for workers and material costs at the time of actual construction, as well as the changing requirements of local and FAA regulations. The construction phasing may be modified as availability of funds, as well as aviation demand influence the program. Ultimate construction of recommended capital projects should occur only after further refinement of the design and costs through architectural and engineering analyses.

TABLE 9-2
CONSTRUCTION PHASING COSTS

Construction Projects	Planning Activity Levels: Aircraft Operations	Planning Activity Levels: Passenger Enplanements (million)	Cost Estimate (2007$)
Year 2005	121,096	1.22	
Year 2006	109,653	1.31	
Phase 1 (2008-2010)	140,000-143,300	1.44-1.47	
New Public Parking Garage			$ 41,580,000
6R-24L Runway Safety Area			$ 5,246,060
New Air Traffic Control Tower			$ 30,000,000
Airport Terminal Drive Reconfiguration			$ 3,894,000
Sub-Total			**$ 80,720,060**
Phase 2 (2011-2015)	144,500-150,200	1.49-1.56	
Consolidated Rental Car Complex			$ 5,946,600
Terminal Apron Expansion			$ 1,752,960
Economy Public Parking Lot Expansion			$ 5,454,900
Sub-Total			**$ 13,154,460**
Phase 3 (2016-2020)	151,800-158,600	1.57-1.65	
Terminal Expansion			$ 23,595,000
Cargo Apron Expansion			$ 39,240,960
Terminal Apron/Taxiway/Deicing Expansion			$ 56,043,240
Relocate Airport Firefighting and Rescue Station			$ 10,560,000
Corporate Hangar Facilities			$ 11,206,800
Sub-Total			**$ 140,646,000**
Phase 4 (2021+)	158,600+	1.65+	
Runway 24L Extension & 6R ILS Upgrade			$ 87,867,674
Runway 18-36 Relocation			$ 118,760,400
Runway 6L Extension			$ 149,828,580
Sub-Total			**$ 356,456,654**
TOTAL COST			**$ 590,977,174**

Source: PBS&J

10. AIRPORT LAYOUT PLAN DRAWINGS

This section presents the Airport Layout Plan (ALP) drawings that are associated with the December 1999 Strategic Master Plan Update Study and the projects presented in this Master Plan Update Report. The ALP package contains the following drawings:

- Sheet 1 – Existing Airport Layout Plan
- Sheet 2 – Future Airport Layout Plan
- Sheet 3 – Airport Data Sheet
- Sheet 4 – Terminal Area Plan
- Sheet 5 – Airspace Plan (Part 77)
- Sheet 6 - Airspace Plan (Part 77)
- Sheet 7 – Runway Protection Zone Plan & Profile (Existing Runway 18-36)
- Sheet 8 - Runway Protection Zone Plan & Profile (Future Runway 18-36)
- Sheet 9 - Runway Protection Zone Plan & Profile (Existing Runway 6R/24L)
- Sheet 10 - Runway Protection Zone Plan & Profile (Future Runway 6R/24L)
- Sheet 11 - Runway Protection Zone Plan & Profile (Existing Runway 6L/24R)
- Sheet 12 - Runway Protection Zone Plan & Profile (Future Runway 6L/24R)
- Sheet 13 – On-Airport Land Use Plan
- Sheet 14 – New Air Traffic Control Tower Line-of-Sight Plan
- Sheet 15 – Airport Property Map (Exhibit A)
- Sheet 15A – Airport Property Map Data Table

Each of these drawings will be provided, in reduced form (11x17), as a separate document under separate cover.

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ATTACHMENT A

Air Traffic Control Tower Site Selection Study

Air Traffic Control Tower
Site Selection Study

Final Report

Dayton International Airport

Prepared By:
Landrum & Brown, Inc.

September 5, 2002

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EXECUTIVE SUMMARY

The Dayton International Airport (DAY) Master Plan Study dated December 1999 recommended that the existing Air Traffic Control Tower (ATCT) and TRACON facilities be relocated to provide a clear line-of-sight to all existing and future airfield “movement areas” as depicted on the May 10, 2001 Airport Layout Plan (ALP) drawing. In addition, the existing control tower is 41-years old and the cab size is not sufficient to accommodate the new technology equipment, additional work-stations and counter space. Based on these deficiencies, an ATCT Siting Study was initiated to determine the optimum location and height for a new control tower.

A series of draft review reports were prepared at the 50%, 75% and 90% levels for discussion and review by the Airport and FAA personnel. The FAA has published four documents that were used to determine the optimum location and height of the new control tower site.

Throughout the course of the tower sighting study there were ten sites identified and evaluated for possible location of the new tower and TRACON facilities. In the final analysis Site #6A was identified as the preferred location for the new tower and was verified at the FAA Airways Facility Technical Institute Lab (AFTIL) in Atlantic City. Site #6A is located at coordinate Latitude 39^{o} 54’ 00.26” and Longitude 84^{o} 13’ 31.71”. The maximum allowable tower height at this site is 1280 MSL (283’) and an eye-level height of 1255 MSL (258’).

SECTION 1: INTRODUCTION

A second tower siting study meeting was conducted on January 29, 2002 to present and discuss the Draft 50% Review Report for siting of the new Air Traffic Control Tower (ATCT) at Dayton International Airport (DAY). A summary of this meeting is presented in **Appendix A**. Some of the key issues that resulted from this meeting are as follows:

- The Airport indicated that they were willing to recommend to the FAA that the proposed 3rd parallel runway be taken off the Future Airport Layout Plan (ALP) drawing to mitigate some of the proposed tower line-of-sight conflicts.
- The existing and future runway missed approach surfaces were limiting factors in allowable tower heights. This resulted in significant shadows on "movement areas" around the terminal complex.
- Tower sites 1-A, 1-B, and 1-C were eliminated from further study and three new tower sites were identified for consideration.

In addition, a teleconference was conducted on April 15, 2002 to review and discuss the Draft 75% Review Report. A summary of this telecon meeting is presented in Appendix A.

After subsequent discussions with the FAA, it was agreed that the proposed 3rd parallel runway would remain on the ALP provided the sponsor (DAY) commits to remove or relocate the existing Emery ramp tower when the runway is constructed. This should eliminate any line-of-sight problems on the proposed 3rd parallel runway resulting from the existing Emery ramp tower.

On April 23-24, 2002, a series of meetings was held at the FAA Airways Facility Technical Institute Lab (AFTIL) in Atlantic City to assess the line-of-sight and operational constraints associated with the proposed Tower Sites 6, 7, 8 and 9 as presented in the Draft 90% Review Report dated April 23, 2002. At the conclusion of these meetings it was unanimously decided that Tower Site 6 is the preferred location for the new control tower. However, due to some minor sighting restrictions on Taxiways 'U' and 'P' it was decided to move this site approximately 178 feet to the southeast in order to improve visibility of these taxiways. This new tower site was identified as Site 6A and is located at coordinate Latitude 39° 54' 00.26" and Longitude 84° 13' 31.71". A summary of these meetings is presented in Appendix A.

SECTION 2: EVALUATION OF PROPOSED TOWER SITES

Figure 1 depicts the proposed tower Sites 1-A, 1-B, 1-C and 6. After considerable review and discussion, it was determined that only Site 6 would be carried forward for further study. Two of the main contributing factors that resulted in the elimination of Sites 1-A, 1-B and 1-C were significant shadows in the terminal complex area and the limiting tower height due to the TERPS Missed Approach Area. A description of each tower site and why it was eliminated from further study is presented below.

2.1 TOWER SITE NO. 1-A

Proposed Tower Site No. 1-A is located in the area between Concorde Drive and Cargo Road in an open area just southwest of the U.S. Post Office and U.S. Customs facilities. This site is located at Latitude 39° 53’ 40.97” and Longitude 84° 13’ 59.15” and has a ground elevation of 997’ MSL.

Site No. 1-A would be located within the 7:1 Secondary Area of the TERPS Straight Missed Approach for future Runway 6R (extended). A tower in this location should not exceed an elevation of 1231 MSL (234 feet AGL) or else it would become an obstruction to the TERPS Missed Approach Area. An obstruction to this area would require the Runway 6R approach minimums to be raised, thereby having an impact on runway arrival capacity during poor weather conditions.

Based on this maximum height limitation, there will be line-of-sight shadows within the terminal taxiway system (existing and proposed taxiways) resulting from the existing control tower and Concourses B and C. The location of numerous proposed airport facilities would also need to be modified in order to avoid line-of-sight conflicts from this tower site. These facilities include:

- Future Emery container repair station building
- Future Emery aircraft maintenance hangars
- Future north logistics buildings
- Proposed terminal cross-field taxiway
- Future ARFF station
- Limit expansion boundary of Emery sortation hub building to the west
- Change the future terminal apron taxiway to a taxilane
- Lower existing control tower (intended to be re-used for ramp and ground operations control)

There would be no shadow impacts on the proposed 3rd parallel runway from the existing Emery ramp tower as a result of the agreement to remove the tower upon construction of the runway. However, based on the other aforementioned operational impacts, the Working Group decided that tower Site No. 1-A should be eliminated from further study.

2.2 TOWER SITE NO. 1-B

Proposed Tower Site No. 1-B is located in the area between Concorde Drive and Cargo Road in an open area just north of the glycol equalization basins. This site is located at Latitude 39^o 53' 38.06" and Longitude 84^o 14' 02.31" and has a ground elevation of 994 MSL. Based on the TERPS Missed Approach Area a maximum tower height of 1299 MSL (305 feet AGL) can be provided at this site. This tower height would result in various line-of-sight shadows within the terminal taxiway system (existing and proposed taxiways) and the proposed 3rd parallel runway and taxiway system. It would be necessary to relocate various proposed facilities in order to mitigate these shadows, which include:

- Future Emery container repair station building
- Proposed terminal cross-field taxiway
- Future ARFF station
- Limit expansion boundary of Emery sortation hub building to the west
- Change the future terminal apron taxiway to a taxilane

There would be no shadow impacts on the proposed 3rd parallel runway from the existing Emery ramp tower as a result of the agreement to remove the tower upon construction of the runway. Based on these operational impacts, the Working Group decided that tower Site No. 1-B would still be a viable tower site, but that it should be moved closer to the terminal area. Therefore, a new tower site will be identified on the south side of Cargo Road and just south of Mill Creek.

2.3 TOWER SITE NO. 1-C

Proposed Tower Site 1-C is located in the area between Concorde Drive and Cargo Road in an open area approximately 400 feet south of the fuel farm tanks. This site is located at Latitude 39^o 53 46.29" and Longitude 84^o 13' 51.27" and has a ground elevation of 996 MSL.

Site 1-C would be located within the 28.26:1 Section 1b Area of the TERPS Straight Missed Approach for existing Runway 6L. A tower in this location should not exceed an elevation of 1251 MSL (255 feet AGL) or else it would become an obstruction to the TERPS Missed Approach Area. An obstruction to this area will require the Runway 6L approach minimums to be raised, thereby, having an impact on runway arrival capacity during poor weather conditions.

Based on this maximum height limitation, there would be line-of-sight shadows within the terminal taxiway system (existing and proposed taxiways) resulting from the existing control tower and Concourse C. In addition, the location of various proposed airport facilities would need to be modified in order to avoid line-of-sight conflicts from this tower site. These facilities include:

- Future Emery container repair station building
- Future Emery aircraft maintenance hangars

- Proposed terminal cross-field taxiway
- Future ARFF station
- Lower existing control tower
- Limit expansion boundary of Emery sortation hub building to the west
- Change the future terminal apron taxiway to a taxilane

There would be no shadow impacts on the proposed 3rd parallel runway from the existing Emery ramp tower as a result of the agreement to remove the tower upon construction of the runway. However, based on the other aforementioned operational impacts, the Working Group decided that tower Site 1-C should be eliminated from further study.

2.4 TOWER SITE NO. 6

Proposed Tower Site No. 6 is located in the area currently occupied by the employee parking lot just northwest of the terminal building. This site is located at Latitude 39^{o} 54' 01.73" and Longitude 84^{o} 13' 32.98" and has a ground elevation of 997 MSL.

Site 6 would be located within the 28.26:1 Section 1B Area of the TERPS Straight Missed Approach for existing Runway 6L and 24R. A tower in this location should not exceed an elevation of 1255 MSL (258 feet AGL) or else it would become an obstruction to the Runway 24R TERPS Missed Approach Area. An obstruction to this area would require the Runway 24R approach minimums to be raised, thereby having an impact on runway arrival capacity during poor weather conditions.

Based on this maximum height limitation, the only line-of-sight impact would be from the existing control tower on Taxiway 'D', and the future Emery aircraft maintenance hangars on the proposed South Cross-Field Taxiway. It was felt that these shadows could be mitigated with minor adjustments in the airfield geometry. There would be no shadow impacts on the proposed 3rd parallel runway from the existing Emery ramp tower as a result of the agreement to remove the tower upon construction of the runway.

In light of these potential impacts, it was recommended that tower Site No. 6 be considered for further analysis.

SECTION 3: TOWER SITE INVESTIGATION AND ANALYSIS

3.1 INTRODUCTION

At the conclusion of the January 29th tower siting meeting, it was determined that only Site No. 6 would be carried forward for further analysis. Also, three additional tower sites were identified for evaluation. The final four tower site locations (Site 6, 7, 8 and 9) are depicted on **Figures 2 and 3**, along with the TERPS Missed Approach Areas. An airspace analysis was performed on these sites for the existing and future precision approaches at Dayton Airport. Criteria established in FAA

Orders 8260.3B and 8260.36A were used in this analysis. **Table 1** indicates the "max to avoid" and eye-level heights for each proposed tower site. Tower Site 7 is located within the future Runway 6R Category I missed approach area and has a "max to avoid" height of 1236 MSL. Due to this height limitation it was recommended to reduce the proposed Runway 6R extension from 4,400 feet to 3,600 feet. This reduction in runway length will allow for a higher tower height at Site 7 (shortened). All of these proposed tower sites and their associated heights would impact the circling and non-precision approach minimums. For this study, Sites 7, 8 and 9 were limited to a maximum height of 1300 MSL (300 feet AGL) and an eye-level elevation of 1275 MSL (275 feet AGL) for line-of-sight analysis and to minimize development costs.

TABLE 1
MAX. TO AVOID TOWER ELEVATIONS

SITE	"MAX TO AVOID" MSL (AGL)	EYE-LEVEL HEIGHT MSL (AGL)	AREA OF PENETRATION
6	1280 (283')	1255 (258')	Exist. Rwy. 24R Missed Approach
7	1236 (236')	1211 (211')	Fut. Rwy. 6R Missed Approach
7 (shortened)	1407 (407')	1382 (382')	Fut. Rwy 6R Missed Approach (shortened)
8	1420 (420')	1395 (395')	Exist. Rwy. 24R Missed Approach
9	1436 (436')	1411 (411')	Exist. Rwy. 24R Missed Approach

3.2 TOWER SITE NO. 6 AND 6A

Proposed Tower Site No. 6 as shown on **Figure 4** is located in the area currently occupied by the Jet A fuel facility and employee parking lot just northwest of the terminal building. This site is located at Latitude 39^o 54' 01.73" and Longitude 84^o 13' 32.98" and has a ground elevation of 997 MSL.

Based on the series of meetings held at the FAA Airways Facility Technical Institute Lab (AFTIL) in Atlantic City it was unanimously decided that Tower Site 6 should be moved approximately 178 feet to the southeast in order to improve visibility along portions of Taxiways 'U' and 'P'. This new tower location was identified as Site 6A at coordinate Latitude 39^o 54' 00.26" and Longitude 84^o 13' 31.71" and is shown on **Figure 4A**.

An evaluation of Sites 6 and 6A is presented below:

3.2.1 Mandatory Siting Criteria

3.2.1.1 Maximum Visibility of Airborne Traffic Patterns – This site would allow for the complete visibility of all airborne traffic patterns. No foreseeable conditions exist that would block or prevent controllers from seeing aircraft in the air.

3.2.1.2 Unobstructed View of Runway Approaches and Landing Areas – Using EarthInfo, Inc. NCDC Surface Airways 2001 weather data from 1990-2000, there were 1,254 hours where the ceiling was less than 1309 MSL (300 feet AGL). This is equivalent to 52.25 days or approximately 4.75 days per year. Based on this weather information and an eye-level elevation of 1255 MSL (258 feet AGL), there would be on average less than 5 days per year when the control tower would not have a clear view of the approach and landing areas.

3.2.1.3 Complete Visibility of All Airport Movement Areas – A shadow study was conducted with an eye-level elevation of 1255 MSL (258 feet AGL). As shown on **Figure 5** (Site 6) and **Figure 5A** (Site 6A), the following shadows were produced on the existing and proposed movement areas:

- *Taxiway 'D'* – Shadow from the existing Air Traffic Control Tower. This shadow has a width of 100 feet and has a height of 0.8 feet. The height of this shadow should not obscure a controller's view of any aircraft type or ground vehicle in this area. Tower Site 6A would eliminate this shadow.
- *South 6-24 Cross-Field Twy*. – Shadow from the future Emery Aircraft Maintenance Hangars. This shadow has a width of 1,742 feet and ranges in height from 24.0 to 24.7 feet. This shadow could be mitigated with a slight southward adjustment in alignment of the south 6-24 cross-field taxiway and connect at the future Runway 6 threshold. Modification of the proposed Logistics Park layout would also be necessary.
- *Fut. 6-24 Parallel Twy.* – Shadow from the existing Emery ramp tower. This shadow has a width of 78 feet and a height of 61.6 feet. An agreement between the Airport and FAA would require removal or relocation of the existing Emery ramp tower when the 3rd Parallel Runway is constructed in order to mitigate this shadow.
- *Fut. 3rd Parallel Rwy.* – Shadow from the existing Emery ramp tower. This shadow has a width of 86 feet and a height of 43.5 feet. An agreement between the Airport and FAA would require removal or relocation of the existing Emery ramp tower when the 3rd Parallel Runway is constructed in order to mitigate this shadow.
- *North 6-24 Cross-Field Twy*. – Shadow from the proposed Emery Container Repair Station. This shadow has a width of 430 feet and a height of 13.0 feet. Mitigation of this shadow is possible by relocating the container repair station.

3.2.1.4 Site Plot Must Provide for Planned Facilities and Future Expansion – Sites 6 and 6A are approximately 8.2 acres in size. A preliminary tower layout similar to that being developed at Port Columbus International Airport (CMH) would occupy approximately 3.3 acres. This includes a control tower, base building, TRACON and auto parking. This area would have adequate land to support any ATCT expansion plans well into the future.

3.2.1.5 Compliance With FAR Part 77 Surfaces – Sites 6 and 6A are located within the 150-foot horizontal surface, which has an elevation of 1159 MSL. A proposed tower at this site would have a maximum elevation of 1280 MSL and will penetrate the horizontal surface by 121 feet. This penetration is not expected to be a hazard to air navigation, however, this will need to be confirmed through completion of an FAA aeronautical study.

3.2.1.6 Derogate Performance of Existing or Planned Electronic Facilities – At this time, Sites 6 and 6A are not anticipated to impact the performance of any existing or planned electronic facilities (VOR, ASR, ILS, RVR, etc.). However, the FAA should conduct a more detailed study of this site for final determination.

3.2.2 Non-Mandatory Siting Criteria

3.2.2.1 Depth Perception – The worst-case scenario for depth perception would be the visibility to the future Runway 18 threshold. At 11,000 feet from the runway threshold, the minimum required height for depth perception would be 112 feet above the runway threshold elevation of 977 MSL. This would require an eye-level elevation of 1089 MSL, which is significantly lower (166 feet AGL) than the required height for visibility of other airport movement surfaces.

3.2.2.2 Cab Orientation – A northern orientation of the tower cab should not be a problem in relation to the sun angles throughout the year as shown on **Figure B-1** in Appendix B.

The existing Aset Corp building is located at the southwest corner of the intersection of Terminal Drive and Boeing Drive. The northern face of this building is sloped at a 39-degree angle with reflective glass panels. The main concern is possible reflection of the sun into the control tower cab. A study was conducted that tracked the suns altitude and azimuth throughout the year, and its' potential to reflect off the Aset building into the proposed tower cab. Based on a tower eye-level elevation of 1255 MSL, the sun must be at an altitude range of 4 to 5 degrees above the horizon and an azimuth range of 269 to 273 degrees in order to cause any reflection problems. A sun azimuth of 269 degrees would cast a building reflection at an elevation of approximately 3305 MSL (2,050 feet above eye-level). A sun azimuth of 273 degrees would cast a building reflection at an elevation of approximately 2730 MSL (1,475 feet above eye-level). Both of these building reflections are well above the proposed tower cab elevation and should not result in any impaired vision for controllers.

3.2.2.3 Impaired Vision from External Light Sources – The main area of concern for external light sources is the flood lighting associated with the Emery aircraft ramp area. However, due to the height of the new tower, this external light source is not anticipated to be a problem.

3.2.2.4 Visibility of Ground Operations (Aircraft and Vehicles) – Section 3.2.1.3 discusses visibility of the aircraft movement areas. An additional analysis was conducted to determine the shadows generated by the preferred terminal expansion concept (building height 40 feet). As shown on **Figure 6**, all of the shadows would be confined to the terminal ramp area that would be considered as a "non-movement area". Also, it is anticipated that ground vehicles would be visible at all runway and taxiway crossings. Similar conditions would exist for proposed Tower Site 6A.

3.2.2.5 Consideration of Fog and Ground Haze – Fog and ground haze should not be an issue at this tower site.

3.2.2.6 Exterior Noise – The close proximity of this site to the terminal and USAirways cargo ramp areas may result in higher than normal noise levels. The anticipated increase in noise levels could be mitigated with proper acoustical design of both the control tower and TRACON building.

3.2.2.7 Site Access Not Crossing Aircraft Operations Areas – Public access to the site would not require crossing of any aircraft operations areas.

3.2.2.8 Consideration of Future Airport Expansion – This study has considered the new parking garage, rental car relocation site, Emery cargo expansion, and the proposed terminal/gate expansion plans. The expansion and location of these facilities should have no impact on these two tower sites.

3.2.2.9 Site Free of Jet Exhaust Fumes – It is possible that the proximity of the terminal and cargo ramp areas may generate unacceptable levels of jet engine exhaust fumes at the site. Testing would need to be conducted to determine the levels and concentration of fumes. One possible mitigation measure would be the use of carbon filters on the fresh air intakes of the HVAC system.

3.2.3 DOT/FAA Order 1600.69, "FAA Facility Security Management Program"

A copy of this order was not available from the FAA due to the high level of security after the 9/11 terrorist attacks. According to the FAA Great Lakes Region, the two main security requirements that should be adhered to are the 300-foot setback from all public roads and the 100-foot separation between the tower and auto parking area. This tower and TRACON building site will have a minimum exterior setback distance of 300 feet from any public road and an interior setback of 100 feet between the parking area and buildings. The site area is adequate to be in full compliance with these setback requirements without the need for costly blast protection.

3.2.4 Environmental Impacts

This environmental analysis does not represent a comprehensive and detailed review of potential environmental impacts. The purpose of this analysis is to determine what key environmental factors should be considered for this proposed tower site. No wetlands are known to exist on this site, however, since drainage ditches and other hydraulic features exist in the proximity, a wetland survey and coordination with the U.S. Army Corps of Engineers should occur. Similarly, no threatened or endangered species, or their critical habitat, are known to exist on this site, however, a formal survey and agency coordination would be necessary. Any unpaved or undeveloped land areas would need to be surveyed to document disturbance or the absence of historical, archeological, or cultural resources. Coordination with the State Historic Preservation Officer (SHPO) would be necessary.

Based on information received from the Dayton Airport and review of aerial photography, the following information is presented:

- Existing stormwater drainage ditches would need to be relocated or placed in a culvert.
- The existing employee parking lot would need to be relocated in-kind to another location on airport property.
- The existing Jet A fuel facility would need to be relocated. This includes two 40,000 gallon underground storage tanks, underground fuel pipes, and other fueling support systems. The site would need to be tested for fuel contamination and assess remediation steps if contamination is found.
- Increase in impervious surfaces and stormwater runoff.

3.2.5 Miscellaneous Considerations

3.2.5.1 <u>Landside Access</u> – Access to this site would be from Cargo Road off the main Terminal Drive. Parking areas would be adjacent to the tower and TRACON building.

3.2.5.2 <u>Utilities</u> – All utilities required for development of this site (water, sanitary sewer, gas, telephone, etc.) are available in this area of the airport.

3.2.5.3 <u>Field Cabling</u> – Installation of new duct bank and fiber optic control cabling would be required between the new ATCT/TRACON facility and two existing electrical vaults.

3.3 TOWER SITE NO. 7

Proposed Tower Site No. 7 as shown on **Figure 7** is located in the area currently occupied by Building No. 18 (multi-cargo tenants). This site is located at Latitude 39^{o} 53’ 44.94” and Longitude 84^{o} 13’ 43.51” and has a ground elevation of 1000 MSL. An evaluation of Site 7 is presented below:

3.3.1 Mandatory Siting Criteria

3.3.1.1 Maximum Visibility of Airborne Traffic Patterns - This site would allow for the complete visibility of all airborne traffic patterns. No foreseeable conditions exist that would block or prevent controllers from seeing aircraft in the air.

3.3.1.2 Unobstructed View of Runway Approaches and Landing Areas – Using EarthInfo, Inc. NCDC Surface Airways 2001 weather data from 1990-2000, there were 1,254 hours where the ceiling was less than 1309 MSL (300 feet AGL). This is equivalent to 52.25 days or approximately 4.75 days per year. Based on this weather information and an eye-level elevation of 1275 MSL (275 feet AGL), there would be on average less than 5 days per year when the control tower would not have a clear view of the approach and landing areas.

3.3.1.3 Complete Visibility of All Airport Movement Areas – A shadow study was conducted with an eye-level elevation of 1275 MSL (275 feet AGL). As noted in Section 3.1, the control tower was limited to a maximum height of 1300 MSL (300' AGL) for line-of-sight analysis and to minimize development costs. In order to achieve this eye-level elevation, it would be necessary to shorten the proposed Runway 6R extension from 4,400 feet to 3,600 feet in order to keep the tower outside of the TERPS Missed Approach Area. As shown on **Figure 8**, the following shadows were produced on the existing and proposed movement areas:

- *Taxiway 'D'* – Shadow from the existing Wright Bros. Ground Vehicle Maintenance building. This shadow has a width of 88 feet and a height of 1.4 feet on the south edge. The height of this shadow is minimal and should not impair a controller's visual sighting of aircraft on this section of taxiway.
- *Fut. 6-24 Parallel Twy*. – Shadow from the existing Emery ramp tower. This shadow has a width of 92 feet and a height of 74.4 feet on the south edge. An agreement between the Airport and FAA would require removal or relocation of the existing Emery ramp tower when the 3rd Parallel Runway is constructed in order to mitigate this shadow.
- *Fut. 3rd Parallel Rwy*. – Shadow from the existing Emery ramp tower. This shadow has a width of 98 feet and a height of 53.9 feet on the south edge. An agreement between the Airport and FAA would require removal or relocation of the existing Emery ramp tower when the 3rd Parallel Runway is constructed in order to mitigate this shadow.
- *North 6-24 Cross-Field Twy*. – Shadow from the proposed Emery Container Repair Station. This shadow has a width of 470 feet and a height of 16.6 feet on the south edge. This shadow could be mitigated by relocating the container repair station.

- *Fut. Terminal Apron Twy*. – Shadow from the existing Air Traffic Control Tower. This shadow has a width of 42 feet and a height of 25.8 feet. This shadow could be mitigated by changing this taxiway into an apron taxilane that would not be under control of the ATCT. However, in order to fully eliminate this shadow the existing control tower height must be lowered by approximately 19 feet, or the new control tower height must be increased by approximately 57 feet at an additional cost of $2.4 million. This increase in the tower height will not be a penetration to the existing Runway 24R missed approach surfaces.
- *Fut. North Connector Twy*. – Shadow from the existing Air Traffic Control Tower. This shadow has a width of 45 feet and a height of 9.1 feet. In order to fully eliminate this shadow the existing control tower must be lowered by approximately 7.5 feet, or the new control tower height must be increased by approximately 20 feet at an additional cost of $824,000. This increase in the tower height will not be a penetration to the existing Runway 24R missed approach surfaces.
- *Taxiway Q* – Shadow from the proposed Airport Rescue and Firefighting (ARFF) Station. This shadow has a width of 176 feet and a height of 3.5 feet. This shadow could be mitigated by changing this taxiway into an apron taxilane that would not be under control of the ATCT, or by relocating the ARFF station to another site on the airport.

3.3.1.4 Site Plot Must Provide for Planned Facilities and Future Expansion – Site 7 is approximately 3.8 acres in size. A preliminary tower layout similar to that being developed at CMH would occupy approximately 3.3 acres. Additional area for future expansion is limited to approximately 0.5 acres.

3.3.1.5 Compliance With FAR Part 77 Surfaces – Site 7 is located within the 150-foot horizontal surface, which has an elevation of 1159 MSL. A proposed tower at this site would have a maximum elevation of 1300 MSL and would penetrate the horizontal surface by 141 feet. This penetration is not expected to be a hazard to air navigation, however, this would need to be confirmed through completion of an FAA aeronautical study.

3.3.1.6 Derogate Performance of Existing or Planned Electronic Facilities – At this time, Site 7 is not anticipated to impact the performance of any existing or planned electronic facilities (VOR, ASR, ILS, RVR, etc.). However, the FAA should conduct a more detailed study of this site for final determination.

3.3.2 Non-Mandatory Siting Criteria

3.3.2.1 Depth Perception – The worst-case scenario for depth perception would be the visibility to the future Runway 18 threshold. At 12,900 feet from the runway threshold, the minimum required height for depth perception would be 132 feet above the runway threshold elevation of 997 MSL. This would require an eye-level elevation of 1129 MSL, which is significantly lower (146 feet AGL) than the required height for visibility of other airport movement areas.

3.3.2.2 Cab Orientation – A northern orientation of the tower cab should not be a problem in relation to the sun angles throughout the year as shown on Figure B-1 in Appendix B.

The existing Aset Corp building is located at the southwest corner of the intersection of Terminal Drive and Boeing Drive. The northern face of this building is sloped at a 39-degree angle with reflective glass panels. The main concern is possible reflection of the sun into the control tower cab. A study was conducted that tracked the suns altitude and azimuth throughout the year, and its' potential to reflect off the Aset building into the proposed tower cab. Based on a tower eye-level elevation of 1275 MSL, the sun must be at an altitude range of 13 to 21 degrees above the horizon and an azimuth range of 273 to 286 degrees in order to cause any reflection problems. A sun azimuth of 273 degrees would cast a building reflection at an elevation of approximately 1220 MSL (55 feet below eye-level). A sun azimuth of 286 degrees would cast a building reflection at an elevation of approximately 1720 MSL (445 feet above eye-level). Site 7 would experience a reflection problem from the Aset building when the sun is at an altitude of 19 degrees above the horizon and at an azimuth of 275 degrees. This occurs at the time of approximately 1810 hours during the peak summer months.

3.3.2.3 Impaired Vision from External Light Sources - The main area of concern for external light sources is the flood lighting associated with the Emery aircraft ramp area. However, due to the height of the new tower, this external light source is not anticipated to be a problem.

3.3.2.4 Visibility of Ground Operations (Aircraft and Vehicles) – Section 3.2.1.3 discusses visibility of the aircraft movement areas. At this time, it is anticipated that ground vehicles would be visible at all runway and taxiway crossings.

3.3.2.5 Consideration of Fog and Ground Haze – Fog and ground haze would not be an issue at this tower site.

3.3.2.6 Exterior Noise – This site is located a significant distance from any aircraft operations areas. It is also approximately 325 feet from the main airport entrance roadway. There should be no above normal noise levels that require additional sound proofing of the control tower or TRACON facilities.

3.3.2.7 Site Access Not Crossing Aircraft Operations Areas – Public access to the site would not require crossing of any aircraft operations areas.

3.3.2.8 Consideration of Future Airport Expansion – This study has considered the new parking garage, rental car relocation site, Emery cargo expansion, and the proposed terminal/gate expansion plans. The expansion and location of these facilities should have no impact on this tower site.

3.3.2.9 Site Free of Jet Exhaust Fumes –This tower site is located a considerable distance from any aircraft operations area and should not experience unacceptable levels of jet exhaust fumes.

3.3.3 DOT/FAA Order 1600.69, "FAA Facility Security Management Program"

A copy of this order was not available from the FAA due to the high level of security after the 9/11 terrorist attacks. According to the FAA Great Lakes Region, the two main security requirements that should be adhered to are the 300-foot setback from all public roads and the 100-foot separation between the tower and auto parking area. The tower and TRACON building at this site would have a setback distance of 300 feet from the main airport access road to the south, however it would only have a setback distance of 150 feet from Cargo Road on the west and north sides. All interior parking areas would have the required setback distance of 100 feet to the tower and base building.

3.3.4 Environmental

This environmental analysis does not represent a comprehensive and detailed review of potential environmental impacts. The purpose of this analysis is to determine what key environmental factors should be considered for this proposed tower site. No wetlands are known to exist on this site, however, since drainage ditches and other hydraulic features exist in the proximity, a wetland survey and coordination with the U.S. Army Corps of Engineers would need to occur. Similarly, no threatened or endangered species, or their critical habitat, are known to exist on this site, however, a formal survey and agency coordination would be necessary. Any unpaved or undeveloped land areas would need to be surveyed to document disturbance or the absence of historical, archeological, or cultural resources. Coordination with the State Historic Preservation Officer (SHPO) would be necessary.

Based on information received from the Dayton Airport and review of aerial photography, the following information is presented for Site 7:

- This site is near stormwater drainage channels and should not directly impact the waterways. Construction techniques would need to be monitored to avoid any impacts.
- The existing cargo building on the site would need to be demolished. The building may contain asbestos or other potentially hazardous materials. A complete Environmental Site Assessment would need to be completed prior to demolition.
- The environmental impacts resulting from the relocated cargo facilities would need to be considered.

- The increase and/or decrease of pervious and impervious areas would need to be assessed.

3.3.5 Miscellaneous Considerations

3.3.5.1 Landside Access – Access to this site would be from Cargo Road off the main Terminal Drive. Parking areas would be adjacent to the tower and TRACON building.

3.3.5.2 Utilities – All utilities required for development of this site are available along Cargo Road and are currently located in the site area.

3.3.5.3 Field Cabling – Installation of new duct bank and fiber optic control cabling would be required between the new ATCT/TRACON facility and two existing electrical vaults.

3.4 TOWER SITE NO. 8

Proposed Tower Site No. 8 as shown on **Figure 9** is located in the area currently occupied by Building No. 17 (Old USAirways Reservation Center). This site is located at Latitude 39^{o} 53' 42.85" and Longitude 84^{o} 13' 48.18" and has a ground elevation of 1000 MSL.

3.4.1 Mandatory Siting Criteria

3.4.1.1 Maximum Visibility of Airborne Traffic Patterns - This site would allow for the complete visibility of all airborne traffic patterns. No foreseeable conditions exist that would block or prevent controllers from seeing aircraft in the air.

3.4.1.2 Unobstructed View of Runway Approaches and Landing Areas – Using EarthInfo, Inc. NCDC Surface Airways 2001 weather data from 1990-2000, there were 1,254 hours where the ceiling was less than 1309 MSL (300 feet AGL). This is equivalent to 52.25 days or approximately 4.75 days per year. Based on this weather information and an eye-level elevation of 1275 MSL (275 feet AGL), there would be on average less than 5 days per year when the control tower would not have a clear view of the approach and landing areas.

3.4.1.3 Complete Visibility of All Airport Movement Areas – A shadow study was conducted with an eye-level elevation of 1275 MSL (275 feet AGL). As shown on **Figure 10**, the following shadows were produced on the existing and proposed movement areas:

- *Taxiway 'D'* – Shadow from the existing Wright Bros. Ground Vehicle Maintenance building. This shadow has a width of 75 feet and a height of 3.3 feet on the south side. The height of this shadow is minimal and should not impair a controller's visual sighting of aircraft on this section of taxiway. However, if necessary this facility could be relocated to another site on the airfield.

- *Fut. 6-24 Parallel Twy*. – Shadow from the existing Emery ramp tower. This shadow has a width of 98 feet and a height of 70.3 feet on the south edge. An agreement between the Airport and FAA would require removal or relocation of the existing Emery ramp tower when the 3rd Parallel Runway is constructed in order to mitigate this shadow.
- *Fut. 3rd Parallel Rwy*. – Shadow from the existing Emery ramp tower. This shadow has a width of 106 feet and a height of 52.7 feet on the south edge. An agreement between the Airport and FAA would require removal or relocation of the existing Emery ramp tower when the 3rd Parallel Runway is constructed in order to mitigate this shadow.
- *North 6-24 Cross-Field Twy*. – Shadow from the proposed Emery Container Repair Station. This shadow has a width of 450 feet and a height of 17.3 feet. It is possible to mitigate this shadow by relocating the proposed container repair station.
- *Fut. Terminal Apron Twy*. – Shadow from the existing Air Traffic Control Tower. This shadow has a width of 40 feet and a height of 39.4 feet. This shadow could be mitigated by changing this taxiway into an apron taxilane that would not be under control of the ATCT. However, in order to fully eliminate this shadow the existing control tower height must be lowered by approximately 28 feet, or the new control tower height must be increased 93 feet at an additional cost of $3.8 million. This increase in the tower height will not be a penetration to the existing Runway 24R missed approach surfaces.
- *Fut. North Connector Twy*. – Shadow from the existing Air Traffic Control Tower. This shadow has a width of 43 feet and a height of 25.1 feet. However, in order to fully eliminate this shadow the existing control tower height must be lowered by approximately 17 feet, or the new control tower height must be increased 49 feet at an additional cost of $2.0 million. This increase in the tower height will not be a penetration to the existing Runway 24R missed approach surfaces.
- *Taxiway Q* – Shadow from the proposed Airport Rescue and Firefighting (ARFF) Station. This shadow has a width of 193 feet and a height of 6.6 feet. This shadow could be mitigated by changing this taxiway into an apron taxilane that would not be under control of the ATCT, or by relocating the ARFF station to another site on the airport.

3.4.1.4 Site Plot Must Provide for Planned Facilities and Future Expansion – Site 8 is approximately 4.2 acres in size and is bound by public roads on three sides and Mill Creek to the south. A preliminary tower layout similar to that being developed at CMH would occupy an area of approximately 3.3 acres in size. Additional area for future tower expansion plans is limited to approximately 0.9 acres. However, this site could expand to the northwest, however a portion of Cargo Road would need to be realigned to provide access to the remaining open land to the southwest.

3.4.1.5 Compliance With FAR Part 77 Surfaces – Site 8 is located within the 150-foot horizontal surface, which has an elevation of 1159 MSL. A proposed tower at this site would have a maximum elevation of 1300 MSL and would penetrate the horizontal surface by 141 feet. This penetration is not expected to be a hazard to air navigation, however, this would need to be confirmed through completion of an FAA aeronautical study.

3.4.1.6 Derogate Performance of Existing or Planned Electronic Facilities – At this time, Site 8 is not anticipated to impact the performance of any existing or planned electronic facilities (VOR, ASR, ILS, RVR, etc.). However, the FAA should conduct a more detailed study of this site for final determination.

3.4.2 Non-Mandatory Siting Criteria

3.4.2.1 Depth Perception – The worst-case scenario for depth perception would be the visibility to the future Runway 18 threshold. At 13,100 feet from the runway threshold, the minimum required height for depth perception would be 133 feet above the runway threshold elevation of 997 MSL. This would require an eye-level elevation of 1130 MSL, which is significantly lower (145 feet) than the required height for visibility of other airport movement areas.

3.4.2.2 Cab Orientation – A northern orientation of the tower cab should not be a problem in relation to the sun angles throughout the year as shown on Figure B-1 in Appendix B.

The existing Aset Corp building is located at the southwest corner of the intersection of Terminal Drive and Boeing Drive. The northern face of this building is sloped at a 39-degree angle with reflective glass panels. The main concern is possible reflection of the sun into the control tower cab. A study was conducted that tracked the suns altitude and azimuth throughout the year, and its' potential to reflect off the Aset building into the proposed tower cab. Based on a tower eye-level elevation of 1275 MSL, the sun must be at an altitude range of 19 to 25 degrees above the horizon and an azimuth range of 303 to 333 degrees in order to cause any reflection problems. Under these conditions the sun is below the horizon before it gets to an azimuth of 303 degrees. Therefore, there would be no building reflection problems at this tower site.

3.4.2.3 Impaired Vision from External Light Sources – The main area of concern for external light sources is the flood lighting associated with the Emery aircraft ramp area. However, due to the height of the new tower, this external light source is not anticipated to be a problem.

3.4.2.4 Visibility of Ground Operations (Aircraft and Vehicles) – Section 3.3.1.3 discusses visibility of the aircraft movement areas. Also, it is anticipated that ground vehicles would be visible at all runway and taxiway crossings.

3.4.2.5 Consideration of Fog and Ground Haze – Fog and ground haze would not be an issue at this tower site.

3.4.2.6 Exterior Noise - This site is located a significant distance from any aircraft operations areas. It is also approximately 350 feet from the main airport entrance roadway. There should be no above normal noise levels that require additional sound proofing of the control tower or TRACON facilities.

3.4.2.7 Site Access Not Crossing Aircraft Operations Areas – Public access to the site would not require crossing of any aircraft operations areas.

3.4.2.8 Consideration of Future Airport Expansion – This study has considered the new parking garage, rental car relocation site, Emery cargo expansion, and the proposed terminal/gate expansion plans. The expansion and location of these facilities should have no impact on this tower site.

3.4.2.9 Site Free of Jet Exhaust Fumes –This tower site is located a considerable distance from any aircraft operations area and should not experience unacceptable levels of jet exhaust fumes.

3.4.3 DOT/FAA Order 1600.69, "FAA Facility Security Management Program"

A copy of this order was not available from the FAA due to the high level of security after the 9/11 terrorist attacks. According to the FAA Great Lakes Region, the two main security requirements that should be adhered to are the 300-foot setback from all public roads and the 100-foot separation between the tower and auto parking area. The tower and TRACON building at this site would have a setback distance of 350 feet from the main airport access road to the south, however it will only have a setback distance of 150 feet from Cargo Road on the west and north sides. All interior parking areas would have the required setback distance of 100 feet to the tower and TRACON.

3.4.4 Environmental

This environmental analysis does not represent a comprehensive and detailed review of potential environmental impacts. The purpose of this analysis is to determine what key environmental factors should be considered for this proposed tower site. No wetlands are known to exist on this site, however, since drainage ditches and other hydraulic features exist in the proximity, a wetland survey and coordination with the U.S. Army Corps of Engineers would need to occur. Similarly, no threatened or endangered species, or their critical habitat, are known to exist on this site, however, a formal survey and agency coordination would be necessary. Any unpaved or undeveloped land areas would need to be surveyed to document disturbance or the absence of historical, archeological, or cultural resources. Coordination with the State Historic Preservation Officer (SHPO) would be necessary.

Based on information received from the Dayton Airport and review of aerial photography, the following information is presented for Site 8:

- This site is near stormwater drainage channels and should not directly impact the waterways. Construction techniques would need to be monitored to avoid any impacts.
- The existing office building on the site would need to be demolished. The building may contain asbestos or other potentially hazardous materials. A complete Environmental Site Assessment would need to be completed prior to demolition.
- The environmental impacts resulting from the relocated office facilities would need to be considered.
- The increase and/or decrease of pervious and impervious areas would need to be assessed.

3.4.5 Miscellaneous Considerations

3.4.5.1 Landside Access – Access to this site would be from Cargo Road off the main Terminal Drive. Parking areas would be adjacent to the tower and TRACON building.

3.4.5.2 Utilities – All utilities required for development of this site are available along Cargo Road and are currently located in the site area.

3.4.5.3 Field Cabling – Installation of new duct bank and fiber optic control cabling would be required between the new ATCT/TRACON facility and two existing electrical vaults.

3.5 TOWER SITE NO. 9

Proposed Tower Site No. 9 as shown on **Figure 11** is located in the vacant area between Terminal Drive and Cargo Road immediately south of Mill Creek. This site is located at Latitude 39^{o} 53’ 39.03” and Longitude 84^{o} 13’ 54.89” and has a ground elevation of 1000 MSL.

3.5.1 Mandatory Siting Criteria

3.5.1.1 Maximum Visibility of Airborne Traffic Patterns - This site would allow for the complete visibility of all airborne traffic patterns. No foreseeable conditions exist that would block or prevent controllers from seeing aircraft in the air.

3.5.1.2 Unobstructed View of Runway Approaches and Landing Areas – Using EarthInfo, Inc. NCDC Surface Airways 2001 weather data from 1990-2000, there were 1,254 hours where the ceiling was less than 1309 MSL (300 feet AGL). This is equivalent to 52.25 days or approximately

4.75 days per year. Based on this weather information and an eye-level elevation of 1275 MSL (275 feet AGL), there would be on average less than 5 days per year when the control tower would not have a clear view of the approach and landing areas.

3.5.1.3 Complete Visibility of All Airport Movement Areas – A shadow study was conducted with an eye-level elevation of 1275 MSL (275 feet AGL). As shown on **Figure 12**, the following shadows were produced on the existing and proposed movement areas:

- *Taxiway 'D'* – Shadow from the existing Wright Bros. Ground Vehicle Maintenance building. This shadow has a width of 83 feet and a height of 5.5 feet on the south side. This shadow could be mitigated by relocating the ground vehicle maintenance building.
- *Taxiway 'A'* – Shadow from the existing Air Traffic Control Tower. This shadow falls directly along the taxiway centerline for a distance of approximately 850 feet and have a height of 55 feet. This shadow could be mitigated by moving the proposed control tower to the north, thereby, shifting the shadow away from the taxiway centerline. However, in order to fully eliminate this shadow the control tower height must be lowered by approximately 39 feet.
- *Fut. 6-24 Parallel Twy*. – Shadow from the existing Emery ramp tower. This shadow has a width of 106 feet and a height of 70.3 feet on the south edge. An agreement between the Airport and FAA would require removal or relocation of the existing Emery ramp tower when the 3rd Parallel Runway is constructed in order to mitigate this shadow.
- *Fut. 3rd Parallel Rwy*. – Shadow from the existing Emery ramp tower. This shadow has a width of 117 feet and a height of 51.4 feet on the south edge. An agreement between the Airport and FAA would require removal or relocation of the existing Emery ramp tower when the 3rd Parallel Runway is constructed in order to mitigate this shadow.
- *North 6-24 Cross-Field Twy*. – Shadow from the proposed Emery Container Repair Station. This shadow has a width of 405 feet and a height of 18.2 feet. This shadow could be mitigated by relocating the container repair station.
- *Fut. Terminal Apron Twy*. – Shadow from the existing Air Traffic Control Tower. This shadow has a width of 37 feet and a height of 51.8 feet. This shadow could be mitigated by changing this taxiway into an apron taxilane that would not be under control of the ATCT. However, in order to fully eliminate this shadow the existing control tower height must be lowered by approximately 39 feet, or the new control tower height must be increased by approximately 148 feet at an additional cost of $6.1 million.

- *Fut. North Connector Twy*. – Shadow from the existing Air Traffic Control Tower. This shadow has a width of 40 feet and a height of 40.1 feet. However, in order to fully eliminate this shadow, the existing control tower must be lowered by approximately 28.5 feet, or the new control tower height must be increased by approximately 131 feet at an additional cost of $5.4 million. This increase in the tower height will not be a penetration to the existing Runway 24R missed approach surfaces.
- *Fut. Terminal Apron Twy*. – Shadow from the existing Concourse C. This shadow has a width of 103 feet and a height of 4.5 feet. This shadow could be mitigated by changing this taxiway into an apron taxilane that would not be under control of the ATCT. This increase in the tower height will not be a penetration to the existing Runway 24R missed approach surfaces.
- *Taxiway Q* – Shadow from the proposed Airport Rescue and Firefighting (ARFF) Station. This shadow has a width of 210 feet and a height of 10.6 feet. This shadow could be mitigated by changing this taxiway into an apron taxilane that would not be under control of the ATCT, or by relocating the ARFF station to another site on the airport.

3.5.1.4 Site Plot Must Provide for Planned Facilities and Future Expansion – Site 9 is approximately 6.0 acres in size and is bound by Mill Creek (north), South Connector Taxiway (south), Terminal Drive (east), and Cargo Road (west). A preliminary tower layout similar to that being developed at CMH would occupy approximately 3.3 acres. Additional expansion could occur to the south and west if needed.

3.5.1.5 Compliance With FAR Part 77 Surfaces – Site 8 is located within the 150-foot horizontal surface, which has an elevation of 1159 MSL. A proposed tower at this site would have a maximum elevation of 1300 MSL and would penetrate the horizontal surface by 141 feet. This penetration is not expected to be a hazard to air navigation, however, this would need to be confirmed through completion of an FAA aeronautical study.

3.5.1.6 Derogate Performance of Existing or Planned Electronic Facilities – At this time, Site 9 is not anticipated to impact the performance of any existing or planned electronic facilities (VOR, ASR, ILS, RVR, etc.). However, the FAA should conduct a more detailed study of this site for final determination.

3.5.2 Non-Mandatory Siting Criteria

3.5.2.1 Depth Perception – The worst-case scenario for depth perception would be the visibility to the future Runway 18 threshold. At 13,600 feet from the runway threshold, the minimum required height for depth perception would be 139 feet above the runway threshold elevation of 997 MSL. This would require an eye-level elevation of 1136 MSL, which is significantly lower (139 feet) than the required height for visibility of other airport movement areas.

3.5.2.2 Cab Orientation – A northern orientation of the tower cab should not be a problem in relation to the sun angles throughout the year as shown on Figure B-1 in Appendix B.

The existing Aset Corp building is located at the southwest corner of the intersection of Terminal Drive and Boeing Drive. The northern face of this building is sloped at a 39-degree angle with reflective glass panels. The main concern is possible reflection of the sun into the control tower cab. A study was conducted that tracked the suns altitude and azimuth throughout the year, and its' potential to reflect off the Aset building into the proposed tower cab. Based on a tower eye-level elevation of 1275 MSL, the sun must be at an altitude range of 14 to 22 degrees above the horizon and an azimuth range of 1 to 16 degrees in order to cause any reflection problems. The sun is never between an azimuth range of 1 and 16 degrees (north sky) and therefore, no building reflection problems would result at this tower site.

3.5.2.3 Impaired Vision from External Light Sources – The main area of concern for external light sources is the flood lighting associated with the Emery aircraft ramp area. However, due to the height of the new tower, this external light source is not anticipated to be a problem.

3.5.2.4 Visibility of Ground Operations (Aircraft and Vehicles) – Section 3.4.1.3 discusses visibility of the aircraft movement areas. An additional analysis was conducted to determine the shadows generated by the preferred terminal expansion concept (building height 40'). As shown on **Figure 13**, all of the shadows would be confined to the terminal ramp area that would be considered as a "non-movement area". Also, it is anticipated that ground vehicles would be visible at all runway and taxiway crossings.

3.5.2.5 Consideration of Fog and Ground Haze – Fog and ground haze would not be an issue at this tower site.

3.5.2.6 Exterior Noise - This site is located a significant distance from any aircraft operations areas. It is also approximately 350 feet from the main airport entrance roadway. There should be no above normal noise levels that require additional sound proofing of the control tower or TRACON facilities.

3.5.2.7 Site Access Not Crossing Aircraft Operations Areas – Public access to the site would not require crossing of any aircraft operations areas.

3.5.2.8 Consideration of Future Airport Expansion – This study has considered the new parking garage, rental car relocation site, Emery cargo expansion, and the proposed terminal/gate expansion plans. The expansion and location of these facilities should have no impact on this tower site.

3.5.2.9 Site Free of Jet Exhaust Fumes –This tower site is located a considerable distance from any aircraft operations area and should not experience unacceptable levels of jet exhaust fumes.

3.5.3 DOT/FAA Order 1600.69, "FAA Facility Security Management Program"

A copy of this order was not available from the FAA due to the high level of security after the 9/11 terrorist attacks. According to the FAA Great Lakes Region, the two main security requirements that should be adhered to are the 300-foot setback from all public roads and the 100-foot separation between the tower and auto parking area. The tower and TRACON building at this site would have a setback distance of 350 feet from the main airport access road to the south. All interior parking areas would have the required setback distance of 100 feet to the tower and TRACON.

3.5.4 Environmental

This environmental analysis does not represent a comprehensive and detailed review of potential environmental impacts. The purpose of this analysis is to determine what key environmental factors should be considered for this proposed tower site. No wetlands are known to exist on this site, however, since drainage ditches and other hydraulic features exist in the proximity, a wetland survey and coordination with the U.S. Army Corps of Engineers would need to occur. Similarly, no threatened or endangered species, or their critical habitat, are known to exist on this site, however, a formal survey and agency coordination would be necessary. Any unpaved or undeveloped land areas would need to be surveyed to document disturbance or the absence of historical, archeological, or cultural resources. Coordination with the State Historic Preservation Officer (SHPO) would be necessary.

Based on information received from the Dayton Airport and review of aerial photography, the following information is presented for Site 9:

- This site is currently unpaved and undeveloped. Aerial photography shows that this site has been farmed in the past.
- This site is near stormwater drainage channels and should not directly impact the waterways. Construction techniques would need to be monitored to avoid any impacts.
- This site is currently undeveloped and pervious. Development of this site would increase the amount of impervious surfaces, thereby increasing stormwater runoff.

3.5.5 Miscellaneous Considerations

3.5.5.1 Landside Access – Access to this site would be from Cargo Road off the main Terminal Drive. Parking areas would be adjacent to the tower and TRACON building.

3.5.5.2 Utilities – All utilities required for development of this site are available along Cargo Road and are currently located within close proximity of this site area.

3.5.5.3 Field Cabling – Installation of new duct bank and fiber optic control cabling would be required between the new ATCT/TRACON facility and two existing electrical vaults.

SECTION 4: SITE SUMMARIES AND RECOMMENDED SITE

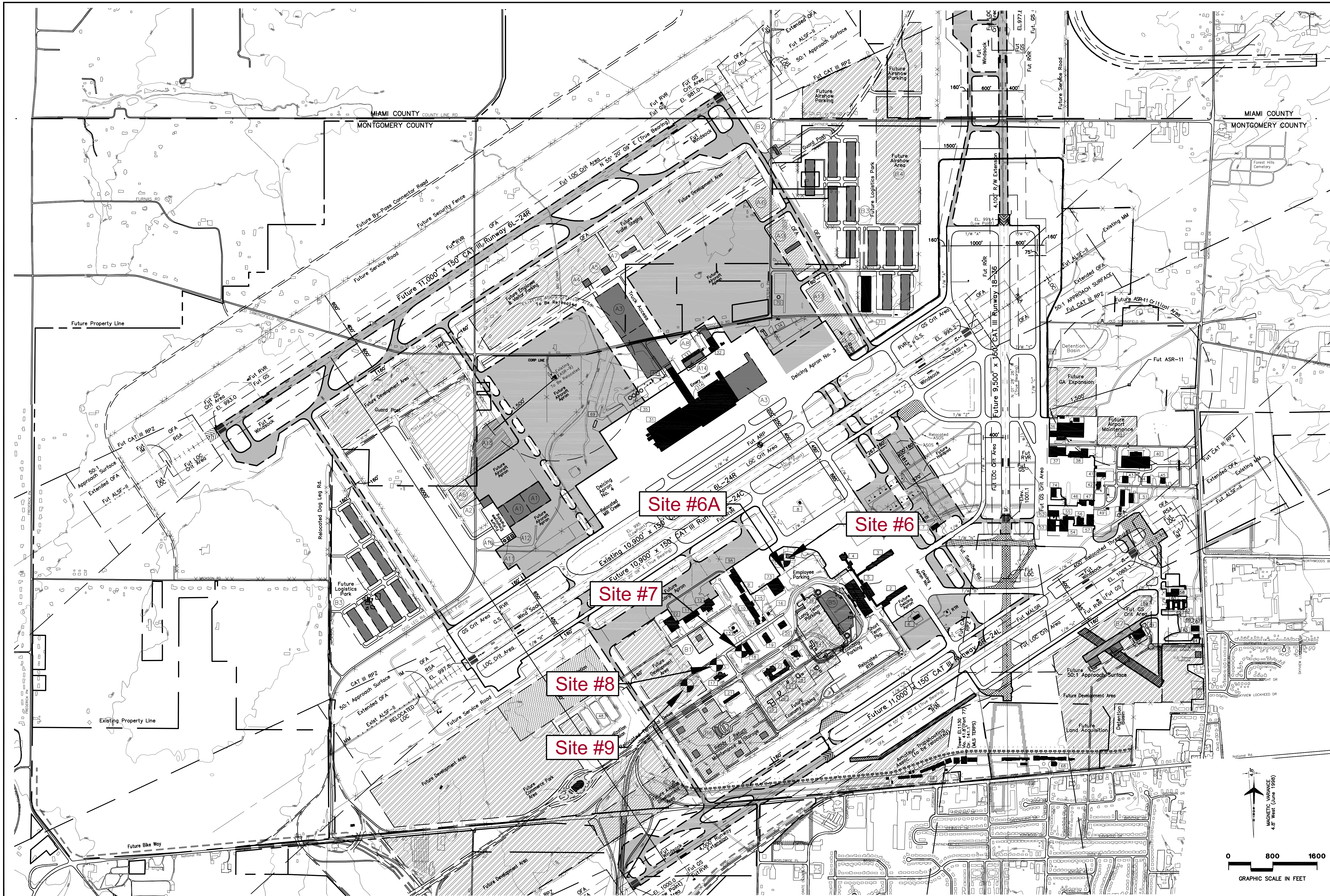
A summary matrix of the evaluation criteria for the proposed tower sites is presented in **Table 2**. Based upon the results of the analysis and evaluation of each site as detailed in this report, Site 6A is recommended as the preferred site for the new Air Traffic Control Tower and TRACON Base Building at Dayton International Airport.

Site 6A is centrally located between the main parallel runways and provides a good view of both airborne traffic as well as movement areas on the ground. Based on the AFTIL line-of-sight analysis, there should be no visibility impacts on existing movement areas and there should also be a clear view of all terminal aircraft parking positions. Site 6A requires the lowest tower elevation of 1280 (283') and eye-level elevation of 1255 (258'). **Appendix D** shows a signed agreement between all parties that Site 6A should be the location of the new control tower at Dayton International Airport.

This site is located on land that is currently occupied by an employee parking lot and Jet A fueling facility. In addition, various utilities traverse this sites; such as 12" high-pressure gas line, 8" fuel line, storm line, and electric line which will require relocation. Various minor negative attributes of Site 6A are the potential for relocation of the Jet A fueling facility and clean-up of contaminated soil. Additional environmental study will be necessary to determine the full impact of the Jet A facility on this site.

Appendix E presents the findings of the TERPS study for Site 6A. Periodically Dayton does experience periods of low visibility due to fog, rain or snow. It is therefore recommended that Airport Surface Detection Equipment (ASDE) be installed in the new tower to enhance the monitoring of aircraft and vehicle ground movements.

Site 7 is not preferred due to the need to shorten the Runway 6R extension from 4,400 feet to 3,600 feet. Site 8 is not preferred due to the increased tower height and need to relocate an existing office complex. Also Site 9 is not preferred due to the increased tower height and cost to provide a clear line-of-sight to the airfield operations areas.



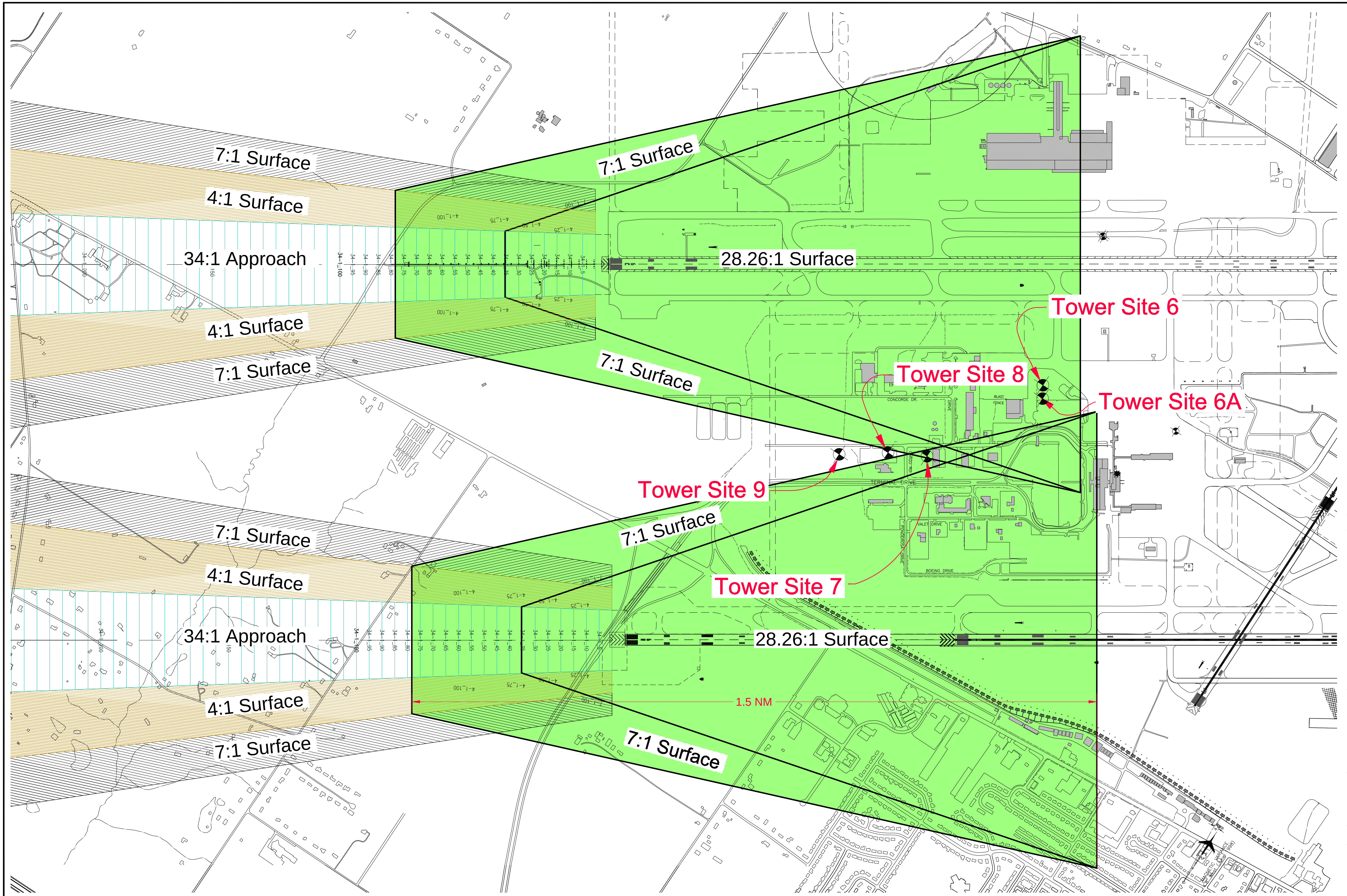
FileName: W:\day\Tower_Sites\Proposed_sites.dwg Date: 04/16/02 © 15:57:27 Tab: 11x17

FIGURE 1

Air Traffic Control Tower Sighting Study
Proposed Relocated ATCT Sites

Landrum&Brown

Tower Sighting Study



FileName: W:\day\Tower_Sites\Missed_Approaches\Missed_Appr_6_Ends.dwg Date: 04/02/02 @ 10:22:07 Tab: Layout1

FIGURE 2

Tower Sighting Study
Missed Approach Surfaces - R/W 6 Ends

Landrum&Brown

Tower Sighting Study

DAYTON INTERNATIONAL AIRPORT

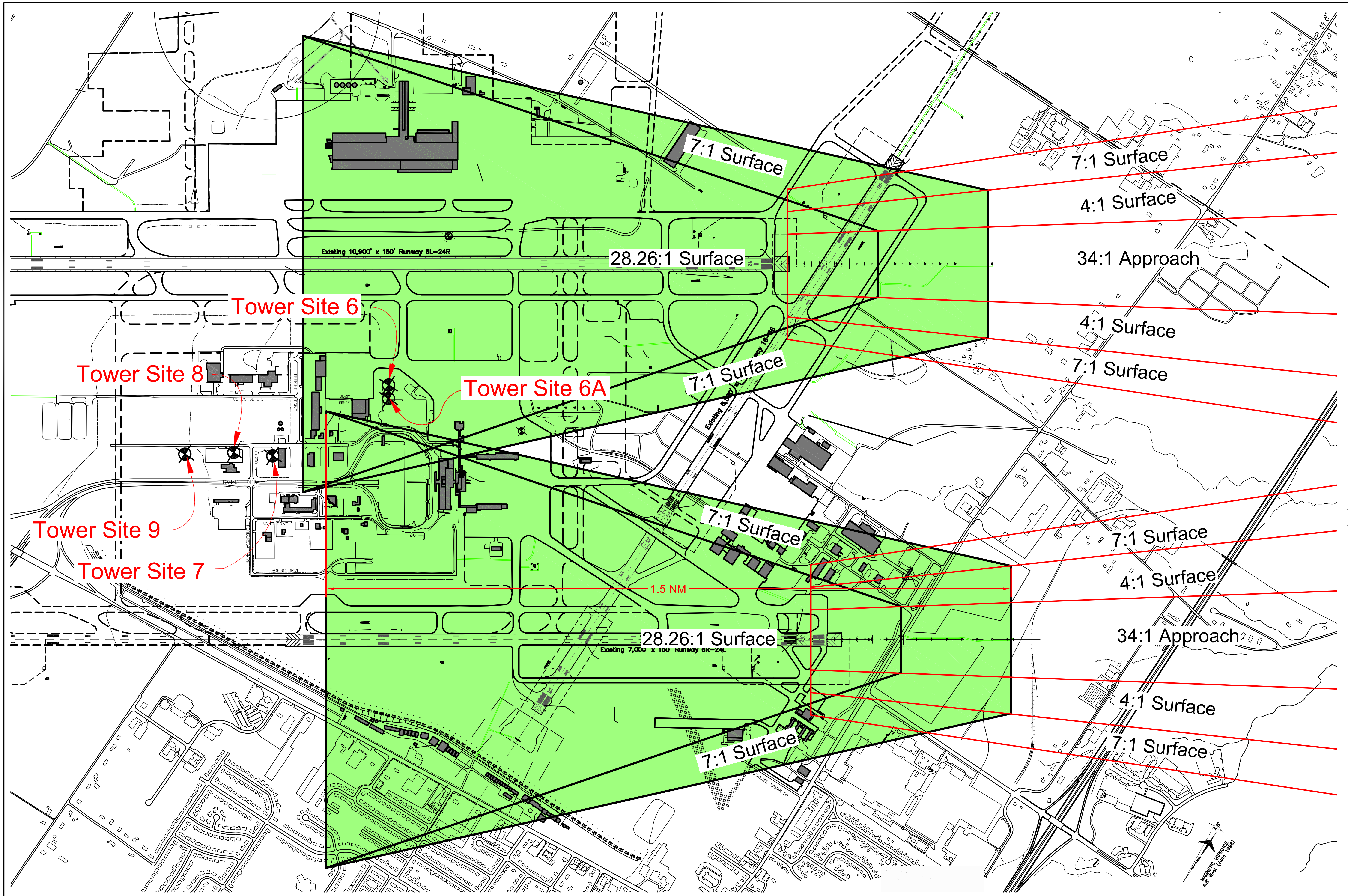
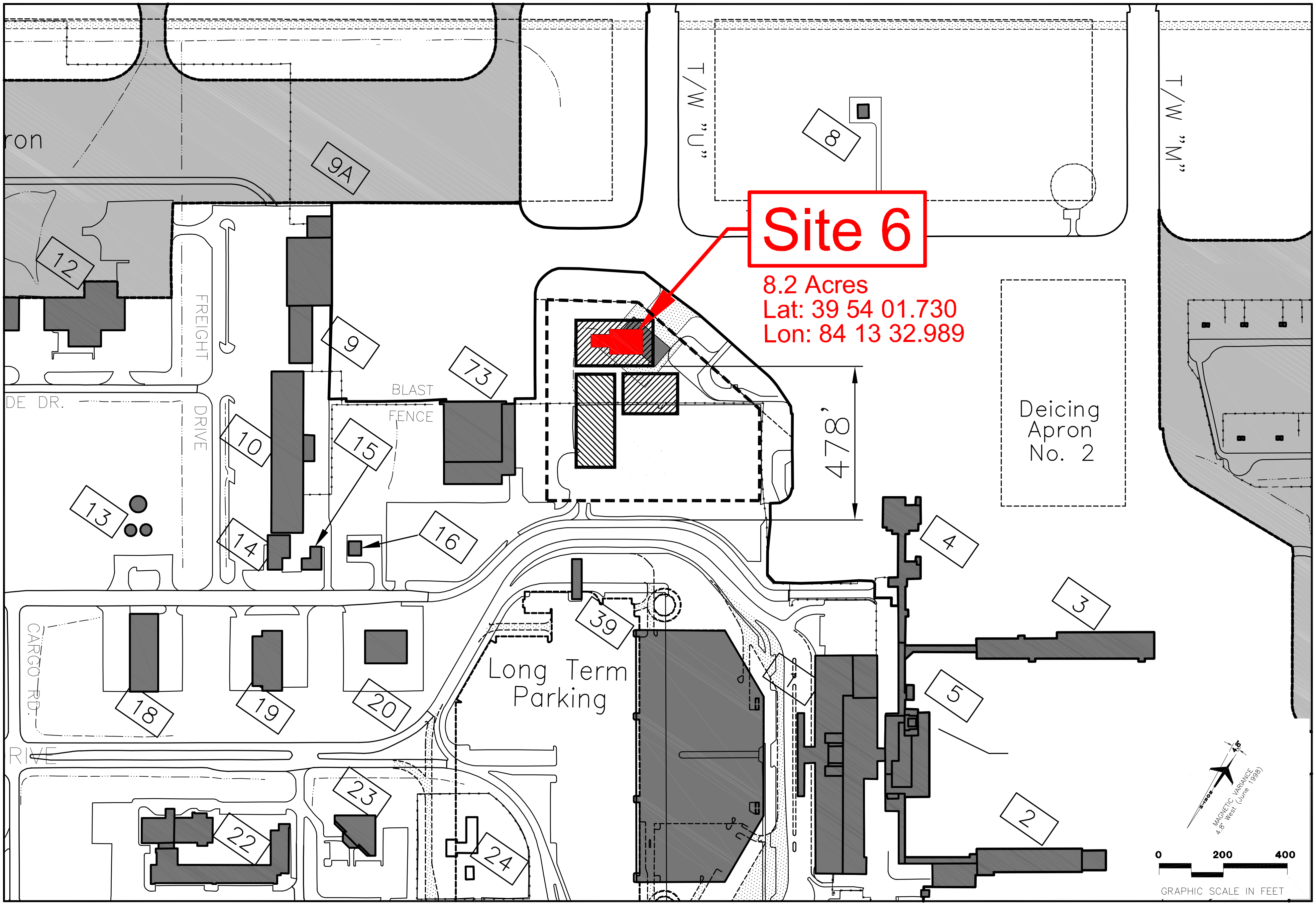


FIGURE 3

Tower Sighting Study
Missed Approach Surfaces - R/W 24 Ends

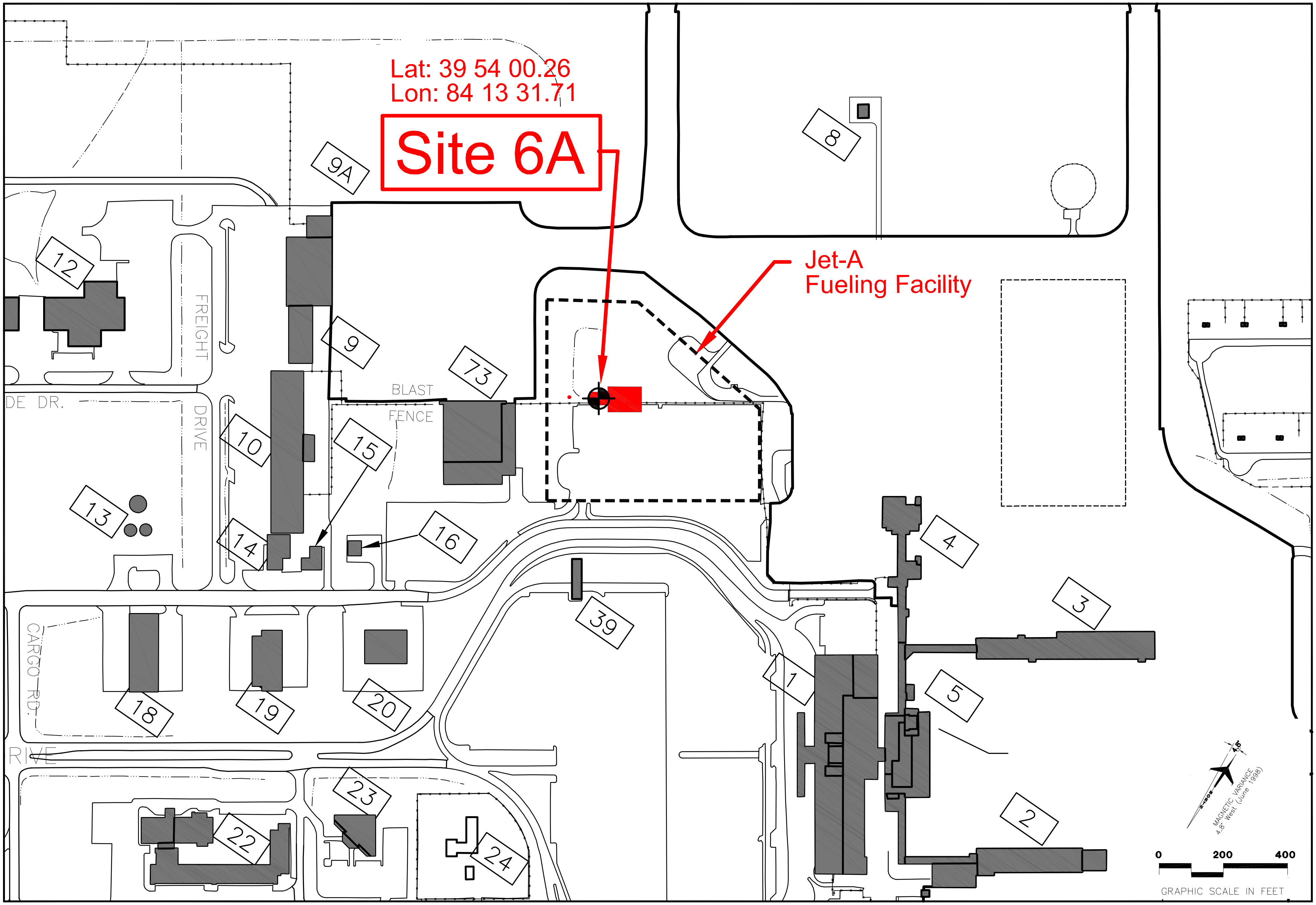
Tower Sighting Study

FileName: W:\day\Tower_Sites\Missed_Approaches\Missed_Appr_24_Ends.dwg Date: 04/02/02 @ 10:23:53 Tab: Layout1



Tower Sighting Study	Landrum&Brown	Air Traffic Control Tower Sighting Study Proposed Site 6 Area	FIGURE 4

FileName: W:\day\Tower_Sites\Tower Locations6.dwg Date: 04/02/02 @ 09:56:23 Tab: Site 6



Tower Sighting Study	Landrum&Brown	Air Traffic Control Tower Sighting Study Proposed Site 6A	FIGURE 4A

FileName: W:\day\Tower_Sites\Tower Locations6A.dwg Date: 07/22/02 @ 16:39:30 Tab: Site 6A

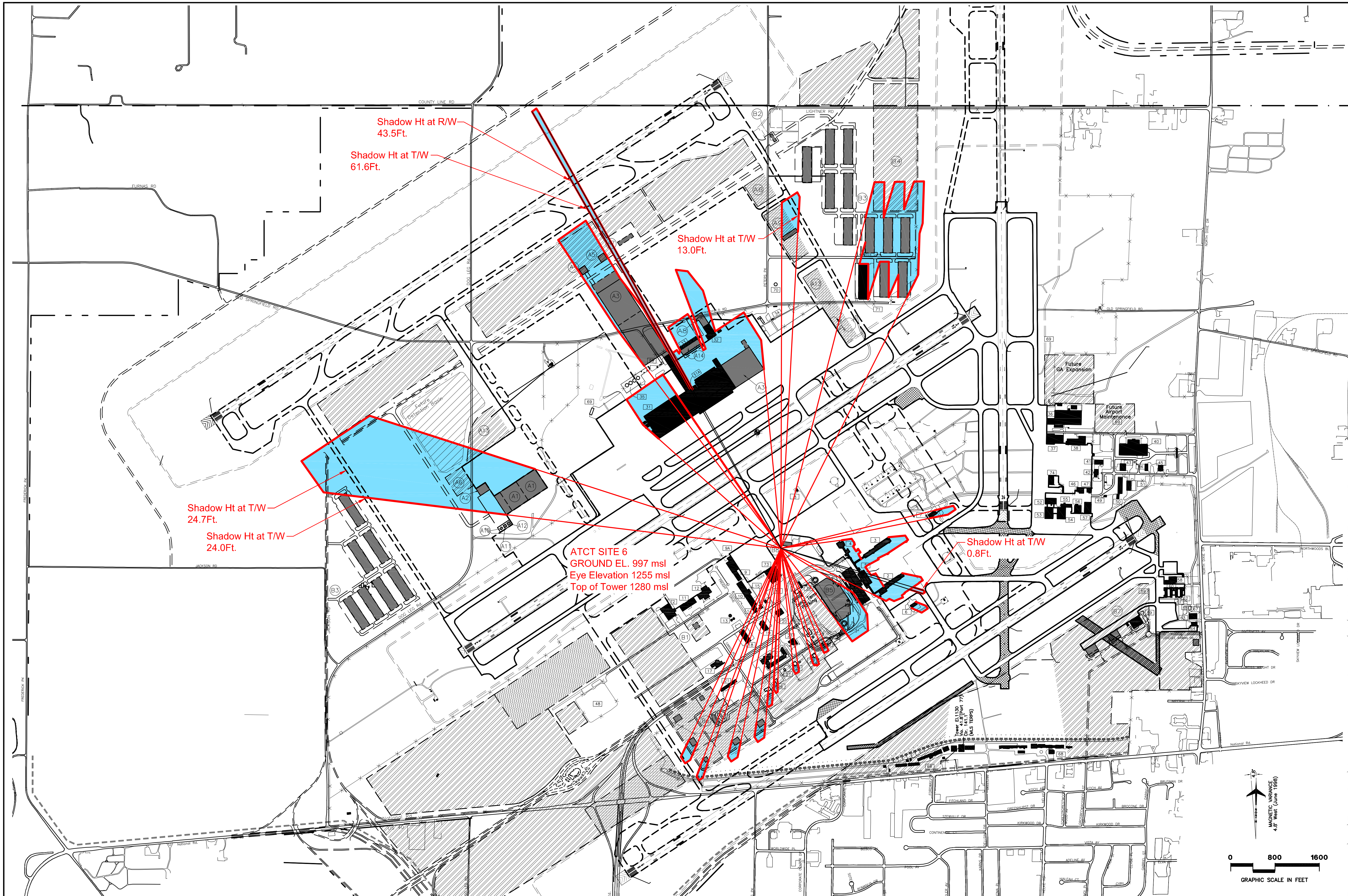
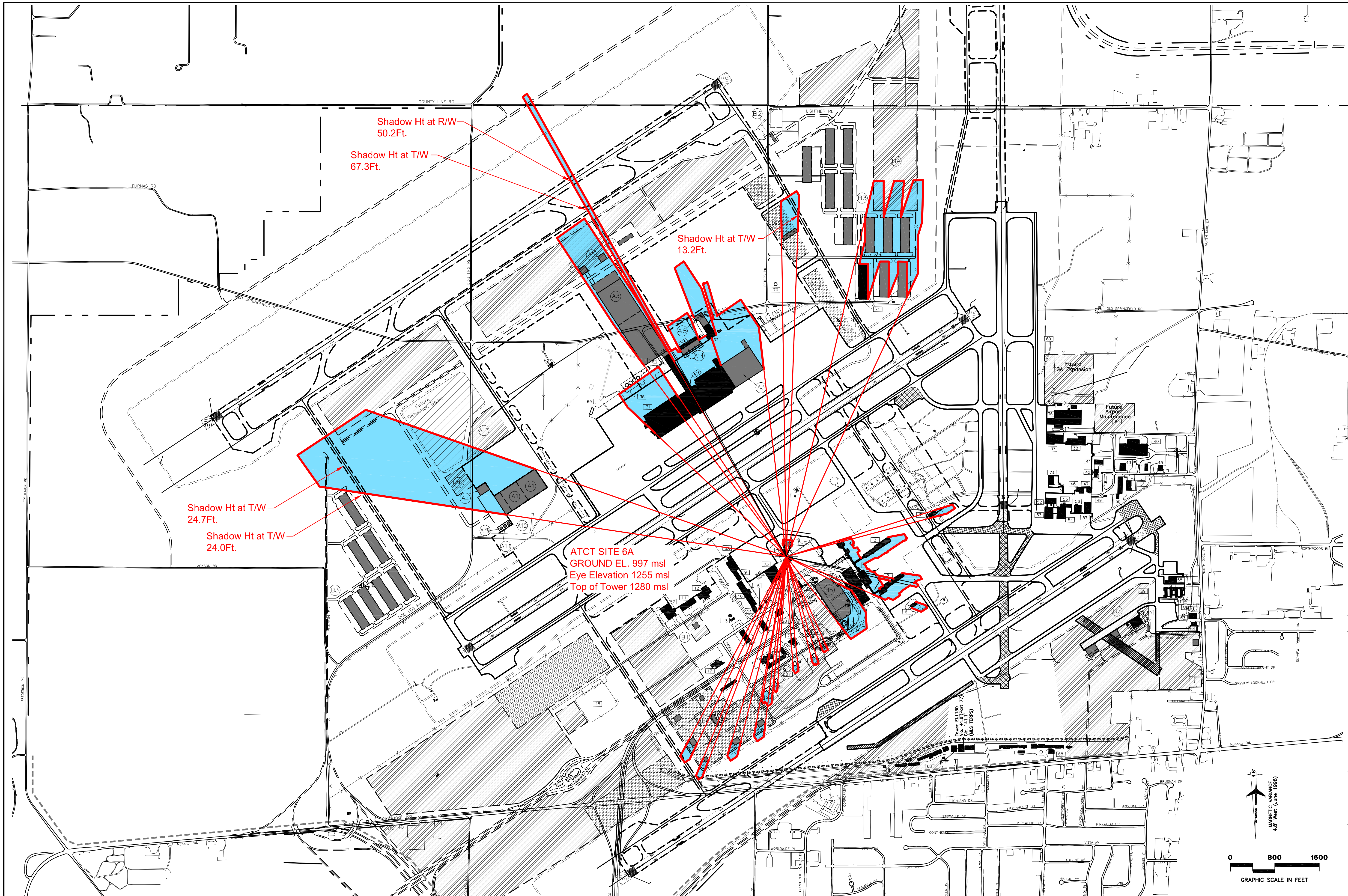


FIGURE 5

Tower Sighting Study Site 6
Shadow Study Analysis

Landrum&Brown

Tower Sighting Study



FileName: W:\day\Tower_Sites\Site-6A_Shadow.dwg Date: 06/18/02 @ 16:30:48 Tab: 11x17

FIGURE 5A

Tower Sighting Study Site 6A
Shadow Study Analysis

Landrum&Brown

Tower Sighting Study

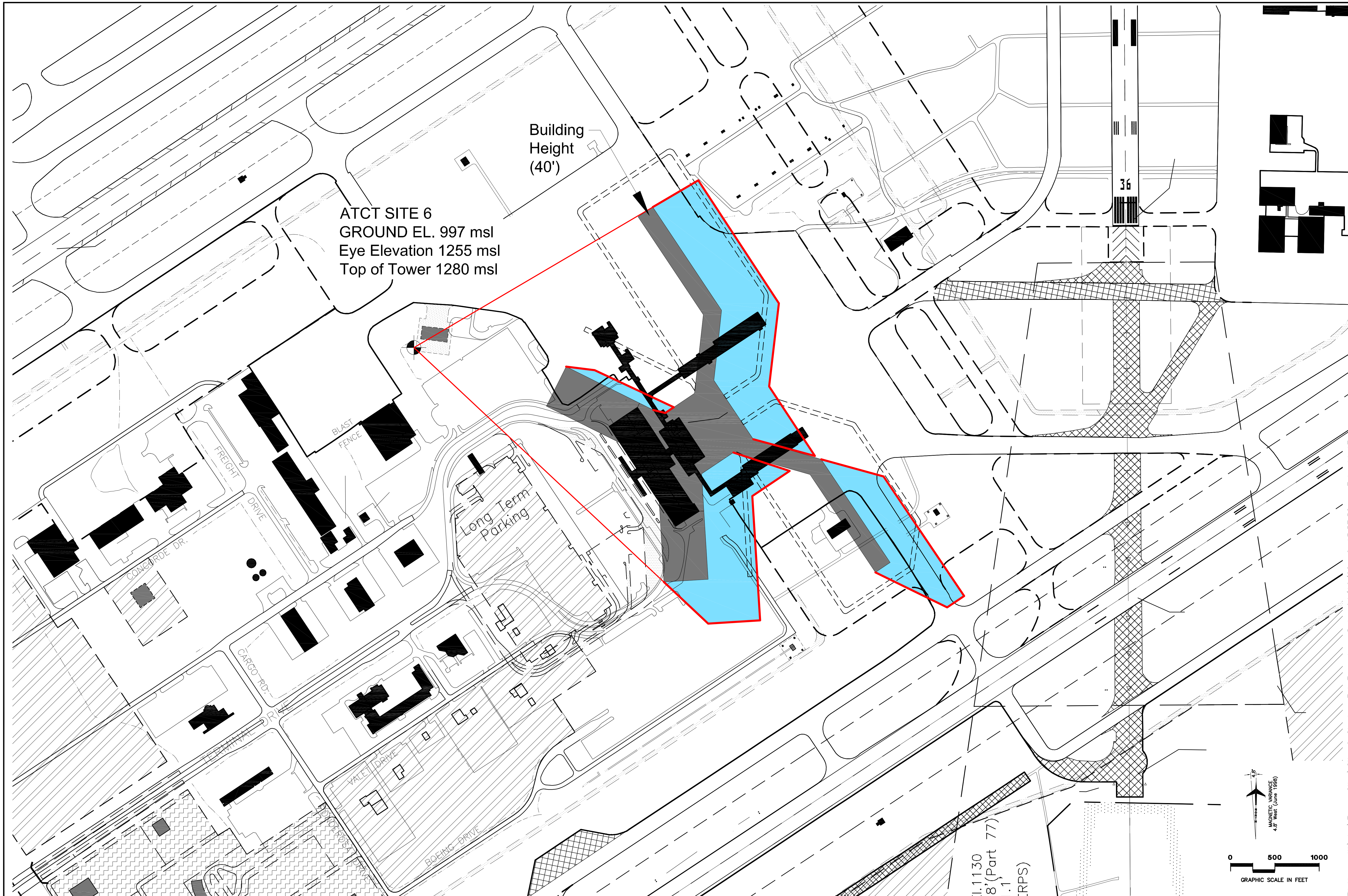
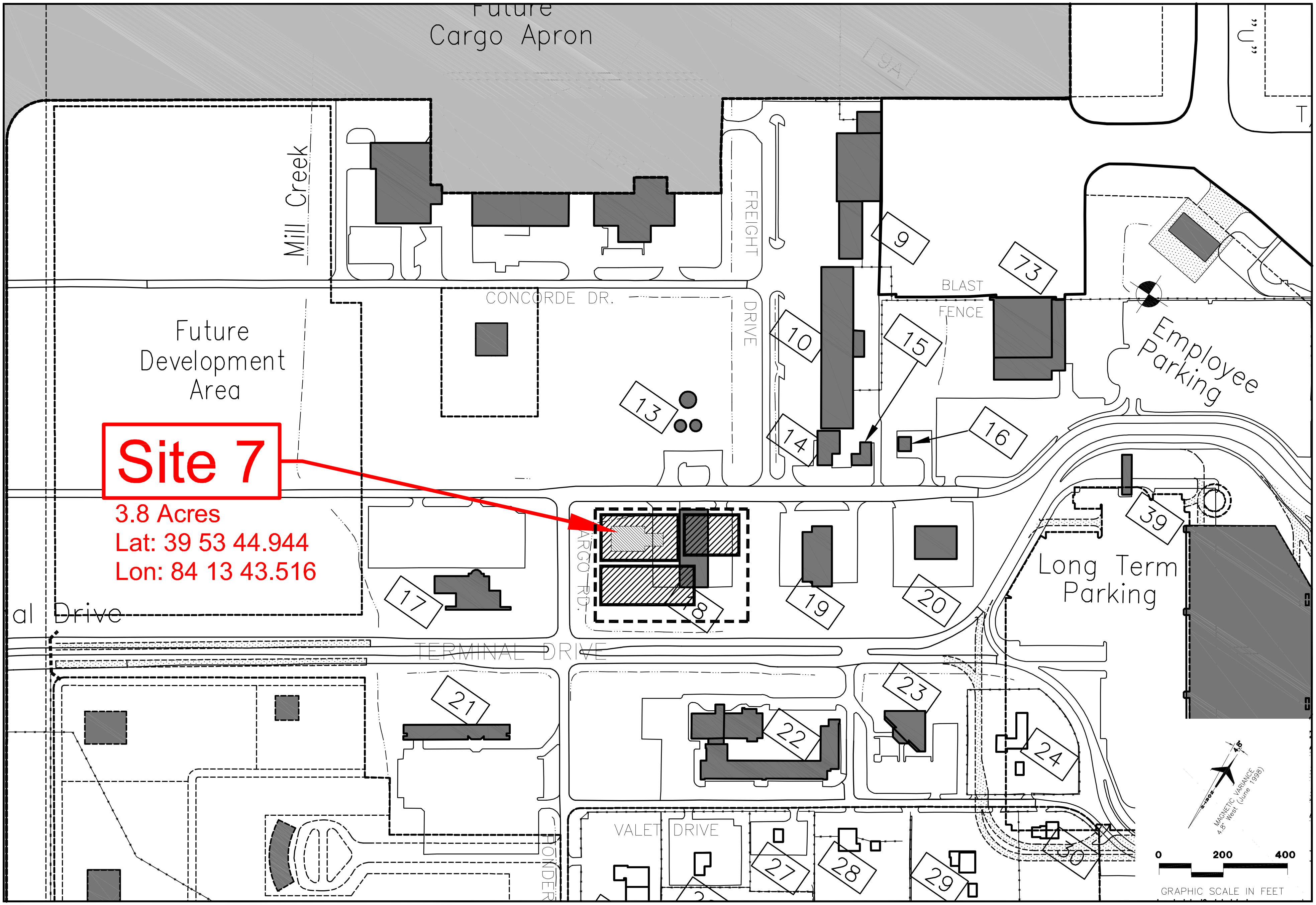


FIGURE 6

Shadow Study Site 6
Using Ultimate Terminal Layout

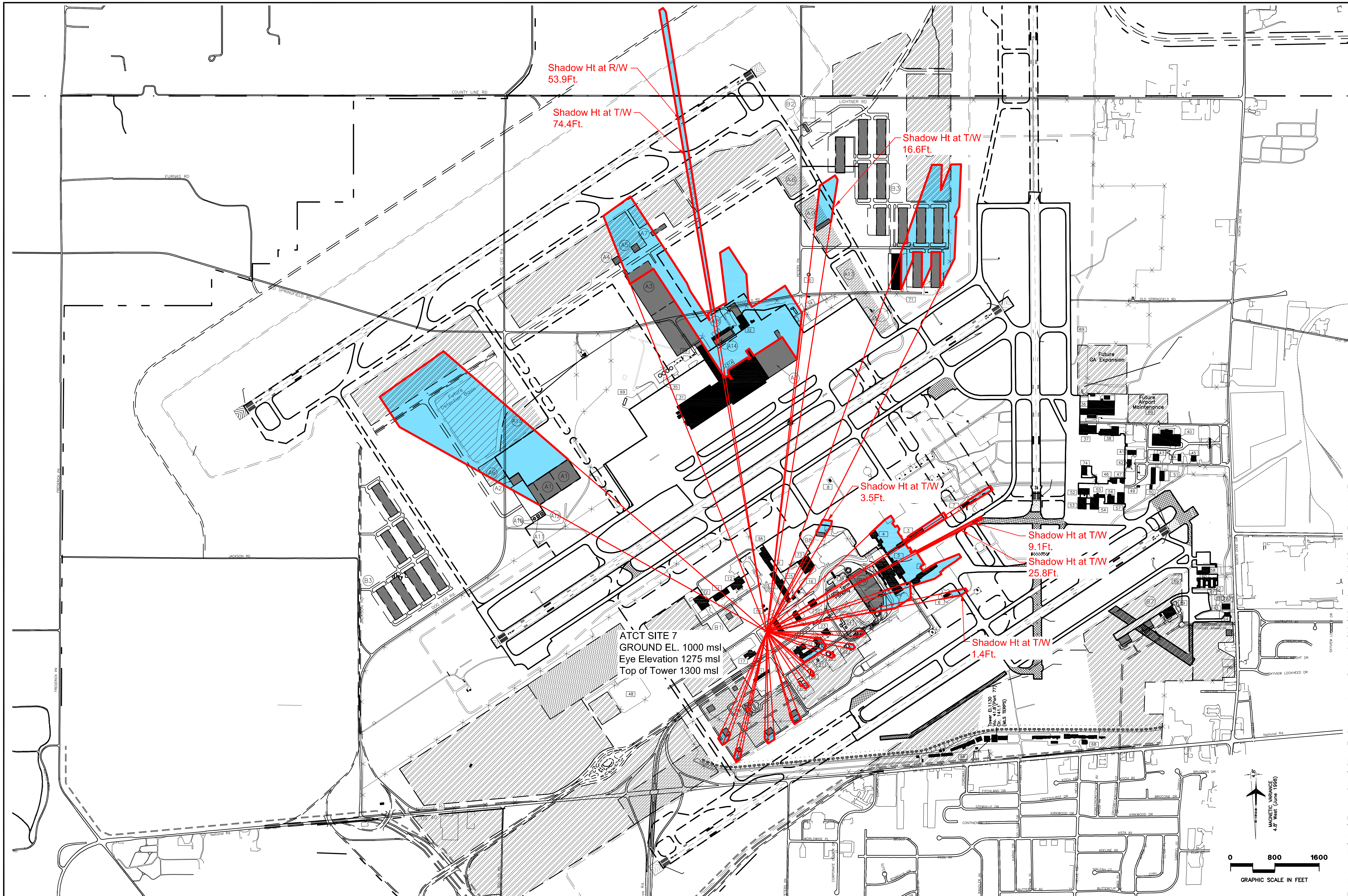
LandrumBrown

Tower Sighting Study



Tower Sighting Study	Landrum&Brown	Air Traffic Control Tower Sighting Study Proposed Site 7 Area	FIGURE 7

FileName: W:\day\Tower_Sites\Tower Locations7.dwg Date: 04/02/02 @ 09:59:03 Tab: Site 7



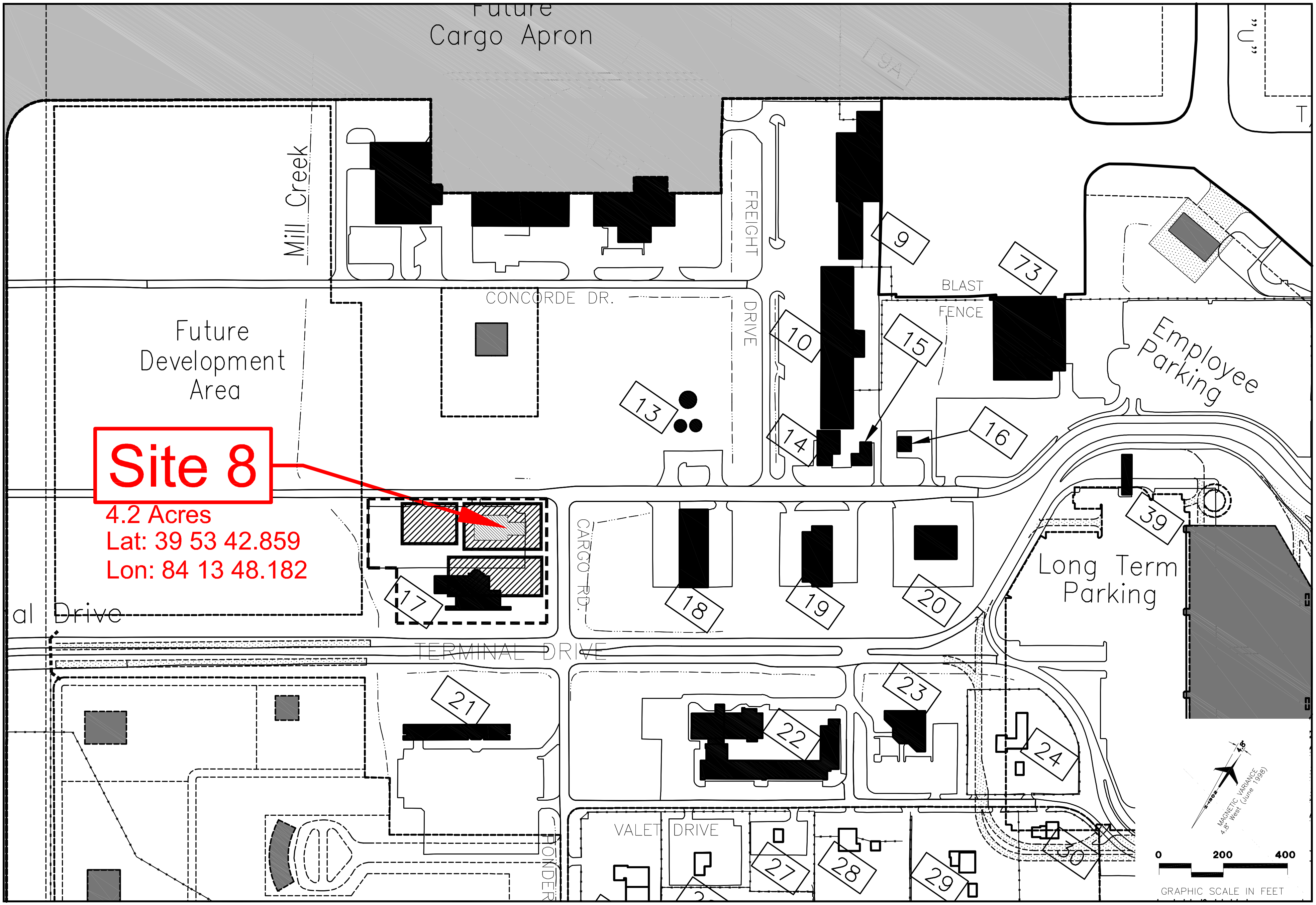
FileName: W:\day\Tower_Sites\Site-7_Shadow.dwg Date: 04/02/02 @ 14:08:25 Tab: 11x17

FIGURE 8

Tower Sighting Study Site 7
Shadow Study Analysis

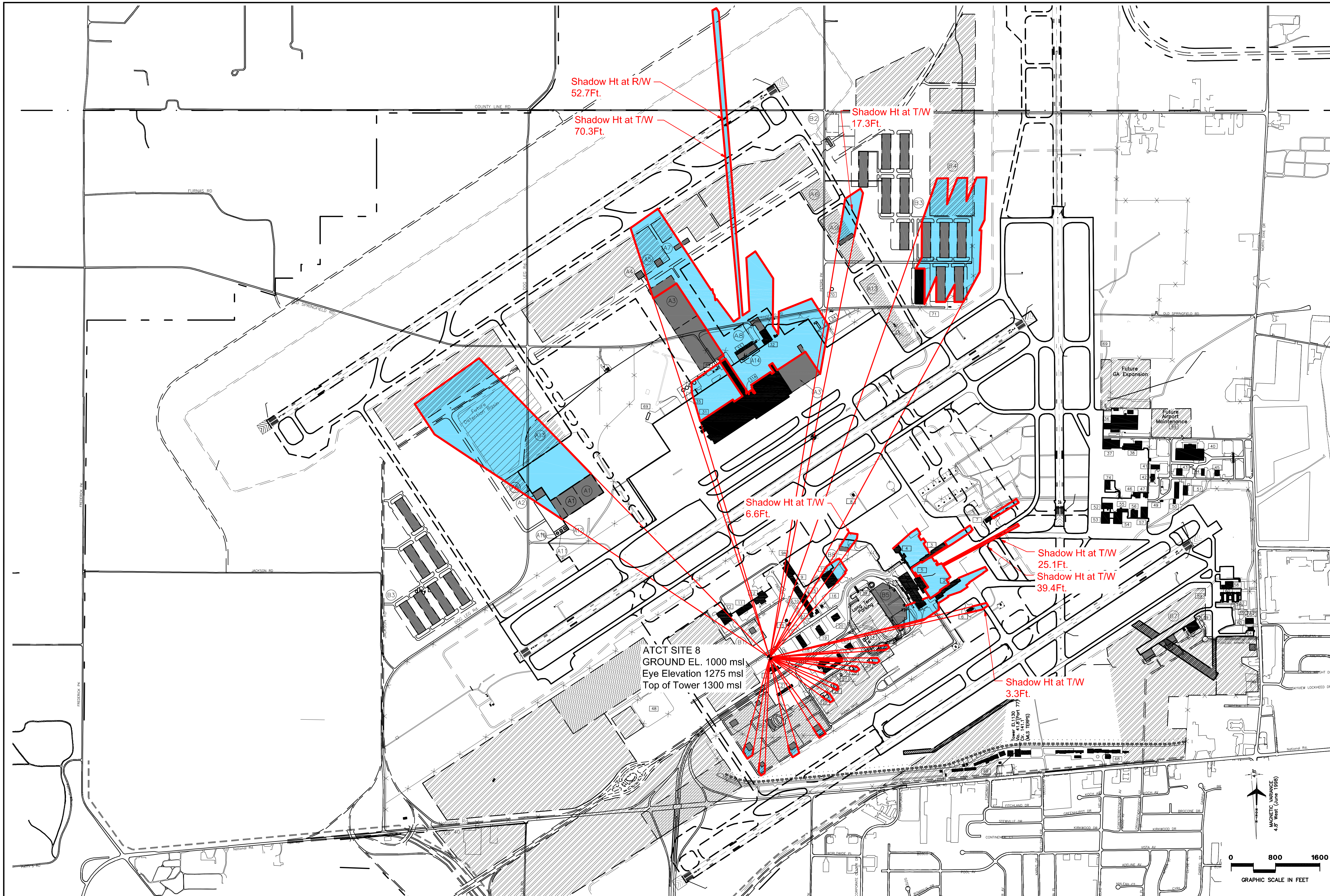
Landrum & Brown

Tower Sighting Study



Tower Sighting Study	Landrum&Brown	Air Traffic Control Tower Sighting Study Proposed Site 8 Area	FIGURE 9

FileName: W:\day\Tower_Sites\Tower Locations8.dwg Date: 03/27/02 @ 13:17:17 Tab: Site 8



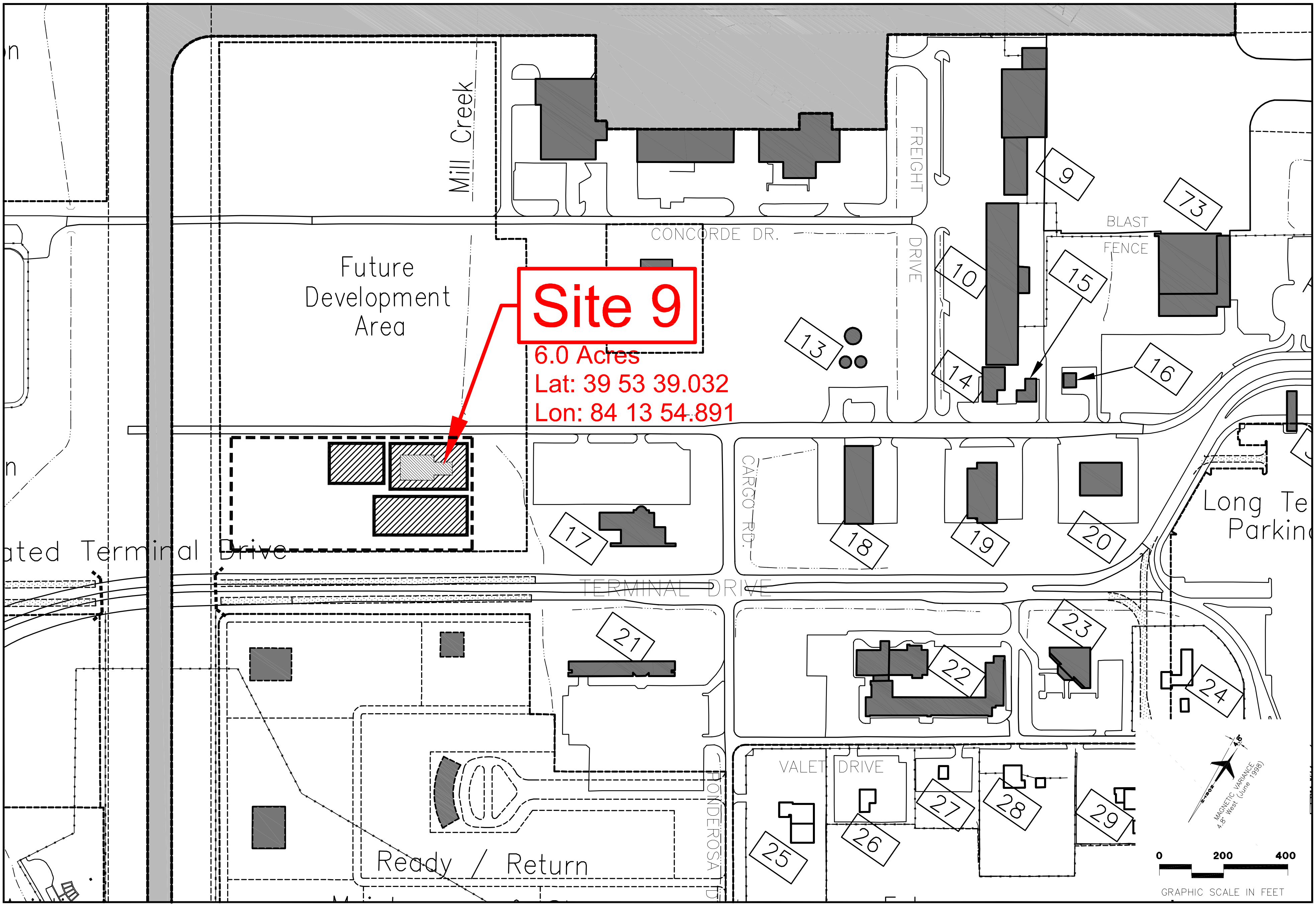
FileName: W:\day\Tower_Sites\Site-8_Shadow.dwg Date: 04/02/02 @ 13:03:14 Tab: 11x17

FIGURE 10

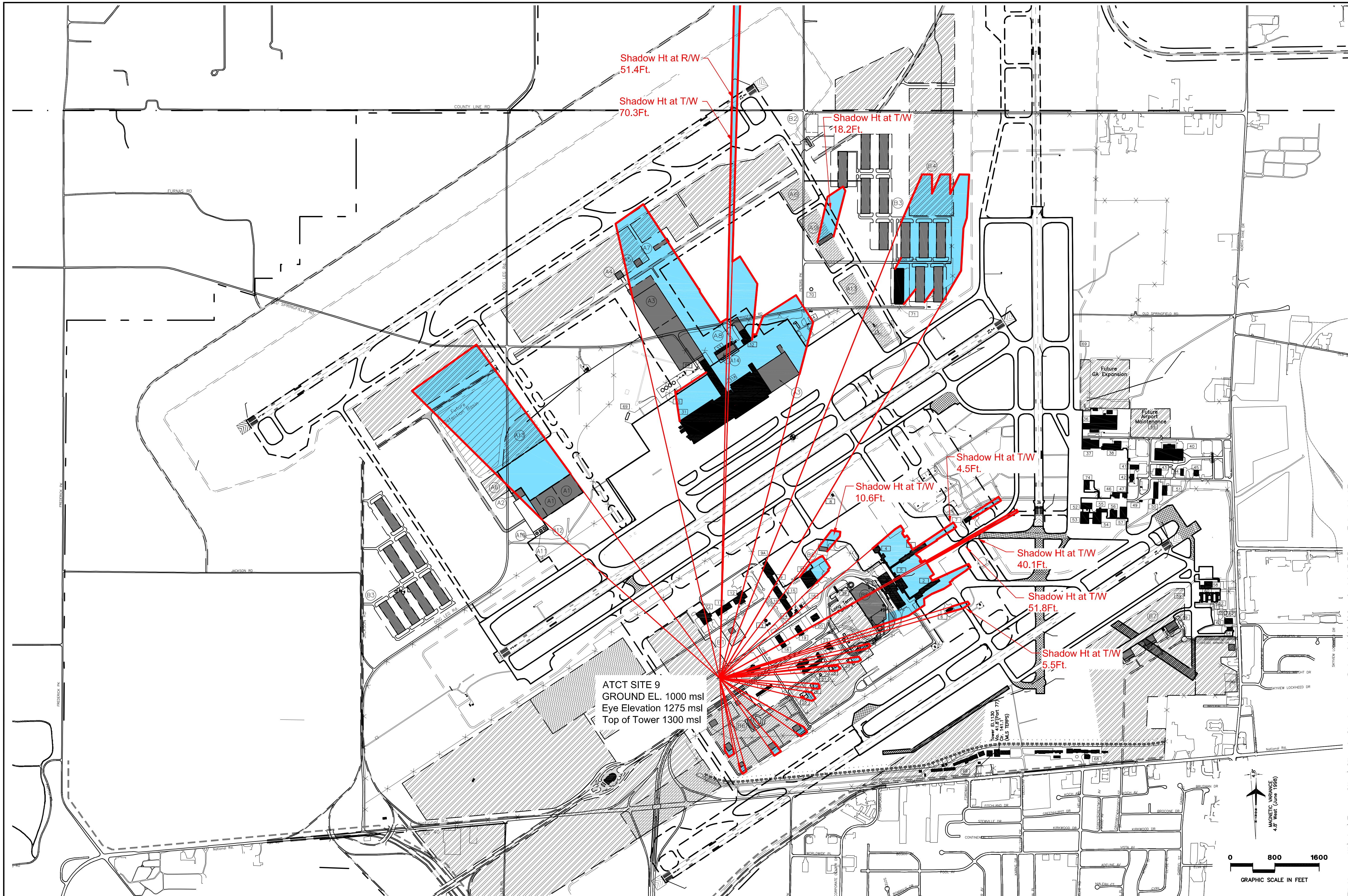
Tower Sighting Study Site 8
Shadow Study Analysis

Landrum&Brown

Tower Sighting Study



Tower Sighting Study	Landrum&Brown	Air Traffic Control Tower Sighting Study Proposed Site 9 Area	FIGURE 11



FileName: W:\day\Tower_Sites\Site-9_Shadow.dwg Date: 04/02/02 @ 14:13:35 Tab: 11x17

FIGURE 12

Tower Sighting Study Site 9
Shadow Study Analysis

LandrumBrown

Tower Sighting Study

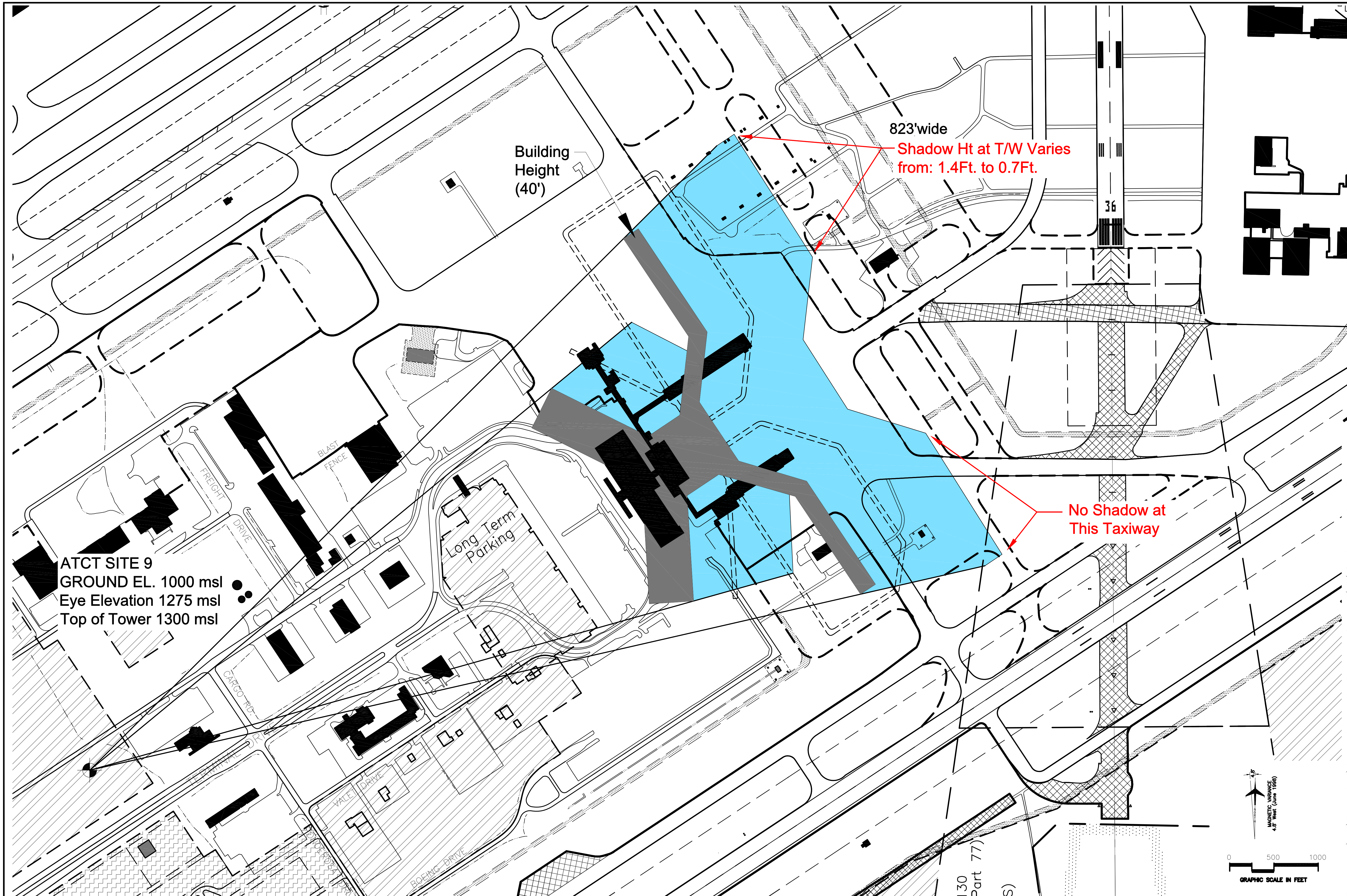


FIGURE 13

Shadow Study Site 9
Using Ultimate Terminal Layout

Landrum&Brown

Tower Sighting Study

DAYTON INTERNATIONAL AIRPORT

Table 2

Dayton International Airport
Proposed ATCT Siting Study

ATCT Siting Evaluation Critieria Matrix
Final Report

Evaluation Criteria	ATCT Site #6	ATCT Site #6A	ATCT Site #7	ATCT Site #8	ATCT Site #9
Assumptions					
ATCT Coordinates	Latitude 39^{o} 54' 01.73" Longitude 84^{o} 13' 32.98"	Latitude 39^{o} 54' 00.26" Longitude 84^{o} 13' 31.71"	Latitude 39^{o} 53' 44.94" Longitude 84^{o} 13' 43.51"	Latitude 39^{o} 53' 42.86" Longitude 84^{o} 13' 48.18"	Latitude 39^{o} 53' 39.03" Longitude 84^{o} 13' 54.89"
Proposed Max. ATCT Eye-Level Elevation and Height	1255 (258')	1255 (258')	1275 (275')	1275 (275')	1275 (275')
Proposed Max. ATCT Elevation and Height	1280 (283')	1280 (283')	1300 (300')	1300 (300')	1300 (300')
Ground Elevation (MSL)	997	997	1000	1000	1000
Shadows at max. eye-level height Facility (impacted from)	Taxiway 'D' (existing control tower) South 6-24 Cross-Field Twy. (future Emery aircraft maintenance hangars) Fut. 6-24 Parallel Twy. (existing Emery ramp tower) Fut. 3rd Parallel Rwy. (existing Emery ramp tower) North 6-24 Cross-Field Twy. (future Emery container repair station)	South 6-24 Cross-Field Twy. (future Emery aircraft maintenance hangars) Fut. 6-24 Parallel Twy. (existing Emery ramp tower) Fut. 3rd Parallel Rwy. (existing Emery ramp tower) North 6-24 Cross-Field Twy. (future Emery container repair station)	Taxiway 'D' (existing Wright Bros. ground vehicle maintenance building) Fut. 6-24 Parallel Twy. (existing Emery ramp tower) Fut. 3rd Parallel Twy. (existing Emery ramp tower) North 6-24 Cross-Field Twy. (future Emery container repair station) Fut. Terminal Apron Twy. (existing control tower) Fut. North Connector Twy. (existing control tower) Taxiway 'Q' (future airport rescue and firefighting station)	Taxiway 'D' (existing Wright Bros. ground vehicle maintenance building) Fut. 6-24 Parallel Twy. (existing Emery ramp tower) Fut. 3rd Parall Rwy. (existing Emery ramp tower) North 6-24 Cross-Field Twy. (future Emery container repair station) Fut. Terminal Apron Twy. (existing control tower) Fut. North Connector Twy. (existing control tower) Taxiway 'Q' (future airport rescue and firefigting station)	Taxiway 'D' (existing Wright Bros. ground vehicle maintenance building) Taxiway 'A' (existing control tower) Fut. 6-24 Parallel Twy. (existing Emery ramp tower) Fut. 3rd Parall Rwy. (existing Emery ramp tower) North 6-24 Cross-Field Twy. (future Emery container repair station) Fut. Terminal Apron Twy. (existing control tower) Fut. North Connector Twy. (existing control tower) Fut. Terminal Apron Twy. (existing Concourse C) Taxiway 'Q' (future airport rescue and firefigting station)
FAA Mandatory Siting Criteria					
Max. visibility of all airborne traffic patterns	Yes	Yes	Yes	Yes	Yes
Clear unobstructed and direct view of the approaches to runway ends and landing areas	Yes	Yes	Yes	Yes	Yes
Complete visibility to all existing and proposed "movement areas", runways, taxiways, aprons, etc	See shadow list above	See shadow list above	See shadow list above	See shadow list above	See shadow list above
Site size is sufficient to accommodate all planned facilities and any future expansion	Yes (8.2 acres)	Yes (8.2 acres)	Yes (3.8 acres)	Yes (4.2 acres)	Yes (6.0 acres)
Compliance with FAR Part 77 surfaces	No (121' violation of Horizontal Surface elev. 1159' MSL)	No (121' violation of Horizontal Surface elev. 1159' MSL)	No (141' violation of Horizontal Surface elev. 1159' MSL)	No (141' violation of Horizontal Surface elev. 1159' MSL)	No (141' violation of Horizontal Surface elev. 1159' MSL)
Site does not derogate the performance of existing or planned electronic facilities (ILS, TVOR, ASR, RVR, etc.)	Additional FAA study needed on ASR facility	Additional FAA study needed on ASR facility	Additional FAA study needed on ASR facility	Additional FAA study needed on ASR facility	Additional FAA study needed on ASR facility
FAA Non-Mandatory Siting Criteria					
Provides depth perception of all surface areas with a line-of-sight vertical angle greater than 35-minutes	Yes	Yes	Yes	Yes	Yes
Cab orientation to the north and avoid positions that place a view of a runway approach in line with the rising or setting sun	Minimal impact from sun glare	Minimal impact from sun glare	Reflective glair from Aset bldg.	Minimal impact from sun glare	Minimal impact from sun glare
Visibility should not be impared by direct or indirect external light sources	No impacts anticipated	No impacts anticipated	No impacts anticipated	No impacts anticipated	No impacts anticipated
Visibility should be available for all ground operations of aircraft and service vehicles	Yes	Yes	Yes	Yes	Yes
Consideration to local weather phenomena (fog, ground haze, etc.)	No impacts	No impacts	No impacts	No impacts	No impacts
Exterior noise should be kept to a minimum	Possible noise from terminal ramp area	Possible noise from terminal ramp area	No impacts	No impacts	No impacts
Site access should avoid crossing aircraft operations areas	No crossings	No crosings	No crossings	No crossings	No crossings
Consider planned airport expansion plans	Yes	Yes	Yes	Yes	Yes
Tower site should be free of jet exhaust fumes, smoke and dust	No impacts	No impacts	No impacts	No impacts	No impacts
Order 1600.69A, Facility Security Management					
Interior setback of 100 feet from building to auto parking areas	Meets setback requirements	Meets setback requirments	Meets setback requirements	Meets setback requirements	Meets setback requirements
Exterior setback of 300 feet from building to nearest public access road	Meets setback requirements	Meets setback requirments	150' from Cargo Road	150' from Cargo Road	Meets setback requirements
Environmental Considerations					
Physical contamination	Potential for aircraft fuel contamination	Potential for aircraft fuel contamination	No impacts	No impacts	No impacts
Protected plant and animal species	No impacts	No impact	No impacts	No impacts	No impacts
Miscellaneous Considerations					
Landside access	Yes	Yes	Yes	Yes	Yes
Utility availability	Yes	Yes	Yes	Yes	Yes
Access to existing field cabling	New duct bank and cabling required	New duct bank and cabling required	New duct bank and cabling required	New duct bank and cabling required	New duct bank and cabling required
Construction costs	$23,034,144	$23,034,144	$28,054,304	$32,542,384	$30,261,024

Table 2

Dayton International Airport
Proposed ATCT Siting Study

ATCT Siting Evaluation Critieria Matrix
Final Report

Evaluation Criteria	ATCT Site #6	ATCT Site #6A	ATCT Site #7	ATCT Site #8	ATCT Site #9
Major Advantages	Lowest tower eye-level elevation of 1255 MSL (258 ft. AGL)	Lowest tower eye-level elevation of 1255 MSL (258 ft. AGL)	Minimal shadow impacts on terminal area	No impact to fut. terminal and gate expansion	Open undeveloped site
	Lowest tower cost	Lowest tower cost	No impact to fut. terminal and gate expansion	Existing site utilities	Minimal environmental review
	Large development area (8.2 acres)	Large development area (8.2 acres)	Lower exist. tower 7.5 ft. to eliminate shadow on fut. north connector twy.	Good landside access	Adequate development and expansion area
	No shadow impacts in terminal area	No shadow impacts in terminal area	Lower exist. tower 19 ft. to eliminate shadow at terminal apron	Large development area (4.2 acres)	Meets setback requirements
	No impact to fut. terminal and gate expansion	No impact to fut. terminal and gate expansion	Existing site utilities		Lowest development cost site
	Meets security set-back distances	Meets security set-back distances			No impact to fut. terminal and gate expansion
Major Disadvantages	Relocate future South 6-24 Cross-Field Twy. (fut. maintenance hangars)	Relocate future South 6-24 Cross-Field Twy. (fut. maintenance hangars)	Requires shorter Rwy. 6R extension (3,600 ft. vs. 4,400 ft.)	More extensive shadows from exist. tower in terminal area	More extensive shadows from exist. tower in terminal area
	Exterior noise from terminal and cargo areas	Exterior noise from terminal and cargo areas	Relocate fut. ARFF station	Must lower exist tower 17-28 ft. to eliminate shadows	Must lower exist. tower 28-39 feet to eliminate shadows
	Possible exhaust fumes from aircraft	Possible exhaust fumes from aircraft	Limited development area (3.8 acres)	Requires relocation of fut. ARFF station	Requires relocation of fut. ARFF station
	Requires relocation of Jet A fueling facility	Requires relocation of Jet A fueling facility	Reflective glair from Aset building (summer months)	Only 150 ft. from Cargo Road	Requires relocation of Wright Bros. ground vehicle maint. bldg.
	Possible contaminated soil in site area	Possible contaminated soil in site area	Requires relocation of multi-use cargo building	Requires relocation of office building	Requires relocation of fut. container repair station
	More extensive environmental review process	More extensive environmental review process	More extensive environmental review process	More extensive environmental review process	
	Construction delays due to site constraints	Construction delays due to site constraints	Construction delays due to site constraints	Requires relocation of Wright Bros. ground vehicle maint. bldg.	
	Requires utility relocation	Requires utility relocation	Only 150 ft. from Cargo Road	Requires relocation of fut. container repair station	

H:\DAY\ATCT Siting Study\[Tower Site Evaluation Matrix.xls]Final Review

APPENDIX A

AIR TRAFFIC CONTROL TOWER
SITING STUDY

DAYTON INTERNATIONAL AIRPORT

DRAFT 50% REVIEW REPORT
MEETING NOTES

5th Floor Conference Room
January 29, 2002

Attendees	Affiliation	Phone No.
Blair Conrad	DAY-Director of Aviation	937-454-8214
Dave Mason	DAY-Chief, Engineering Planning & Environment	937-454-8208
Regina Holman	DAY-Sen. Development Specialist	937-454-8217
Youssef Elzein	DAY-Senior Engineer	937-264-3584
Russell Blanck	Landrum & Brown	513-530-1206
Drew Squires	PBS&J	859-371-9051
Tom Hilquist	Planning Technology	847-696-0833
Duke Dudley	DAY-ATCT/NATCA	937-454-7336
Dave Neef	DAY-FAA/ATCT	937-454-7336
Bill Johnson	DAY-FAA/ATCT Support Manager	937-454-7320
Doug Weaver	FAA/ANI-440/RAPM	847-294-8187
Ronald Hubrich	FAA/ANI-440.H/Civil Engineer	847-294-7729

Mr. Blanck presented the Draft 50% Review Report for siting of the new Air Traffic Control Tower (ATCT) at Dayton International Airport (DAY). The following information is noted:

1. Mr. Weaver indicated that he is unaware of any additional security requirements, however he will have the FAA Security Dept. review the report. The Airport indicated that the security rules are not a Federal regulation, but only a desire of the FAA. These security rules have the flexibility to be modified based on specific needs and requirements.

2. The FAA requested that the shadow height above ground be included in Figures 8, 10 and 12 for the runway approach areas.

3. Tower Site 1-B will also not have a clear view of the proposed service road adjacent to the terminal apron.

4. Mr. Conrad indicated that the Airport might take the proposed 3rd parallel runway off the Future ALP because it isn't needed to meet the 20-year demand levels. Elimination of this runway will help mitigate some of the line-of-sight constraints with the proposed tower sites. Discussions with the FAA-Detroit ADO will be necessary to determine if there will be any impacts on the Master Plan and EIS.

5. The AFTIL lab trip is tentatively scheduled for April 22-24, 2002.

6. Upon review of the runway missed approach surfaces, the group recommended that three new tower sites should be analyzed. All other tower sites were eliminated due to line-of-sight constraints or impact on other future development projects. The three new tower sites are located between Terminal Drive and Cargo Road in the vicinity of of the old USAir Reservation Center. One of the new tower sites will require the 6R extension to be shortened by 1,500 feet.

7. The following items were discussed as input into the 75% Review Report:

    - Explanation why the previous proposed tower sites have been discarded from further study.
    - Add new Sites 7, 8 and 9 to the study for more detailed analysis.
    - Site 7 will require the 6R extension to be shortened by 1,500 feet.
    - Prepare full shadow study for the three tower sites at the "Max to Exceed" elevations
    - Prepare schematic layout of the tower sites with similar facilities as those in Port Columbus
    - Prepare order of magnitude construction costs.
    - Environmental overview of each site.
    - Conduct sun reflection analysis on the existing Asset building.

H:\DAY\ATCT SITING STUDY\DRAFT 50% REPORT MTG NOTES.DOC

AIR TRAFFIC CONTROL TOWER SITING STUDY

DAYTON INTERNATIONAL AIRPORT

DRAFT 75% REVIEW REPORT TELECONFERENCE MEETING NOTES

April 15, 2002

Attendees	**Affiliation**
Blair Conrad	Dayton International Airport
Dave Mason	Dayton International Airport
John Brabel	Dayton International Airport
Mark Schoewe	PBS&J
Greg Shuttleworth	PBS&J
Drew Squires	PBS&J
Russell Blanck	Landrum & Brown
Bill Johnson	DAY-ATCT
Dave Neef	DAY-FAA/NATCA
Doug Weaver	FAA/ANI-440
Scott Iwamoto	FAA/ANI-440
Mike Hannigan	FAA/ANI-440
Ron Hubrich	FAA/ANI-440.H

Mr. Blanck presented some of the key issues regarding the Draft 75% Review Report for siting of the new Air Traffic Control Tower (ATCT) at Dayton International Airport (DAY). The following information is noted:

Site 6

1. Mr. Blanck noted that Tower Site 6 is the lowest cost tower site alternative and has the least amount of shadow impacts on airfield "movement areas." The most critical shadow is on existing Taxiway 'D' from the existing control tower. Lowering the existing tower approximately 10 feet would eliminate this shadow impact.

2. Relocation of the existing Jet A fueling facility will be necessary and may result in environmental impacts due to soil contamination from fuel spillage. The cost to relocate the fueling facility has not been included into the development cost estimates. This cost will be added to the Final Report submittal.

3. Mr. Conrad indicated that the Airport does not prefer this site due to its close proximity to the existing terminal and possible impact to future terminal expansion alternatives.

4. Mr. Weaver indicated that the FAA believes this site is superior due to its central location to the runway system, close proximity to the terminal apron, and its lower height requirements. This site will be assessed in more detail at the AFTIL lab next week.

5. Mr. Johnson agreed that Site 6 is preferred from a controller operational standpoint.

6. Mr. Iwamoto indicated that the shadow height associated with the Emery hub building expansion is not correct at 88.1 feet. Mr. Blanck noted that this shadow height would be corrected.

Site 7

1. Mr. Blanck noted that Site 7 has a height restriction of 1236 MSL (236' AGL) due to the missed approach surface from future Runway 6R (4,400' extension). It will be necessary to shorten the proposed runway extension to 3,600 feet in order to locate the tower site outside of the missed approach surface and allow for an increase in the tower height.

2. This site is within 150 feet of Cargo Road. Mr. Weaver noted that the FAA Security Office would need to review the report for compliance with the new security regulations. Mr. Mason indicated that while the FAA Region states there is a 300-foot security rule, the Airport questions the existence of an actual rule. The Airport is preparing a submittal to the FAA for modification of the 300-foot setback rule for the future public parking garage. This security modification could also apply to the new control tower site.

3. This site will also experience sun glair from the Aset building during the late afternoon hours. Mr. Johnson indicated that the tower currently experiences

sun glair during the early morning and late evening hours when the sun is low in the horizon. This is not a major operational issue.

4. This site will also require demolition of the existing multi-tenant cargo facility. Relocation costs are included in the cost estimate for this site.

5. Shadows from the existing control tower will impact existing Taxiways 'A' and 'N', and the future North Connector Taxiway. In order to eliminate these shadow impacts, it would be necessary to raise the new tower approximately 20 feet at a cost of $824,000.

Site 8

1. Mr. Blanck noted that Site 8 requires demolition of the old USAirways Reservation Center. A detailed environmental review will be required of this site. Mr. Conrad noted that the Airport is trying to purchase the current lease from USAirways for approximately $890,000. Mr. Blanck indicated that this site cost estimate did not include the lease-back purchase cost, but will be added to the next report submittal.

2. This site is also only 150 feet from Cargo Road and will need to be reviewed by the FAA Security Office.

3. Mr. Blanck noted that there are shadows from the existing control tower within the terminal taxiway system (Twys. 'A' and 'N'). In order to eliminate these shadows, the new control tower would need to be raised to an elevation of 1393 MSL (393' AGL). This would cost an additional $3.8 million. Mr. Mason suggested that this area be designated as a "non-movement" area and monitored by ground control. Mr. Johnson indicated that the control tower will try to work with ground control on this issue so as to minimize the need to raise the tower height. Mr. Blanck noted that another alternative to mitigate these shadows is to lower the existing control tower by approximately 28 feet. This may have an impact on the Airport's 5th floor office space.

Site 9

1. Mr. Blanck noted that Site 9 is an undisturbed area that can be developed immediately with minimal environmental review.

2. There are more severe shadows on the terminal taxiway system. To fully eliminate these shadows the new control tower would need to have an eye-level elevation of 1423 MSL, and would cost an additional $6.1 million. Mr.

Conrad noted that this additional height would not be practical and is to costly.

3. Mr. Blanck noted that the other alternative to mitigate the taxiway shadows would be to lower the existing control tower by approximately 39 feet. This would require relocation of the Airport's offices on the 4^{th} and 5^{th} floors.

Conclusion

1. Mr. Mason suggested that this report be updated based on the telecon discussion and to label the report as 90% review. Mr. Blanck will update the report and redistribute copies prior to the AFTIL trip on April 23-25, 2002.

2. The Airport indicated that Sites 8 is their first choice and Site 6 is their second choice for a new tower site. Additional analysis of the fueling facility may be warranted at Site 6 to see if it can remain in place and reduce the overall development cost and impacts. Site 7 is not preferred due to the Runway 6R-24L reduction in length extension. Site 9 requires a higher control tower that is not cost efficient or realistic.

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AIR TRAFFIC CONTROL TOWER SITING STUDY

DAYTON INTERNATIONAL AIRPORT

AIRWAYS FACILITY TECHNICAL INSTITUTE LAB (AFTIL)

Date: April 23-24, 2002

Meeting: Dayton Airport Tower Siting

Location: AFTIL, Atlantic City

Name	Organization	Phone No.
Doug Weaver	FAA-ANI-440	847-294-8187
Ron Hubrich	FAA-ANI-440.H	847-294-7729
David Neef	FAA-DAY-ATCT	937-454-7336
Mark Browning	FAA-DAY-ATCT	937-454-7336
Richard Fox	FAA-DAY-ATCT	937-454-7336
Bill Johnson	FAA-DAY-ATCT	937-454-7320
Scott Iwamoto	FAA-ANI-440	847-294-7668
Michael Hannigan	FAA-ANI-440	847-294-7204
E. Blair Conrad	Dayton Airport	937-454-8214
Dave Mason	Dayton Airport	937-454-8208
Youssef Elzein	Dayton Airport	937-264-3584
Regina Holman	Dayton Airport	937-454-8217
Russell Blanck	Landrum & Brown	513-530-1206

A two-day meeting was held at the FAA Airways Facility Technical Institute Lab (AFTIL) in Atlantic City to assess the line-of-sight and operational constraints associated with the proposed Tower Sites 6, 7, 8 and 9. These sites are presented in the Draft 90% Review Report dated April 23, 2002.

Each site was assessed at variable eye-level heights and visibility minimums (3-5-7 miles). Based on these observations the following decisions were made:

Site #9

1. This site posed visibility problems to the relocated Runway 18 end, especially during 5-mile and 7-mile visibility conditions.

2. FAA expressed concern about odors from the existing glycol ponds just south of this site.

3. Shadow problems within the terminal taxiway system (existing and future) would require a tower line-of-sight elevation of 448 MSL to mitigate these shadows. This would increase the tower cost by approximately $6.1 million.

4. If the new tower height is not increased, it will be necessary to demolish the existing control tower. This would require relocation of the Airport's administrative offices. Also, it is preferable to keep the existing control tower for use by the Airport during snow operations and to control aircraft ground operations within the terminal area.

5. It was determined by all in attendance that Site #9 should not be considered as a viable site for the new tower.

Site #8

1. This site had somewhat better line-of-sight within the terminal area, however it still would require a tower elevation of 393 MSL to fully mitigate these shadows. This would increase the tower cost by approximately $3.8 million.

2. If the new tower height is not increased, it will be necessary to lower the existing control tower approximately 28 feet. It is preferable to keep the existing control tower for use by the Airport during snow operations and to control aircraft ground operations within the terminal area.

3. This site would require demolition of the old USAirways Reservation Center facility.

4. This site posed visibility problems to the relocated Runway 18 end, especially during 5-mile and 7-mile visibility conditions.

5. It was determined by all in attendance that Site #8 would be considered as a back-up site for the new tower.

Site #7

1. This site had somewhat better line-of-sight within the terminal area, however it still would require a tower elevation of 357 MSL to fully mitigate these shadows. This would increase the tower cost by approximately $2.4 million.

2. If the new tower height is not increased, it will be necessary to lower the existing control tower approximately 19 feet. It is preferable to keep the existing control tower for use by the Airport during snow operations and to control aircraft ground operations within the terminal area.

3. This site will require a 1,500-foot reduction in the Runway 6R extension.

4. It was determined by all in attendance that Site #7 should not be considered as a viable site for the new tower.

Site #6

1. Even with the eye-level height limitation of 1255 MSL, this tower site had minimal to no shadow problems throughout the airport.

2. It was determined that existing Taxiway 'U' was not visible from this site, therefore the tower site was move approximately 178 feet to the southeast to provide a clearer view of this taxiway. Upon further study, it may be necessary to modify the Taxiway 'U' geometry. This new tower location was identified as Site #6A.

3. It was suggested to lower the tower height at Site #6A to provide a clear view of the adjacent terminal ramp area. It was decided to keep the tower height at its maximum allowable elevation in order to provide the maximum height capability of future development projects.

4. Site #6A is within close proximity to the existing Jet A fueling facility and will need to be reviewed by the FAA Security Office.

5. Additional analysis of the underground utilities in this area will be needed. Major known utilities include a fuel and gas line.

6. During the design process it will be determined if the Jet A fueling facility can remain in its current location.

7. All parties unanimously agreed that Site #6A is the preferred new tower site location.

8. Site #6A is located at Lat. 39^{o} 54' 00.26", Long. 84^{o} 13' 31.71" and has a maximum to avoid elevation of 1280 MSL and an eye-level elevation of 1255 MSL.

The following additional information is noted based on other meetings conducted during this time period:

Action Item	Person Responsible	Date for Completion
Dayton International Airport will send a letter requesting Design and Construction of a new Air Traffic Control Tower to Mr. Gary Nielsen, Terminal Business Manager, FAA Great Lakes Region	Regina (Prepare for Blair's signature)	April 30, 2002
The request will include the following details: • FAA to design and manage construction of ATCT • DAY will submit new garage concept/rendering to FAA as a guide • FAA to have design completed and prepared to bid construction in time for the "Dayton Centennial Year of Flight " • ATCT Ground Breaking July 20, 2003		
Preliminary cost estimate will be sent to Dave Mason	Scott and Ron	May 17, 2002
Draft Reimbursable Agreement between the FAA and DAY to Regina for Review by the City of Dayton Legal Department. Phase I is the Design and Phase II will be the construction	Doug	May 31, 2002
Air Space request will be sent to Ron	Dave	May 17, 2002
Meet with Skip Bona at Headquarters to draft the LOC and to discuss the mechanism to begin releasing monies ($4 million) to the Regional Office etc.	Blair, Mike and Regina	June 10, 2002
Return Draft Agreement to Doug with comments from DAY	Regina	June 14, 2002

Submit Agreement to FAA Legal for review and signing	Doug	June 21, 2002
Agreement signed DAY and FAA		Sept 13, 2002
LOC from Headquarters	DAY	TBD

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APPENDIX B

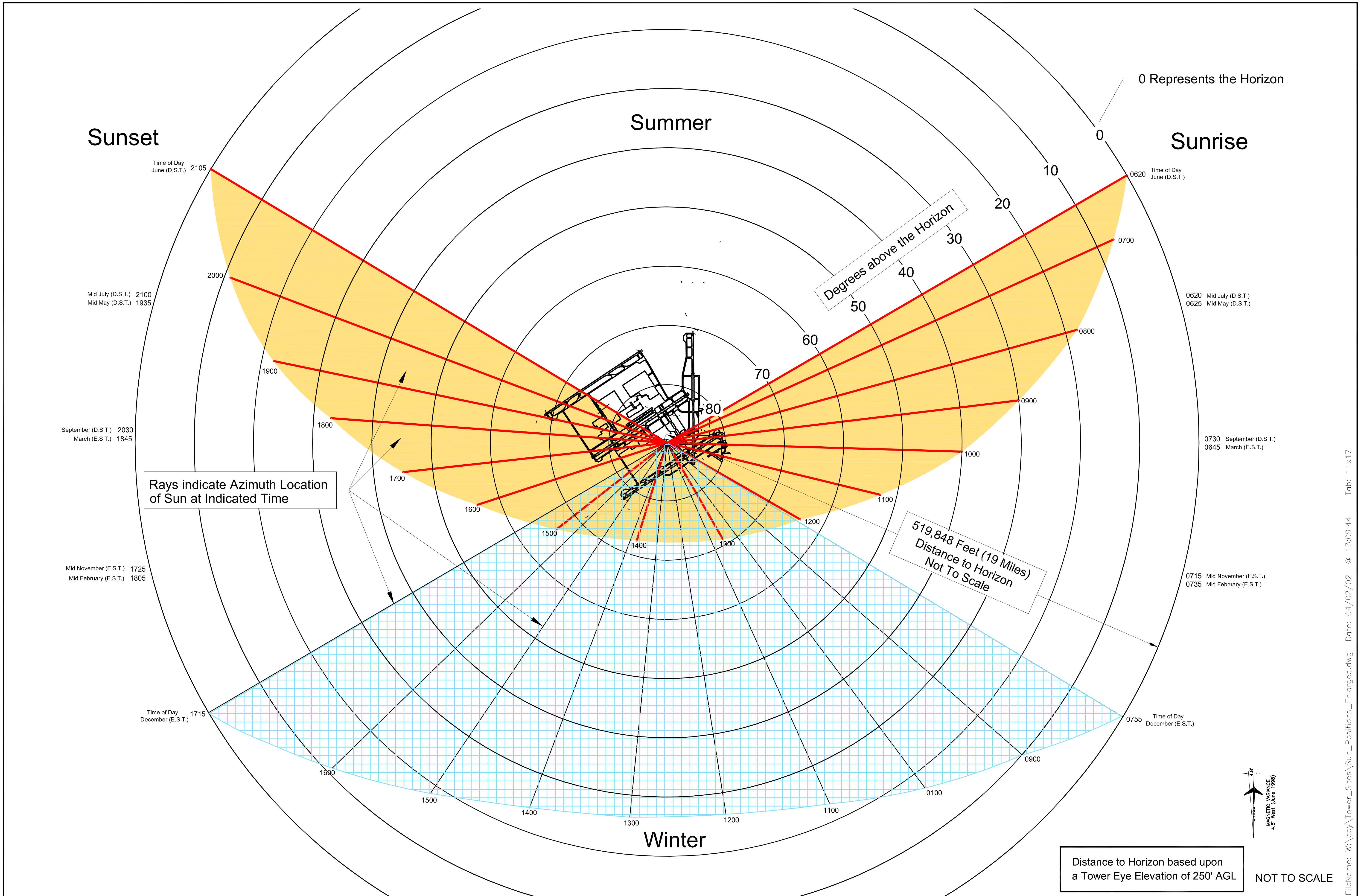

FIGURE B-1

Tower Sighting Study Sun Angles

Landrum & Brown

Tower Sighting Study

APPENDIX C

July 26, 2002

DAYTON INTERNATIONAL AIRPORT
DAYTON, OHIO
CONTROL TOWER COST ESTIMATE WITH ENHANCEMENTS

	Site #6 & #6A, 258' Tower - Estimated Costs				
	Construction Cost	Construction Cost w/ 15% Contingency	Design 10%	Services During Const. 3%	Sub-Totals
Tower					
258 ft Tower w/ Tower Cab	$ 8,300,000	$ 9,545,000	$ 830,000	$ 249,000	$ 10,624,000
TRACON Base Building	6,920,500	7,958,575	692,050	207,615	8,858,240
Site Utilities and Parking	1,284,300	1,476,945	128,430	38,529	1,643,904
Tower Totals:	**$ 16,504,800**	**$ 18,980,520**	**$ 1,650,480**	**$ 495,144**	**$ 21,126,144**
Enabling/Resulting Projects					
Demolition of existing bldg and Fuel Hydrant System	$ 100,000	$ 115,000	10,000	$ 3,000	$ 128,000
Recontrustion of bldg and Fuel Hydrant System	$ 500,000	575,000	50,000	15,000	640,000
2 FAA Inspectors (Full time during construction)				400,000	400,000
Airspace Study			100,000		100,000
Decommissioning existing Tower	500,000	575,000	50,000	15,000	640,000
Enabling Project Totals:	**$ 500,000**	**$ 575,000**	**$ 150,000**	**$ 415,000**	**$ 1,908,000**
Totals w/ Enabling Projects:	**$ 17,004,800**	**$ 19,555,520**	**$ 1,800,480**	**$ 910,144**	**$ 23,034,144**

Notes:

Control Tower - 258' High
Tower Cab 750 SF
Base Building - 20,000 SF
Start Construction - July 2003
Complete Construction - July 2005

Source: PBS&J

DAYTON INTERNATIONAL AIRPORT
DAYTON, OHIO
CONTROL TOWER COST ESTIMATE WITH ENHANCEMENTS

July 26, 2002

	Site #7, 300' Tower - Estimated Costs				
	Construction Cost	Construction Cost w/ 15% Contingency	Design 10%	Services During Const. 3%	Sub-Totals
Tower					
300 ft Tower w/ Tower Cab	$ 9,600,000	$ 11,040,000	$ 960,000	$ 288,000	$ 12,288,000
57 ft. Tower Extension	$ 1,824,000	$ 2,097,600	$ 182,400	$ 54,720	$ 2,334,720
Base Building and TRACON	$ 6,920,500	$ 7,958,575	$ 692,050	$ 207,615	$ 8,858,240
Site Utilities and Parking	$ 1,414,300	$ 1,626,445	$ 141,430	$ 42,429	$ 1,810,304
Tower Totals:	**$ 19,758,800**	**$ 22,722,620**	**$ 1,975,880**	**$ 592,764**	**$ 25,291,264**
Enabling/Resulting Projects					
Demolition of existing distribution bldg.	$ 68,000	$ 78,200	$ 6,800	$ 2,040	$ 87,040
Recontrustion of distribution bldg w/ docks	$ 1,200,000	$ 1,380,000	$ 120,000	$ 36,000	$ 1,536,000
2 FAA Inspectors (Full time during construction)				$ 400,000	$ 400,000
Airspace Study			$ 100,000		$ 100,000
Decommissioning existing tower	$ 500,000	$ 575,000	$ 50,000	$ 15,000	$ 640,000
Enabling Project Totals:	**$ 1,768,000**	**$ 2,033,200**	**$ 276,800**	**$ 453,040**	**$ 2,763,040**
Totals w/ Enabling Projects:	**$ 21,526,800**	**$ 24,755,820**	**$ 2,252,680**	**$ 1,045,804**	**$ 28,054,304**

Notes:

Control Tower - 300' High
Tower Cab 750 SF
Base Building - 20,000 SF
Start Construction - April 2004
Complete Construction - April 2006

Source: PBS&J

H:\DAY\ATCT Siting Study\[Tower Cost Est 4-5-02.xls]Site 9

July 26, 2002

DAYTON INTERNATIONAL AIRPORT
DAYTON, OHIO
CONTROL TOWER COST ESTIMATE WITH ENHANCEMENTS

	Site #8, 300' Tower - Estimated Costs				
	Construction Cost	Construction Cost w/ 15% Contingency	Design 10%	Services During Const. 3%	Sub-Totals
Tower					
300 ft Tower w/ Tower Cab	$ 9,600,000	$ 11,040,000	$ 960,000	$ 288,000	$ 12,288,000
93 ft. Tower Extension	$ 2,976,000	$ 3,422,400	$ 297,600	$ 89,280	$ 3,809,280
Base Building and TRACON	$ 6,920,500	$ 7,958,575	$ 692,050	$ 207,615	$ 8,858,240
Site Utilities and Parking	$ 1,454,300	$ 1,672,445	$ 145,430	$ 43,629	$ 1,861,504
Tower Totals:	**$ 20,950,800**	**$ 24,093,420**	**$ 2,095,080**	**$ 628,524**	**$ 26,817,024**
Enabling/Resulting Projects					
Demolition of reservation center	$ 137,000	$ 157,550	$ 13,700	$ 4,110	$ 175,360
Recontrustion of reservation center	$ 2,750,000	$ 3,162,500	$ 275,000	$ 82,500	$ 3,520,000
Acquisition of reservation building and lease					$ 890,000
2 FAA Inspectors (Full time during construction)				$ 400,000	$ 400,000
Airspace Study			$ 100,000		$ 100,000
Decommissioning existing Tower	$ 500,000	$ 575,000	$ 50,000	$ 15,000	$ 640,000
Enabling Project Totals:	**$ 3,387,000**	**$ 3,895,050**	**$ 438,700**	**$ 501,610**	**$ 5,725,360**
Totals w/ Enabling Projects:	**$ 24,337,800**	**$ 27,988,470**	**$ 2,533,780**	**$ 1,130,134**	**$ 32,542,384**

Notes:

Control Tower - 300' High
Tower Cab 750 SF
Base Building - 20,000 SF
Start Construction - April 2004
Complete Construction - April 2006

Source: PBS&J

H:\DAY\ATCT Siting Study\[Tower Cost Est 4-5-02.xls]Site 9

July 26, 2002

DAYTON INTERNATIONAL AIRPORT
DAYTON, OHIO
CONTROL TOWER COST ESTIMATE WITH ENHANCEMENTS

	Site #9, 300' Tower - Estimated Costs				
	Construction Cost	Construction Cost w/ 15% Contingency	Design 10%	Services During Const. 3%	Sub-Totals
Tower					
300 ft Tower w/ Tower Cab	$ 9,600,000	$ 11,040,000	$ 960,000	$ 288,000	$ 12,288,000
148 ft. Tower Extension	$ 4,736,000	$ 5,446,400	$ 473,600	$ 142,080	$ 6,062,080
Base Building and TRACON	$ 6,920,500	$ 7,958,575	$ 692,050	$ 207,615	$ 8,858,240
Site Utilities and Parking	$ 1,494,300	$ 1,718,445	$ 149,430	$ 44,829	$ 1,912,704
Tower Totals:	**$ 22,750,800**	**$ 26,163,420**	**$ 2,275,080**	**$ 682,524**	**$ 29,121,024**
Enabling/Resulting Projects					
2 FAA Inspectors (Full time during construction)				$ 400,000	$ 400,000
Airspace Study			$ 100,000		$ 100,000
Decommissioning existing Tower	$ 500,000	$ 575,000	$ 50,000	$ 15,000	$ 640,000
Enabling Project Totals:	**$ 500,000**	**$ 575,000**	**$ 150,000**	**$ 415,000**	**$ 1,140,000**
Totals w/ Enabling Projects:	**$ 23,250,800**	**$ 26,738,420**	**$ 2,425,080**	**$ 1,097,524**	**$ 30,261,024**

Notes:

Control Tower - 300' High
Tower Cab 750 SF
Base Building - 20,000 SF
Start Construction - July 2003
Complete Construction - July 2005

Source: PBS&J

H:\DAY\ATCT Siting Study\[Tower Cost Est 4-5-02.xls]Site 9

APPENDIX D

The undersigned unanimously agree with the choice of the following site for a new Airport Traffic Control Tower (ATCT) at Dayton International Airport (DAY):

- Site **#6A** with a Max To Avoid (MTA) is **1280 MSL** (283 AGL)
- Site **#6A** at an eye-level height of **1255 MSL** (258 AGL)
- Site **#6A:**

Latitude:	**39° 54' 00.26"**
Longitude:	**84° 13' 31.71"**

Scott Iwamoto, FAA ANI-440
Programs Manager Plants Engineering

Michael Hannigan, FAA AGL-510
AT Requirements Specialist

Douglas Weaver, FAA ANI-440
Terminal Programs Manager

Ronald M. Hubrich
Ron Hubrich, FAA ANI-440
Civil Engineer

Eugene B. Conrad Jr., A.A.E.
Dayton Airport Director

David Neef, FAA DAY ~~NATCA~~
ATCT Project Representative

Mark Browning, FAA DAY NATCA

Richard Fox, FAA/DAY OP Sup.

William Johnson, FAA DAY Sup. ~~Mgr.~~
Support Manager

April 24, 2002
Date

APPENDIX E

APPENDIX E
SITE 6A TERPS STUDY

Latitude: 39° 54’ 00.26”

Longitude: 84° 13’ 31.71”

IFR Departures: No Impacts

Circling Minimums-Minimum Decent Altitude

CAT A	From 1480	To 1580
CAT B	From 1480	To 1580
CAT C	From 1480	To 1580
CAT D	From 1560	To 1580

Non-Precision Instrument Approach Effects-Minimum Decent Altitude:

ASR Rwy 06L	From 1380	To 1400
ASR Rwy 36	From 1420	To 1480
GPS Rwy 06L	From 1360	To 1440
GPS Rwy 06R	From 1420	To 1540
LOC Rwy 06L	From 1360	To 1400
LOC Rwy 24R	From 1340	To 1420
VOR/DME RNAV Rwy 06R	From 1420	To 1540

Precision Instrument Approach Effects: None

AIR TRAFFIC CONTROL TOWER SITING STUDY

DAYTON INTERNATIONAL AIRPORT

ADDENDUM NO. 1

MAY 20, 2003

The FAA has completed a preliminary airspace review (2002-AGL-50-NR) of the proposed Air Traffic Control Tower (ATCT) at Dayton International Airport. The proposed ATCT with a maximum elevation of 1280msl would have the following adverse IFR effects on Standard Instrument Approach Procedures (SIAP):

- ILS on Runway 24R will increase the minimum descent altitude from 1198msl/200' to 1248msl/250', with a max-to-avoid elevation of 1260msl
- Straight-in LOC on Runway 24R will increase the minimum descent altitude from 1340 to 1420msl, with a max-to-avoid elevation of 1218msl
- ASR on Runway 6L will increase the minimum descent altitude from 1380 to 1400msl, with a max-to-avoid elevation of 1274msl
- ASR on Runway 36 will increase the minimum descent altitude from 1420 to 1480msl, with a max-to-avoid elevation of 1227msl
- Straight-in LOC on Runway 6L will increase the minimum descent altitude from 1360 to 1400msl, with a max-to-avoid elevation of 1254msl
- Lateral RNAV (GPS) on Runway 6L will increase the minimum descent altitude from 1380 to 1440msl, with a max-to-avoid elevation of 1228msl

Based on the above operational impacts, it was recommended to lower the maximum tower height to an elevation of 1260msl. Landrum & Brown prepared a revised shadow study that reflects this lower tower elevation with an eye-level elevation of 1235msl (see attached Figure 5A).

On May 15, 2003 a trip was made to the FAA-AFTIL in Atlantic City. An eye-level elevation of 1231msl was used to analyze any potential line-of-sight impacts on existing or future airfield "movement areas." The 360-degree view from the proposed tower cab did not produce any significant shadows and it was determined that an eye-level elevation of 1231msl would provide an adequate line-of-sight to all existing and proposed airfield "movement areas." The following person's were present at the AFTIL for the demonstration:

Name	Organization	Phone Number	E-Mail
Bernie Garbowski	JSA Inc. ACB-340	609-485-4952	Bernard.cth.garbowski@faa.gov
Dave Neef	Dayton-ATCT	937-454-7339	daveduck@prodigy.net
George Wetmore	Dayton-ATCT	937-454-7339	gwetmore@wolt.rr.com
Scott Iwamoto	FAA, ANI-440	847-294-7668	Scott.t.iwamoto@faa.gov
Ron Hubrich	FAA, ANI-440.H	847-294-7729	Ron.m.Hubrich@faa.gov
Russell Blanck	Landrum & Brown	513-530-1206	rblanck@landrum-brown.com
David Mason	Dayton Intl. Airport	937-454-8208	dmason@flydayton.com
Michael Hannigan	FAA, AGL-510	847-294-7204	Michael.hannigan@faa.gov

A Letter of Agreement was prepared and signed by the appropriate representatives (see attachment). A preliminary airspace review by the FAA indicates that there will be no impact on the existing instrument flight rule procedures, but will have the following impact on non-precision instrument procedure minimums:

- Straight-in LOC Runway 24R, will raise minimum descent altitude from 1340 to 1380, with max-to-avoid elevation of 1221msl
- ASR Runway 36, will raise minimum descent altitude from 1420 to 1480, with max-to-avoid elevation of 1227msl
- Straight-in LOC Runway 6L, will raise minimum descent altitude from 1360 to 1400, max-to-avoid elevation of 1254msl
- Lateral RNAV (GPS) Runway 6L, will raise minimum descent altitude from 1380 to 1440, max-to-avoid elevation of 1228msl

The Airport agreed to send a letter to the airlines requesting their input on these operational changes that would occur upon construction of the new tower. Concurrence from the airlines will be necessary in order for the FAA to complete their final airspace review. In addition, the FAA will inform Holmes & Narver of the proposed design changes to the proposed control tower.

Letter of Agreement
Regarding
The Dayton International Airport Traffic Control Tower
Cab Floor Height
15 May 2003

This Agreement is made by and between ANI-440, AGL-510, Dayton Air Traffic Management, Dayton National Air Traffic Controllers Association (NATCA) and Dayton Cox International Airport, collectively known as the "Parties." The purpose of this agreement is to address the design requirements for the cab height for the new Airport Traffic Control Tower (ATCT) planned to be constructed at the Dayton International Airport.

Section 1. The parties agree that the directions provided to the Architect/Engineering (A/E) will include the following details:

> Article 1: The location of the tower site shall remain as Site#6A with the coordinates of Latitude: 39^{0} 54' 00.26" and Longitude: 84° 13' 31.71".
>
> Article 2: The Max to Avoid shall be approximately 1260 MSL (258' above 1st floor elev.).
>
> Article 3: The cab floor elevation shall be approximately 1226 MSL (224' above 1st floor elev.).
>
> Article 4: The cab eye elevation shall be approximately 1231 MSL (229' above 1st floor elev.).

Note: The 1st floor elevation is 1002 MSL.

Section 2. This agreement does not constitute a wavier of any right guaranteed by law, rule, regulation or contract on behalf of any Party.

FOR ANI-440:

5/15/03
name **(date)**

5/15/03
name **(date)**

FOR Dayton Air Traffic Management:

5/15/3
name **(date)**

FOR AGL-510:

5.15.03
name **(date)**

FOR Dayton NATCA:

5/15/03
name **(date)**

FOR Dayton Cox International Airport:

5/15/03
name **(date)**

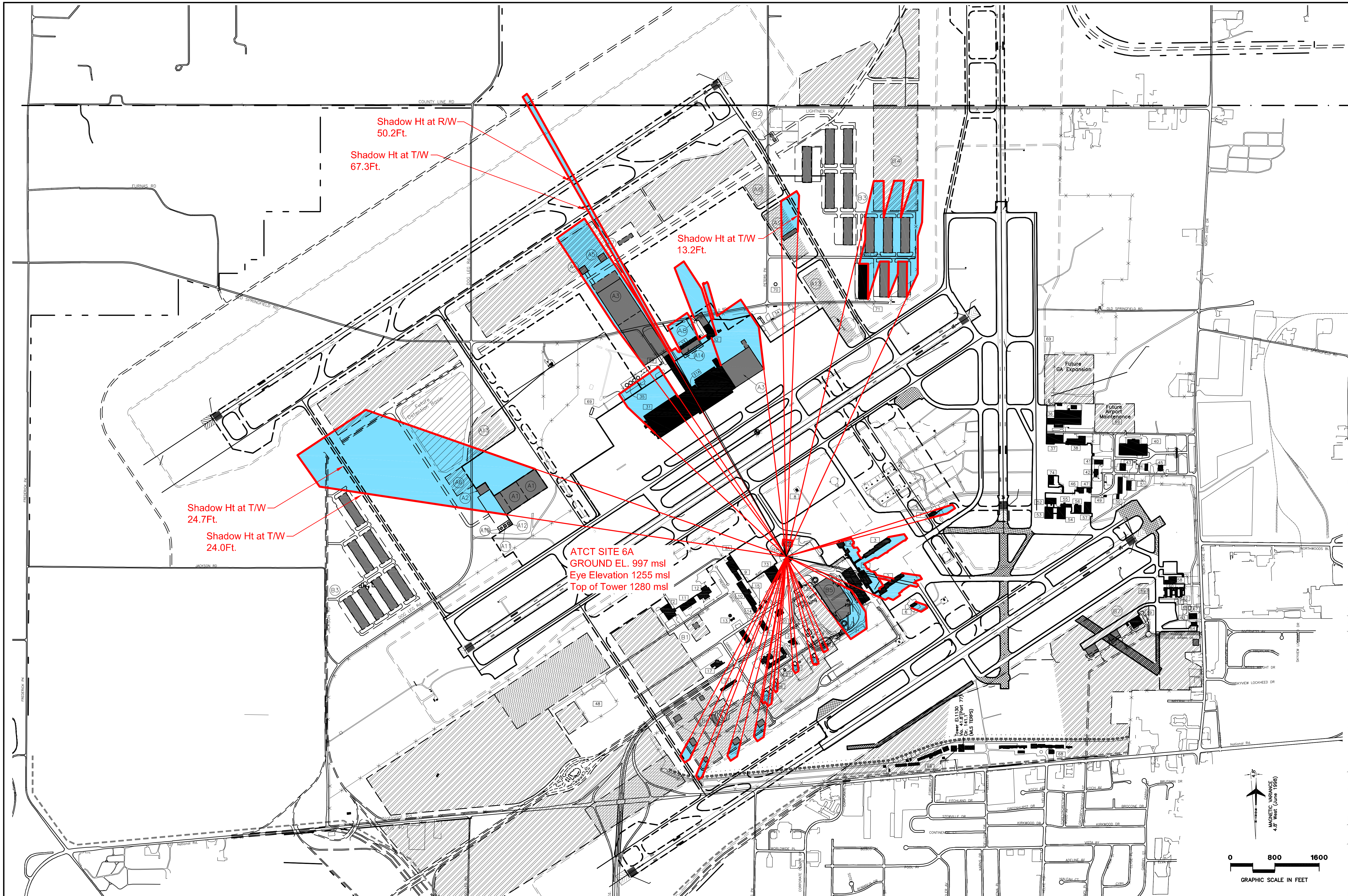

FIGURE 5A

Tower Sighting Study Site 6A
Shadow Study Analysis

Landrum&Brown

Tower Sighting Study

ATTACHMENT B

Runway Length Requirements Analysis

RUNWAY LENGTH
REQUIREMENTS ANALYSIS

DAYTON INTERNATIONAL AIRPORT
MASTER PLAN UPDATE

Prepared By:
Landrum & Brown, Inc.

Draft
February 9, 2005

TABLE OF CONTENTS

I. EXECUTIVE SUMMARY

In accordance with FAA Advisory Circular 150/5325-4A and the aircraft manufacturers' characteristics manuals, an analysis was conducted to determine the runway length requirements for passenger air carrier, commuter, and cargo aircraft operating at Dayton International Airport (DAY). Based on 100 percent maximum takeoff weights (MTOW) of the existing and future aircraft fleet mix through year 2020, the following runway lengths are justified at DAY.

Justified Runway Lengths

Runway	Justified Runway Length (ft.)
6R-24L	13,900
6L/24R	13,900
18-36	11,120

These runway lengths are based on individual aircraft performance charts, and take into consideration the elevation and average temperature of the airport, runway conditions, and the operating weight and engine type of the aircraft. This initial runway length analysis did not take into consideration local conditions, such as, environmental, noise, topographical (except for runway gradient), physical, land use, political, and economic factors. However, these factors were taken into consideration for determination of the proposed runway lengths as depicted on the draft Future Airport Layout Plan (ALP) dated January 19, 2005.

The following are the results of the runway length requirements for the three existing runways at DAY:

- ***Runway 6R/24L*** – In accordance with Advisory Circular 150/5325-4A, parallel runways should have a length based on the airplanes that will use the runways and should also be approximately equal in length. Based on these criteria, the Runway 6R/24L takeoff length of 13,900 feet is justified since the theoretical 13,900-foot length of Runway 6L/24R is justified. This length would accommodate all of the existing and future aircraft fleet mix at 100 percent MTOW.

  Although justifiable at 13,900 feet, the draft Future ALP proposes a length of 9,500 feet for Runway 6R/24L due to various local factors as previously noted. The proposed runway length of 9,500 feet can accommodate the air carrier fleet with a 95 percent or greater MTOW, with the exception of the B-757-200, B-757-300, B-737-900, and DC-9-32 aircraft. The flight range distance for each aircraft is also adequate to serve the current commercial markets at DAY. The proposed 9,500-foot Runway 6R/24L is based on the premise that both parallel 6-24 runways are in operation.

  During peak arrival periods, the proposed 9,500-foot long Runway 6R/24L will be capable of accommodating all of the cargo aircraft for landing under wet conditions.

- ***Runway 18-36*** – In accordance with Advisory Circular 150/5325-4A, a crosswind runway should have a length of at least 80 percent of the primary runway length. Based on these criteria, Runway 18-36 is justified at a takeoff length of 11,120 feet, which is 80 percent of the justified 13,900-foot Runway 6L/24R length. It is anticipated that the air carrier and commuter aircraft will mainly use Runway 18-36, with use by cargo aircraft when wind and weather dictate. Based on recent radar data, the actual usage of Runway 18-36 is approximately 10.6 percent annually.

  The draft Future ALP proposed a length of 9,500 feet for Runway 18-36. This runway length is less than the justified length of 11,120 feet in accordance with FAA Advisory Circular due to various local factors as previously noted. The proposed runway length of 9,500 feet can accommodate the air carrier fleet with a 95 percent or greater MTOW, with the exception of the B-757-200, B-757-300, B-737-900, and DC-9-32 aircraft. In addition, the flight range distance for each aircraft is adequate to serve the current commercial markets at DAY.

- ***Runway 6L/24R*** – Due to the anticipated heavy use by cargo aircraft, the Runway 6L/24R takeoff length is justified at 13,900 feet to adequately serve all of the anticipated cargo aircraft at 100 percent MTOW. Also, all of the air carrier and commuter aircraft fleet would be able to use a 13,900-foot long runway at 100 percent MTOW. The draft Future ALP proposes a length of 12,600 feet for Runway 6L/24R. This runway length is less than the justified length of 13,900 feet in accordance with the FAA Advisory Circular due to various local factors as previously noted. The 24R threshold has been moved 1,478 feet to the west-southwest in order to provide a full 1,000-foot safety area, and construction of a parallel taxiway and service road on the west side of Runway 18-36. The 6L threshold has been extended 3,178 feet to the west-southwest such that US 40 could stay in its existing alignment.

  The proposed runway length of 12,600 feet can accommodate the cargo aircraft fleet at 100 percent MTOW, with the exception of the A300-B4, B-727-200, DC-10-30, and DC-8-62 aircraft. The worst case is the DC-8-62 aircraft with a 97.3 percent MTOW. Although, all of the cargo aircraft can takeoff with 100 percent payload weight, their flight range distances and markets that are reachable non-stop are limited.

Based on this runway length requirements analysis, it has been demonstrated that the runway lengths as depicted on the January 19, 2005 Future ALP are justified based on the existing and future aircraft fleet mix, and anticipated runway usage. As mentioned, the proposed runway lengths are less than what is justified per the FAA Advisory Circular planning standards due to local considerations such as land use, noise, and cost-benefits. These issues have been addressed in the Master Plan Study and other planning efforts. The proposed runway lengths will provide adequate aircraft takeoff and landing performance based on current markets being served from DAY. However, as future markets are added and travel distances increase, it may be necessary to increase one or more of the runway lengths to assure maximum efficiency and utilization of the airport runway system.

II. INTRODUCTION

In accordance with FAA Advisory Circular 150/5325-4A and the aircraft manufacturers characteristics manuals, an analysis was conducted to determine the theoretical runway length requirements for passenger air carrier, commuter, and cargo aircraft operating at Dayton International Airport (DAY). The runway length requirements were calculated using charts published in the aircraft manufacturers' characteristics manuals and the International Civil Aviation Organization (ICAO) Aerodrome Design Manual. Requirements were calculated by taking into consideration the elevation and average temperature of the airport, the performance characteristics of the individual aircraft, runway conditions, and the operating weight and engine type of the aircraft, which is dependent on the amount of fuel needed to reach the destination, and the amount of payload (passengers, baggage, and cargo).

FAA Advisory Circular 150/5325-4A, dated 1/29/90, "Runway Length Requirements for Airport Design", notes the following: "*Parallel Runways* should have a length based on the airplanes that will use the runways. Parallel runways should be approximately equal in length. A *Crosswind Runway* should have a length of at least 80 percent of the primary runway length." These criteria will be taken into consideration for the runway length analysis.

Also to be considered for this analysis is the Draft Advisory Circular 150/5325-4B, "Runway Length Requirements for Airport Design," currently out for review and comment. This draft AC makes the following recommendations: "When the MTOW of listed airplanes is over 60,000 pounds, the recommended runway length is determined according to *individual airplanes*. The design objective for the main primary runway is to determine a recommended runway length that serves all airplanes without operational weight restrictions. The design objective for the length of crosswind runways for scheduled transport service is to equal 100 percent of the primary runway."

In accordance with FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems (NPIAS)*, the following is noted regarding airport dimensional standards. "Airport dimensional standards (such as runway length and width, separation standards, surface gradients, etc.) should be selected which are appropriate for the critical aircraft that will make substantial use of the airport in the planning period. Substantial use means either 500 or more annual itinerant operations, or scheduled commercial service. The critical aircraft may be a single aircraft or a composite of the most demanding characteristics of several aircraft." This planning standard will be taken into consideration when determining the runway length requirements.

Dayton International Airport has a three-runway airfield system that consists of two parallel 6-24 runways, and a single 18-36 runway. Runway 6L/24R serves as the primary runway and has a length of 10,900 feet with Category II/III approach capability on Runway 6L, and Category I approach capability on Runway 24R. Runway 6R/24L serves as the secondary parallel runway and has a length of 7,000 feet with Category I approach capability on Runway 24L, and a Non-Precision (non-directional beacon) approach capability on Runway 6R. Runway 18-36 serves as the cross-wind runway and has a length of 8,500 feet with Category I approach capability on Runway 18, and Visual approach capability on Runway 36. Runway 18-36 provides operations beyond that of a typical crosswind runway and is used approximately 10.6 percent of the time.

III. FORECAST AIRCRAFT OPERATIONS AND AIRCRAFT FLEET MIX

Based on the FAA approved February 20, 2004 Forecasts of Aviation Activity at DAY, total annual operations are to increase from approximately 125,217 in 2002 to 158,600 in 2020. This represents an average annual increase of 1.4 percent over the forecast period. **Table 1** summarizes the total annual aircraft operations forecast for Dayton International Airport.

Air carrier passenger operations are projected to grow 1.5 percent per year, beginning in 2004. The regional passenger operations are projected to grow 1.7 percent per year, beginning in 2004. In addition, the cargo operations are anticipated to grow 3.3 percent per year.

UPS has recently acquired (December 2004) the Menlo Worldwide Forwarding freight hub at DAY that currently has 34 daily flights. The following information was taken from the UPS pressroom web site:

> The acquisition *(Menlo)* reinforces UPS's strategy of providing broad supply chain solutions to enable global commerce. As a result of the acquisition, UPS will expand its global capabilities and add guaranteed heavy airfreight services around the world, enabling customers to reach the global marketplace faster. This also means UPS will introduce new time-definite products such as overnight, two-day and deferred heavy airfreight to North America. *www.pressroompups.com (10/5/04).*
>
> "Menlo Worldwide Forwarding's capabilities complement UPS's ability to manage customers' shipments of any size, anywhere and in virtually any time frame," said Bob Stoffel, UPS senior vice president, Supply Chain Group. Menlo Worldwide Forwarding services soon will be sold under the UPS brand, he added. *www.pressroomups.com (1/24/05).*

In addition, the following are excerpts from an article in the October 21, 2004, Dayton Daily News:

> "If you look at their *(UPS)* commitment to going into a heavy weight, global, time-definite product, our hub *(DAY)* has those capabilities," Trimarco said. The Menlo executive said he expects to sign on with the new owner. He also said that he expects Dayton hub employment to remain stable under UPS provided the economy continues to grow.

Based on these comments, it has been assumed that UPS will continue to operate and grow the DAY cargo hub as anticipated in the February 20, 2004 Forecast of Aviation Activity.

Based on this forecast, **Table 2** summarizes the anticipated passenger air carrier and commuter aircraft fleet-mix at DAY. The air carrier fleet mix is projected to remain a narrow-body fleet. Based on the proposed 2020 air carrier fleet mix, the Boeing 717-200 will represent approximately 57 percent of the fleet, the Airbus 320-200 will represent approximately 28 percent, and the Boeing 737-800/900 will represent approximately 15 percent of the air carrier fleet mix. Based on a total of 14,200 annual air carrier operations in year 2020, each of these aircraft type will exceed the 500 annual operations requirement.

The air carrier aircraft fleet-mix and engine types used in this analysis is presented in **Table 3**, and are grouped by aircraft weight classes for informational purposes only. ***Heavy*** – Aircraft capable of takeoff weights of more than 255,000 pounds, including the B757, whether or not they are operating at this weight during a particular phase of flight. ***Large*** – Aircraft of more than 41,000 pounds, maximum certificated takeoff weight, up to 255,000 pounds. ***Small*** – Aircraft of 41,000 pounds or less maximum certificated takeoff weight.

Today, the commuter aircraft fleet is dominated with 50-seat regional jets, and small turboprop aircraft. Over the forecast horizon, the regional carriers are expected to phase out virtually all of the turboprop aircraft in favor of regional jets ranging in size from 32 to 90 seats. The Canadair Regional Jet CRF-200/700 and the Embraer Regional Jet ERJ 135/140/145 will dominate the commuter aircraft fleet mix at approximately 86 percent of the fleet. Based on a total of 68,200 annual commuter operations in year 2020, each of these aircraft type will exceed the 500 annual operations requirement.

With the recent acquisition of Menlo Worldwide Forwarding by UPS (December 2004), it was assumed that all cargo aircraft types that have served the airport over the past five years, along with the current UPS aircraft fleet would be used in this analysis. **Table 4** summarizes the anticipated cargo aircraft fleet mix.

IV. TAKEOFF RUNWAY LENGTH REQUIREMENTS

When aircraft operate during periods of high temperatures, the relative increased density altitude decreases an aircraft's operational performance. Loss in performance requires longer takeoff distances and faster ground speeds during landings, which results in longer runway length requirements. This section discusses the takeoff runway length requirements for the aircraft currently or projected to be in operation at Dayton International Airport throughout the planning horizon. Runway length requirements are identified for air carrier, commuter, and cargo aircraft.

Air Carrier Aircraft Requirements

Takeoff runway length requirements were determined from the "standard day" charts (59 degrees Fahrenheit) and a mean daily high temperature of 85 degrees Fahrenheit was used to determine the ultimate runway length requirements for air carrier and commuter aircraft. Based on an airport elevation of 1009 msl, the density altitude at 85^{o}F is approximately 3,000 feet. Density altitude is defined as pressure altitude corrected for nonstandard temperature. **Exhibit A-1** in

Appendix A illustrates the calculation for density altitude. The density altitude is the altitude at which the density of the International Standard Atmosphere (ISA) is the same as the density of the air being evaluated. The temperature at ISA is 15 degrees Celsius (59^{o}F).

Exhibit 1 shows the takeoff runway length requirements for air carrier aircraft at 100 percent Maximum Takeoff Weight (MTOW) for each of the existing runways at DAY. The required lengths for each runway are slightly different due to the variation in their centerline slope. The "standard day" runway length has been increased 10 feet for every foot of difference in centerline elevation between the high and low points. The following table summaries the necessary runway length at 100 percent MTOW for some of the existing and future air carrier aircraft type that are anticipated to be in operation through the year 2020.

100 percent MTOW Runway Length

AIRCRAFT TYPE	RUNWAY LENGTH (FT.)
B-717-200	7,600
A320-200	9,600
MD-80-83	10,600
B-757-300	12,000
B-737-900	12,800

Commuter Aircraft Requirements

Runway length requirements for commuter regional jets and turboprop aircraft were taken from the *Jane's All The World Aircraft* manuals based on maximum takeoff weight and standard day temperature (15 degrees Celsius). These runway length requirements were then adjusted for airport elevation, temperature, and runway slope as specified in the ICAO Aerodrome Runway Design Manual.

Exhibit 2 shows the standard day (Jane's) and adjusted (ICAO) runway lengths. For this analysis, the adjusted ICAO runway lengths were used to determine the optimum commuter aircraft takeoff runway length requirements because there is insufficient detailed data from the aircraft manufacturers. As shown, the commuter aircraft require between 5,000 feet and 9,350 feet of runway length at 100 percent MTOW. The majority of the commuter aircraft fleet will be comprised of regional jets that require the longer runway length.

Cargo Aircraft Requirements

Takeoff runway length requirements were determined from the "standard day" charts (59 degrees Fahrenheit) and a mean morning high temperature of 65 degrees Fahrenheit was used to determine the ultimate runway length requirements for cargo aircraft. The lower temperature was used for the cargo aircraft to reflect the typical morning hours in which these aircraft depart. Based on an airport elevation of 1009 msl, the density altitude at 65^{o}F is approximately

1,900 feet. Density altitude is defined as pressure altitude corrected for nonstandard temperature. **Exhibit A-2** in **Appendix A** illustrates the calculation for density altitude.

Cargo aircraft takeoff length requirements were calculated in the same manner as the air carrier aircraft and are presented in **Exhibit 3**. Likewise, it is desirable to accommodate 100 percent of the cargo aircraft payload for maximum revenue potential. As shown, the cargo aircraft will require a runway length ranging from 8,000 feet for the B-757-200 and 13,900 feet for the B-727-200 aircraft.

V. LANDING RUNWAY LENGTH REQUIREMENTS

Landing runway length requirements were also determined for the air carrier, commuter, and cargo aircraft at Dayton International Airport. **Exhibits 4, 5 and 6** depict the runway lengths necessary with maximum aircraft landing weight for wet and dry pavement conditions. All of the air carrier aircraft should be able to land on a 7,000-foot long runway, while all of the commuter aircraft should be able to land on a 6,400-foot long runway under wet conditions. In addition, all of the cargo aircraft should be able to land on an 8,900-foot long runway under wet conditions. The landing runway lengths are not the critical metric for determining the optimum runway length requirements, because it requires less runway length to conduct aircraft landings. This information is provided for airport planning purposes and potential runway usage during peak arrival periods.

VI. SUMMARY

Runway takeoff and landing length requirements were identified for air carrier, commuter, and cargo aircraft at Dayton International Airport in accordance with FAA Advisory Circular 150/5325-4A and the aircraft manufacturers' characteristics manuals. Based on 100 percent maximum takeoff and landing weights, the table below shows the runway lengths that are justified for use by the three aircraft groups.

Runway Length Requirements

AIRCRAFT TYPE	TAKEOFF LENGTH AT MTOW (FT.)	LANDING LENGTH (FT.)(WET)
Air Carrier	12,800	7,000
Commuter	9,350	6,400
Cargo	13,900	8,900

These runway lengths are based on individual aircraft performance charts, and take into consideration the elevation and average temperature of the airport, runway conditions, and the operating weight and engine type of the aircraft. This initial runway length analysis did not take into consideration local conditions, such as, environmental, noise, topographical (except for runway gradient), physical, land use, political, and economic factors. However, these factors were taken into consideration for determination of the proposed runway lengths as depicted on the draft Future Airport Layout Plan (ALP) dated January 19, 2005.

The following are the results of the runway length requirements for the three existing runways at DAY:

- ***Runway 6R/24L*** – In accordance with Advisory Circular 150/5325-4A, parallel runways should have a length based on the airplanes that will use the runways and should also be approximately equal in length. Based on these criteria, the Runway 6R/24L takeoff length of 13,900 feet is justified since the theoretical 13,900-foot length of Runway 6L/24R is justified. This length would accommodate all of the existing and future aircraft fleet mix at 100 percent MTOW.

  Although justifiable at 13,900 feet, the draft Future ALP proposes a length of 9,500 feet for Runway 6R/24L due to various local factors as previously noted. The proposed runway length of 9,500 feet can accommodate the air carrier fleet with a 95 percent or greater MTOW, with the exception of the B-757-200, B-757-300, B-737-900, and DC-9-32 aircraft. **Table 7** shows the percent MTOW and maximum stage length (nautical miles) for each of the air carrier aircraft based on a 9,500-foot long runway. The flight range distance for each aircraft is also adequate to serve the current commercial markets at DAY as shown in Table 6. The proposed 9,500-foot Runway 6R/24L is based on the premise that both parallel 6-24 runways are in operation. However, if the airlines wish to add new markets with longer stage lengths, the 9,500-foot runway length may not be adequate for all aircraft types to serve these new markets with payloads that are economically viable for the airlines.

  An additional analysis was conducted to determine the performance of the cargo aircraft on a 9,500-foot long runway. **Table 8** shows the percent MTOW and maximum stage length for each of the cargo aircraft. The flight range distance for each aircraft is less than those for the proposed 12,600-foot long Runway 6L/24R. The MTOW for all of the cargo aircraft are between 90 percent and 100 percent based on the 9,500-foot long runway.

  The cargo aircraft could also use Runway 6R/24L primarily during peak arrival periods and will require a minimum landing length of 8,900 feet. The proposed 9,500-foot long Runway 6R/24L will be capable of accommodating all of the cargo aircraft for landing under wet conditions.

- ***Runway 18-36*** – In accordance with Advisory Circular 150/5325-4A, a crosswind runway should have a length of at least 80 percent of the primary parallel runway length. Based on these criteria, Runway 18-36 is justified at a takeoff length between 11,120 feet, which is 80 percent of the justified 13,900-foot Runway 6L/24R length. It is anticipated that the air carrier and commuter aircraft will mainly use Runway 18-36, with use by cargo aircraft when wind and weather dictate. Based on recent radar data, the actual usage of Runway 18-36 is approximately 10.6 percent annually.

  The draft Future ALP proposed a length of 9,500 feet for Runway 18-36. This runway length is less than the justified length of 11,120 feet in accordance with the FAA Advisory Circular due to various local factors as previously noted. The proposed runway length of 9,500 feet can accommodate the air carrier fleet with a 95 percent or greater MTOW, with the exception of the

B-757-200, B-757-300, B-737-900, and DC-9-32 aircraft. Table 7 shows the percent MTOW and maximum stage length (nautical miles) for each of the air carrier aircraft based on a 9,500-foot long runway. The flight range distance for each aircraft is adequate to serve the current commercial markets at DAY as shown in Table 6. However, as previously noted, if the airlines wish to add new markets with longer stage lengths, the 9,500-foot runway length may not be adequate for all aircraft types to serve the new markets with payloads that are economically viable for the airlines.

- ***Runway 6L/24R*** – Due to the anticipated heavy use by cargo aircraft, the Runway 6L/24R takeoff length is justified at 13,900 feet to adequately serve all of the anticipated cargo aircraft at 100 percent MTOW. Also, all of the air carrier and commuter aircraft fleet would be able to use a 13,900-foot long runway at 100 percent MTOW. The draft Future Airport Layout Plan (ALP) dated January 18, 2005 proposes a length of 12,600 feet for Runway 6L/24R. This runway length is less than the justified length of 13,900 feet in accordance with the FAA Advisory Circular due to various local factors as previously noted. The 24R threshold has been moved 1,478 feet to the west-southwest in order to provide a full 1,000-foot safety area, and construction of a parallel taxiway and service road on the west side of Runway 18-36. The 6L threshold has been extended 3,178 feet to the west-southwest such that US 40 could stay in its existing alignment.

  The proposed runway length of 12,600 feet can accommodate the cargo aircraft fleet at 100 percent MTOW, with the exception of the A300-B4, B-727-200, DC-10-30, and DC-8-62 aircraft. **Table 5** shows the percent MTOW and maximum stage length (nautical miles) for each of the cargo aircraft based on a 12,600-foot long runway. The worst case is the DC-8-62 aircraft with a 97.3 percent MTOW. Although, all of the cargo aircraft can takeoff with 100 percent payload weight, their flight range distances and markets that are reachable non-stop are limited. **Table 6** shows the current markets that are being served by UPS today (previous Menlo Worldwide Forwarding markets).

Based on this runway length requirements analysis, it has been demonstrated that the runway lengths as depicted on the January 19, 2005 draft Future ALP are justified based on the existing and future aircraft fleet mix, and anticipated runway usage at DAY. As mentioned, the proposed runway lengths are less than what is justified per the FAA Advisory Circular planning standards due to local considerations such as land use, noise, and cost-benefits. These issues have been addressed in the Master Plan Study and other planning efforts. The proposed runway lengths will provide adequate aircraft takeoff and landing performance based on current markets being served from DAY. However, as future markets are added and travel distances increase, it may be necessary to increase one or more of the runway lengths to assure Dayton International Airport's ability to competitively serve the existing and future cargo and passenger markets.

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TABLE 1
AIRCRAFT OPERATIONS FORECAST

		Passenger					Annual
	Year	Air Carrier	Regional	Cargo	Other	Total	Change
Actual	1998	24,148	31,398	42,540	53,393	151,479 \1	
	1999	24,239	30,330	38,987	58,448	152,004 \1	0.3%
	2000	25,540	33,466	35,118	51,277	145,401 \2	-4.3%
	2001	21,795	40,114	22,706	47,994	132,609 \2	-8.8%
	2002	15,079	44,940	16,066	49,132	125,217 \2	-5.6%
Estimate	2003	11,000	51,500	14,700	47,100	124,300	-0.7%
Forecast	2004	12,200	54,400	14,800	47,300	128,700	3.5%
	2005	12,400	58,400	15,300	47,500	133,600	3.8%
	2006	12,600	59,600	15,800	47,700	135,700	1.6%
	2007	12,700	60,800	16,400	47,900	137,800	1.5%
	2008	12,900	62,000	17,000	48,100	140,000	1.6%
	2009	13,000	62,900	17,600	48,300	141,800	1.3%
	2010	13,100	63,500	18,200	48,500	143,300	1.1%
	2011	13,200	63,800	18,800	48,700	144,500	0.8%
	2012	13,400	64,200	19,500	48,900	146,000	1.0%
	2013	13,500	64,600	20,200	49,100	147,400	1.0%
	2014	13,600	65,000	20,900	49,300	148,800	0.9%
	2015	13,700	65,400	21,600	49,500	150,200	0.9%
	2016	13,800	65,900	22,400	49,700	151,800	1.1%
	2017	13,900	66,400	23,200	49,900	153,400	1.1%
	2018	14,000	67,000	24,000	50,100	155,100	1.1%
	2019	14,100	67,600	24,800	50,300	156,800	1.1%
	2020	14,200	68,200	25,700	50,500	158,600	1.1%
Average Annual Growth Rates							
	1998-2003	-14.6%	10.4%	-19.1%	-2.5%	-3.9%	
	2003-2010	2.5%	3.0%	3.1%	0.4%	2.1%	
	2010-2020	0.8%	0.7%	3.5%	0.4%	1.0%	
	2003-2020	1.5%	1.7%	3.3%	0.4%	1.4%	

Notes:

Other Operations includes military, non-commercial air taxi, and general aviation.

\1 Total from FAA TAF

\2 Total from Airport records

TABLE 2
FUTURE ANNUAL PASSENGER AIRCRAFT FLEET MIX

Air Carrier Aircraft	Seats	2003	2005	2010	2015	2020
757	180	17.1%	5.9%	5.6%	0.0%	0.0%
739	177	0.0%	0.0%	0.0%	5.3%	5.1%
738	162	0.0%	0.0%	0.0%	10.7%	10.3%
320	144	0.5%	0.0%	0.0%	26.6%	27.8%
M80	142	23.3%	35.6%	39.8%	0.0%	0.0%
733	134	10.4%	5.9%	5.6%	0.0%	0.0%
M80	129	3.3%	11.9%	5.6%	0.0%	0.0%
319	126	0.2%	0.0%	0.0%	0.0%	0.0%
717	117	15.8%	28.9%	32.4%	46.7%	56.8%
735	116	6.3%	11.9%	11.1%	10.7%	0.0%
D9S	106	13.3%	0.0%	0.0%	0.0%	0.0%
100	87	9.4%	0.0%	0.0%	0.0%	0.0%
DC9	78	0.5%	0.0%	0.0%	0.0%	0.0%
Total		100.0%	100.0%	100.0%	100.0%	100.0%
Total Operations		11,152	12,400	13,100	13,700	14,200

Regional Aircraft	Seats	2003	2005	2010	2015	2020
142/146 (NB)	85	1.0%	1.2%	2.3%	2.2%	2.1%
ARJ	82	0.2%	0.0%	0.0%	0.0%	0.0%
CR7	70	1.9%	2.3%	3.4%	4.5%	5.4%
CRJ/ERJ/ER4	50	40.6%	69.5%	69.4%	75.8%	80.9%
DH3 (TP)	50	0.6%	0.0%	0.0%	0.0%	0.0%
ATR (TP)	46	0.0%	0.0%	0.0%	0.0%	0.0%
ERD (RJ)	44	2.2%	1.1%	2.3%	3.0%	3.2%
DH8 (TP)	37	1.5%	2.5%	0.0%	0.0%	0.0%
ER3 (RJ)	37	4.0%	4.5%	4.6%	4.5%	4.1%
SF3 (TP)	34	12.3%	8.5%	8.0%	2.2%	0.0%
FRJ (RJ)	32	5.2%	4.7%	4.6%	4.5%	2.1%
EM2/SF3	30	0.0%	0.0%	0.0%	0.0%	0.0%
D38/J41	29	25.8%	3.8%	3.5%	3.3%	2.1%
BEH/BE1/J31	19	4.6%	2.0%	1.8%	0.0%	0.0%
Total		100.0%	100.0%	100.0%	100.0%	100.0%
Total Operations		52,234	58,500	63,500	65,400	68,200

TABLE 3
AIR CARRIER AIRCRAFT FLEET MIX CHARACTERISTICS

AIRCRAFT TYPE	MODEL	ENGINE TYPE	MTOW (POUNDS)
Heavy Aircraft			
Boeing 757	200	RB211-535E-4B	255,000
Boeing 757	200	PW2037	255,000
Boeing 757	300	RB211-535E-4B	270,000
Boeing 757	300	PW2043	270,000
Large Aircraft			
Boeing 737	300	CFM56-3B2	139,500
Boeing 737	500	CFM56-3B1	133,500
Boeing 737	800	CFM56-7B-24	174,200
Boeing 737	900	CFM56-7B-24	174,200
Airbus 320	100	CFM56-5A1	149,911
Airbus 320	200	CFM56-5A1	169,754
Airbus 319	112	CFM56-5B6	141,096
MD-80	83	PW-JT8D-219	160,000
MD-80	87	PW-JT8D-217C	140,000
DC-9	32	PW-JT8D-9	108,000
DC-9	51	PW-JT8D-17	121,000
Avro Regional Jet	70/85/100	ASE-LF507-1F	101,500
Fokker	100	RR-Tay 650	98,000
British Aerospace 146	100	ASE-ALF502R-5	84,000
British Aerospace 146	200	ASE-ALF502R-5	93,000
Boeing 717	200	RR-BR715	51,710
Embraer Regional Jet	145	AE3007-A1	42,328
Embraer Regional Jet	140	AE3007-A1/3	46,517
Embraer Regional Jet	135	AE3007-A1/3	44,092
Canadair Regional Jet	900	GE-CF34-8C5	80,500
Canadair Regional Jet	700	GE-CF34-8C1	72,500
Canadair Regional Jet	200	GE-CF34-3B1	51,000
De Havilland DHC8	300	PW123	43,000
Small Aircraft			
Saab	340	GE-CT7-5A2	28,000
British Aerospace Jetstream	41	ASE-TPE331-14GR	24,000
Beechcraft	1900D	PWC PT6A-67D	17,120
Fairchild Dornier 328	310	PWC-PW306B	34,524

MTOW=Maximum Takeoff Weight
Source: October 2003 Official Airline Guide

TABLE 4
CARGO AIRCRAFT FLEET MIX CHARACTERISTICS

AIRCRAFT TYPE	MODEL	ENGINE TYPE	MTOW (POUNDS)
Airbus 300	B4/203	CF6-50C2	363,756
Boeing 727	100C	JT8D-7	169,000
Boeing 727	200F	JT8D-15	209,500
Boeing 747	200C	JT9D-7Q	833,000
MD-11	11F	PW4460	602,500
DC-10	10CF	CF6-6D	440,000
DC-10	30CF	CF6-50C	555,000
Boeing 767	300	CF6-80A	350,000
Boeing 757	200	RB211-535E-4B	255,000
DC8-	62	JT3D-3B	350,000
DC8	73	CFM56-2	355,000
DC-9	41	JT8D-15	114,000

MTOW=Maximum Takeoff Weight
Source: 2001-2002 Cargo Landings from FAA Form 5100-108

TABLE 5
CARGO AIRCRAFT TAKEOFF REQUIREMENTS (12,600' RUNWAY)

Cargo Aircraft	Engine Type	Takeoff Weights (lbs.) Fuel	Payload	OEW	Total	OEW Plus Payload (lbs.)	Max. Structural Payload (lbs.)	Loss in Payload (lbs.)	MTOW	Percent of Total Payload	Percent of MTOW
A300-B4/203	CF6-50C2	88,631	78,252	195,117	362,000	273,369	78,252	0	363,756	100.0%	99.5%
B-727-100C	JT8D-7	45,500	35,800	87,696	169,000	123,500	35,800	0	169,000	100.0%	100.0%
B-727-200F	JT8D-15	60,600	43,300	100,700	204,600	144,000	43,300	0	209,500	100.0%	97.7%
B-747-200C	JT9D-7Q	243,000	244,670	345,330	833,000	590,000	244,670	0	833,000	100.0%	100.0%
MD-11F	PW4460	151,200	202,733	248,567	602,500	451,300	202,733	0	602,500	100.0%	100.0%
DC-10-10CF	CF6-6D	105,000	119,556	215,444	440,000	335,000	119,556	0	440,000	100.0%	100.0%
DC-10-30CF	CF6-50C	160,000	152,964	238,036	551,000	391,000	152,964	0	555,000	100.0%	99.3%
B-767-300	CF6-80A	72,000	88,248	189,752	350,000	278,000	88,248	0	350,000	100.0%	100.0%
B-757-200	RB211-535E-4B	67,000	47,060	136,940	255,000	188,000	47,060	0	255,000	100.0%	100.0%
DC-8-62F	JT3D-3B	110,600	91,440	138,560	340,600	230,000	91,440	0	350,000	100.0%	97.3%
DC-8-73F	CFM56-2	94,000	111,800	149,200	355,000	261,000	111,800	0	355,000	100.0%	100.0%
DC-9-41	JT8D-15	21,000	31,665	61,335	114,000	93,000	31,665	0	114,000	100.0%	100.0%
									Average	100.0%	99.5%

1. Runway lengths calculated based on specific aircraft manufacturers manuals for standard day temperature (15 degrees C) at 1009 elevation and adjusted for density altitude.
2. Mean daily high temperature of 65 degrees F and a pressure altitude of 1,009 feet yields a density altitude of approximately 1,900 feet.

TABLE 6
TAKEOFF DESTINATION AND DISTANCE

PASSENGER AIRCRAFT MARKETS

City	Distance (nautical miles)
Dallas	747
St. Louis	294
Chicago	209
Cleveland	141
New York	480
Houston	807
Cincinnati	56
Atlanta	376
Orlando	703
Detroit	144
Minneapolis	498
Washington	339
Charlotte	322
Pittsburgh	186
Philadelphia	413
Milwaukee	247
Ft. Lauderdale	593

CARGO AIRCRAFT MARKETS

City	Distance (nautical miles)
Toronto	306
St. Louis	294
New Orleans	664
Boston	615
Kansas City	487
Montreal	566
Rochester	352
Baltimore	352
Nashville	255
Charlotte	322
Sacramento	1,713
Atlanta	376
Chicago	209
Monterrey, MX	1,163
Dallas	747
Denver	940
Los Angeles	1,668
Brussels, Belgium	3,566
El Paso	1,176
Austin	879
Brownsville	1,069
Wichita	632
Ft. Lauderdale	593
Portland, OR	1,837
Salt Lake City	1,345

TABLE 7
AIR CARRIER AIRCRAFT TAKEOFF REQUIREMENTS (9,500' RUNWAY)

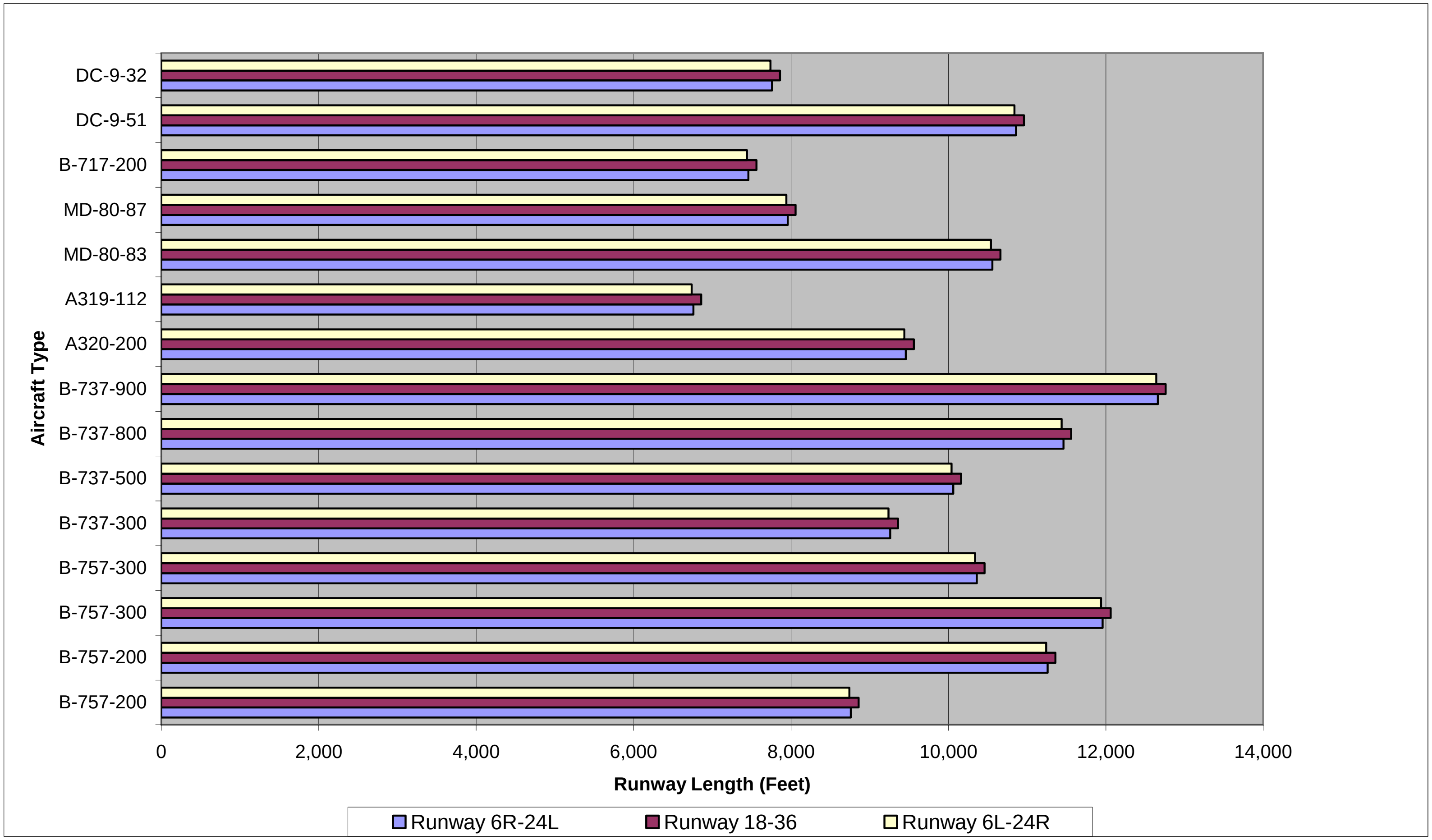
Air Carrier Aircraft	Engine Type	Takeoff Weights (lbs.) Fuel	Payload	OEW	Total	OEW Plus Payload (lbs.)	Max. Structural Payload (lbs.)	Loss in Payload (lbs.)	MTOW	Percent of Total Payload	Percent of MTOW
B-757-200	RB211-535E-4B	37,000	47,060	136,940	225,000	188,000	47,060	0	255,000	100.0%	88.2%
B-757-200	PW2037	58,000	53,125	130,875	246,000	188,000	53,125	0	255,000	100.0%	96.5%
B-757-300	PW2043	57,000	68,200	141,800	267,000	210,000	68,200	0	270,000	100.0%	98.9%
B-757-300	RB211-535E-4B	42,500	67,650	142,350	252,500	210,000	67,650	0	270,000	100.0%	93.5%
B-737-300	CFM56-3B2	26,500	33,960	72,540	133,000	106,500	33,960	0	139,500	100.0%	95.3%
B-737-500	CFM56-3B-1	26,500	33,470	69,030	129,000	102,500	33,470	0	133,500	100.0%	96.6%
B-737-800	CFM56-7B-24	26,700	47,000	91,300	165,000	138,300	47,000	0	174,200	100.0%	94.7%
B-737-900	CFM56-7B-24	27,000	35,420	94,580	157,000	130,000	45,720	10,300	174,200	77.5%	90.1%
A320-200	CFM56-5A1	36,374	44,028	89,350	169,754	133,380	44,028	0	169,754	100.0%	100.0%
A319-112	CFM56-5B6	15,434	37,116	86,476	141,096	125,662	37,116	0	141,096	100.0%	100.0%
MD-80-83	PW-JT8D-219	32,187	42,127	79,686	154,000	121,813	42,127	0	160,000	100.0%	96.3%
MD-80-87	PW-JT8D-217C	28,000	38,726	73,274	140,000	112,000	38,726	0	140,000	100.0%	100.0%
B-717-200	RR-BR715	18,000	26,170	69,830	114,000	96,000	26,170	0	114,000	100.0%	100.0%
DC-9-51	PW-JT8D-17	19,000	33,825	64,675	117,500	98,500	33,825	0	121,000	100.0%	97.1%
DC-9-32	PW-JT8D-9	24,645	11,000	56,855	92,500	67,855	30,145	19,145	108,000	36.5%	85.6%
									Average	94.3%	95.5%

1. Runway lengths calculated based on specific aircraft manufacturers manuals for standard day temperature (15 degrees C) at 1009 elevation and adjusted for density altitude.
2. Mean daily high temperature of 85 degrees F and a pressure altitude of 1,009 feet yields a density altitude of approximately 3,000 feet.

TABLE 8
CARGO AIRCRAFT TAKEOFF REQUIREMENTS (9,500' RUNWAY)

Cargo Aircraft	Engine Type	Takeoff Weights (lbs.) Fuel	Payload	OEW	Total	OEW Plus Payload (lbs.)	Max. Structural Payload (lbs.)	Loss in Payload (lbs.)	MTOW	Percent of Total Payload	Percent of MTOW
A300-B4/203	CF6-50C2	75,631	78,252	195,117	349,000	273,369	78,252	0	363,756	100.0%	95.9%
B-727-100C	JT8D-7	45,500	35,800	87,696	169,000	123,500	35,800	0	169,000	100.0%	100.0%
B-727-200F	JT8D-15	47,000	43,300	100,700	191,000	144,000	43,300	0	209,500	100.0%	91.2%
B-747-200C	JT9D-7Q	185,000	244,670	345,330	775,000	590,000	244,670	0	833,000	100.0%	93.0%
MD-11F	PW4460	108,700	202,733	248,567	560,000	451,300	202,733	0	602,500	100.0%	92.9%
DC-10-10CF	CF6-6D	88,500	119,556	215,444	423,500	335,000	119,556	0	440,000	100.0%	96.3%
DC-10-30CF	CF6-50C	115,400	152,964	238,036	506,400	391,000	152,964	0	555,000	100.0%	91.2%
B-767-300	CF6-80A	68,000	88,248	189,752	346,000	278,000	88,248	0	350,000	100.0%	98.9%
B-757-200	RB211-535E-4B	67,000	47,060	136,940	255,000	188,000	47,060	0	255,000	100.0%	100.0%
DC-8-62F	JT3D-3B	85,000	91,440	138,560	315,000	230,000	91,440	0	350,000	100.0%	90.0%
DC-8-73F	CFM56-2	69,000	111,800	149,200	330,000	261,000	111,800	0	355,000	100.0%	93.0%
DC-9-41	JT8D-15	21,000	31,665	61,335	114,000	93,000	31,665	0	114,000	100.0%	100.0%
									Average	100.0%	95.2%

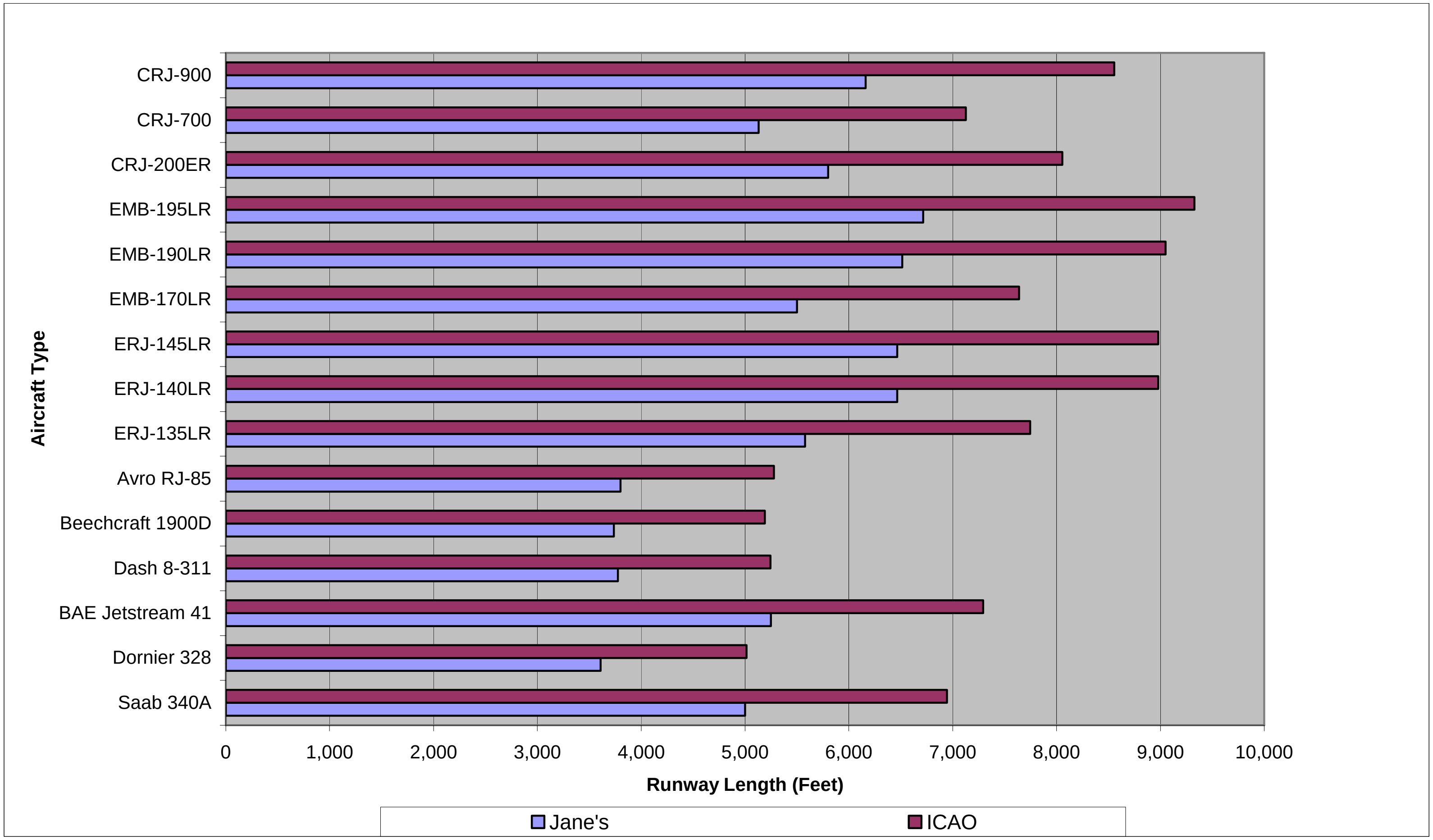
1. Runway lengths calculated based on specific aircraft manufacturers manuals for standard day temperature (15 degrees C) at 1009 elevation and adjusted for density altitude.
2. Mean daily high temperature of 65 degrees F and a pressure altitude of 1,009 feet yields a density altitude of approximately 1,900 feet.



Notes: 1. Mean daily high temperature of 85 degrees F and a pressure altitude of 1,009 feet yields a density altitude of approximately 3,000 feet.
2. Runway lengths calculated based on specific aircraft manufacturers manuals for standard day temperature (15 degrees C) and adjusted for density altitude.

Source: Aircraft Characteristic Manuals
H:\DAY\Runway Length\[Rwy 6R Length Analysis_12-04.xls]9,500' RW 01/27/05

Dayton International Airport	Runway Takeoff Length Requirements Air Carrier Aircraft - 100% MTOW	Exhibit 1



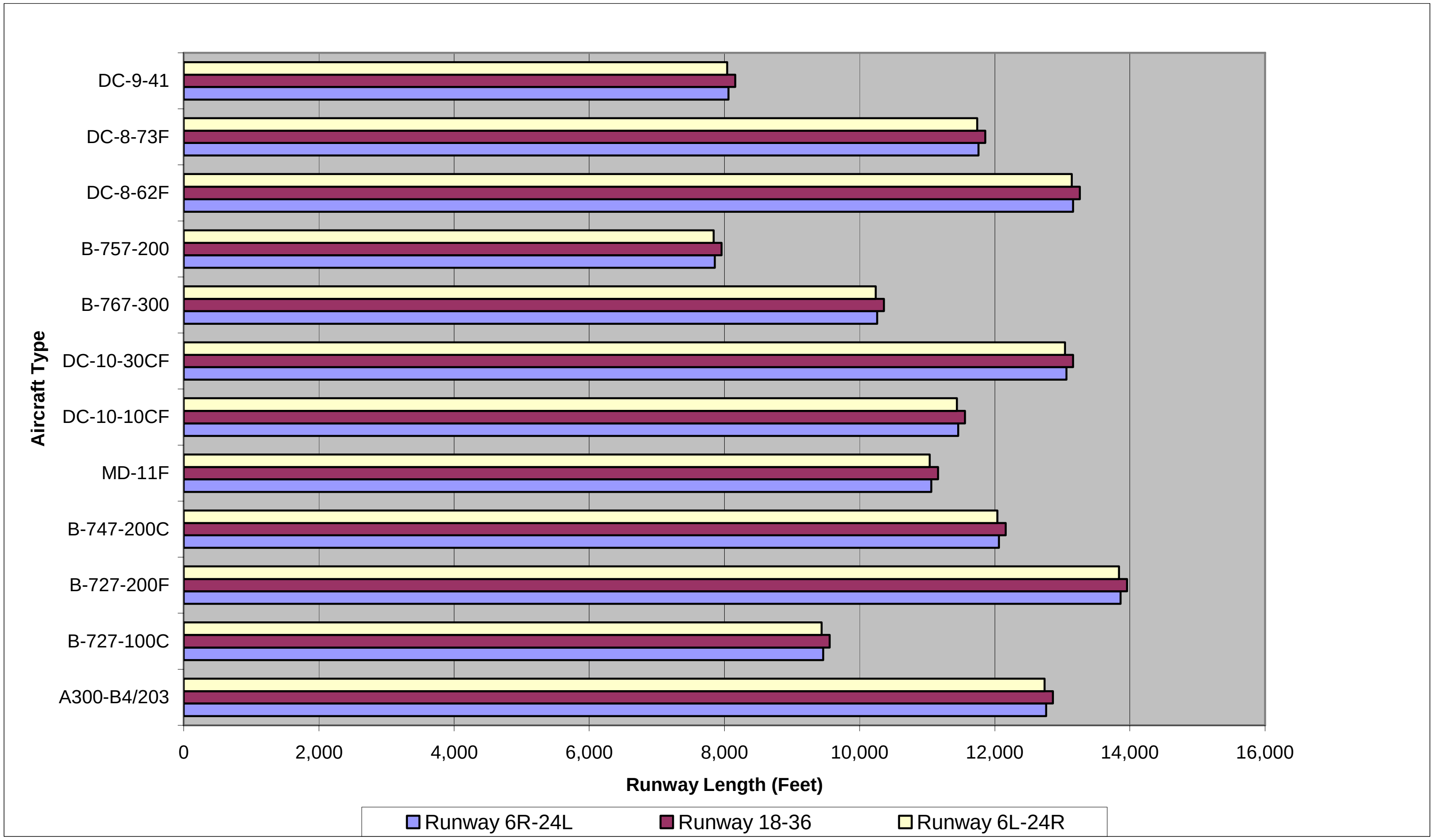
Notes:
1. Mean daily high temperature of 85 degrees F and a pressure altitude of 1,009 feet yields a density altitude of approximately 3,000 feet.
2. Runway lengths calculated based on specific aircraft manufacturers manuals for standard day temperature (15 degrees C) and adjusted for density altitude.

Source: Aircraft Characteristic Manuals
H:\DAY\Runway Length\[Rwy 6R Length Analysis_12-04.xls]9,500' RW 01/27/05

Dayton International Airport

Runway Takeoff Length Requirements Commuter Aircraft - 100% MTOW

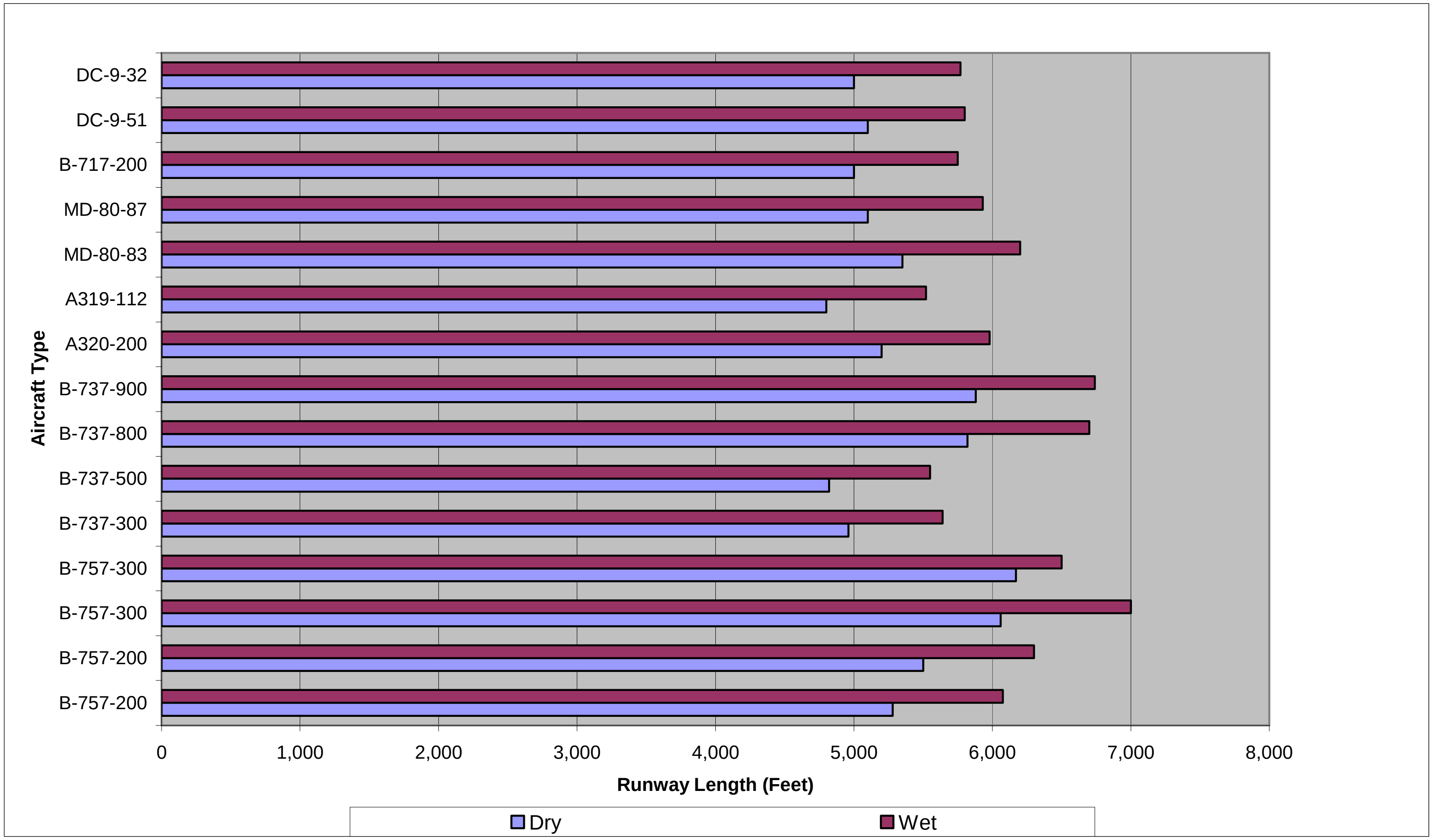
Exhibit 2



Notes:
1. Mean daily high temperature of 65 degrees F and a pressure altitude of 1,009 feet yields a density altitude of approximately 1,900 feet.
2. Runway lengths calculated based on specific aircraft manufacturers manuals for standard day temperature (15 degrees C) and adjusted for density altitude.

Source: Aircraft Characteristic Manuals
H:\DAY\Runway Length\[Rwy 6R Length Analysis_12-04.xls]Cargo T-O Graph 01/27/05

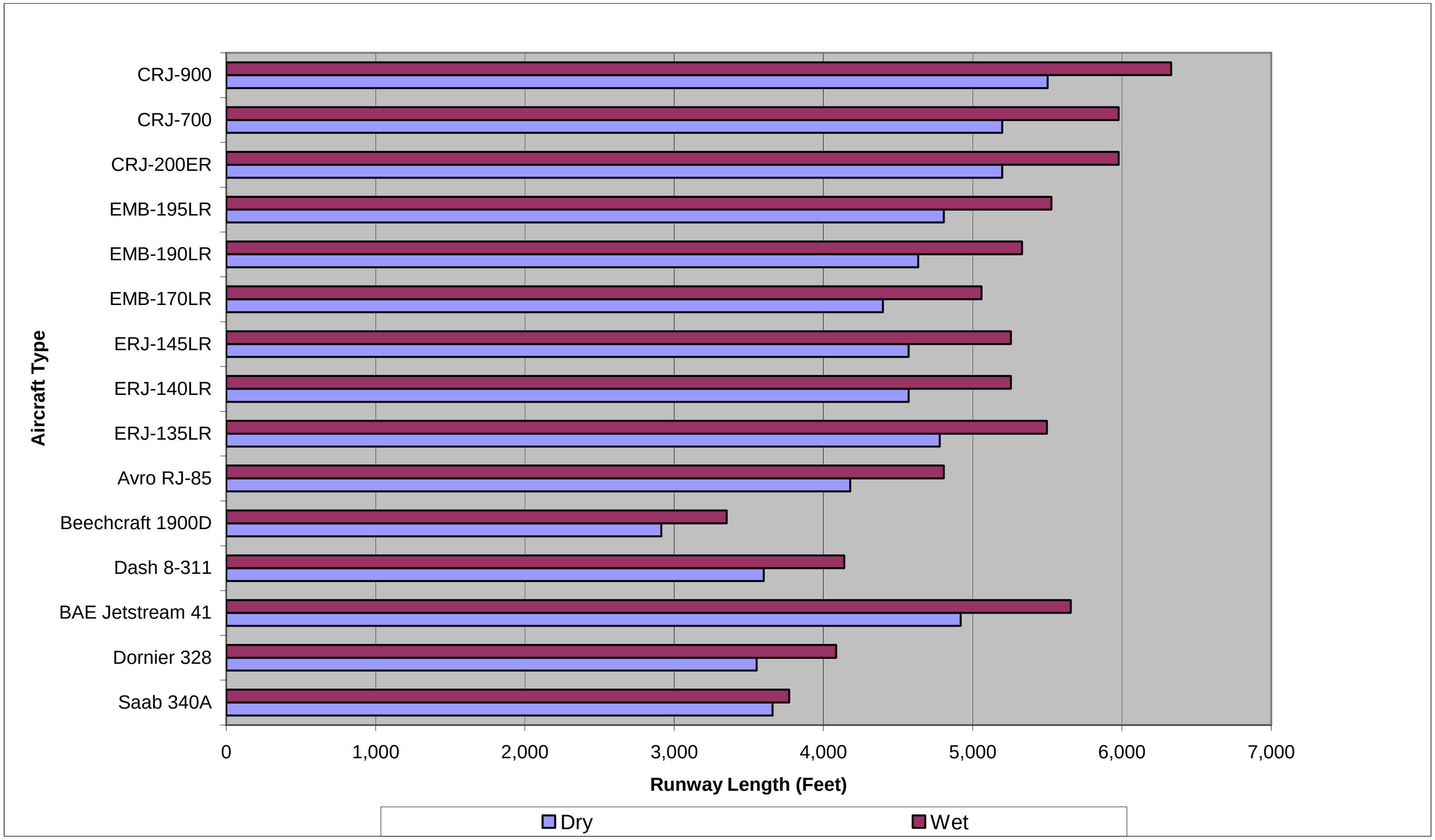
Dayton International Airport	**Runway Takeoff Length Requirements** **Cargo Aircraft - 100% MTOW**	**Exhibit 3**



Notes: 1. Mean daily high temperature of 85 degrees F and a pressure altitude of 1,009 feet yields a density altitude of approximately 3,000 feet.
2. Runway lengths calculated based on specific aircraft manufacturers manuals for standard day temperature (15 degrees C) and adjusted for density altitude.

Source: Aircraft Characteristic Manuals
H:\DAY\Runway Length\[Rwy 6R Length Analysis_12-04.xls]Cargo T-O Graph 01/27/05

Dayton International Airport	Runway Landing Length Requirements Air Carrier Aircraft	Exhibit 4



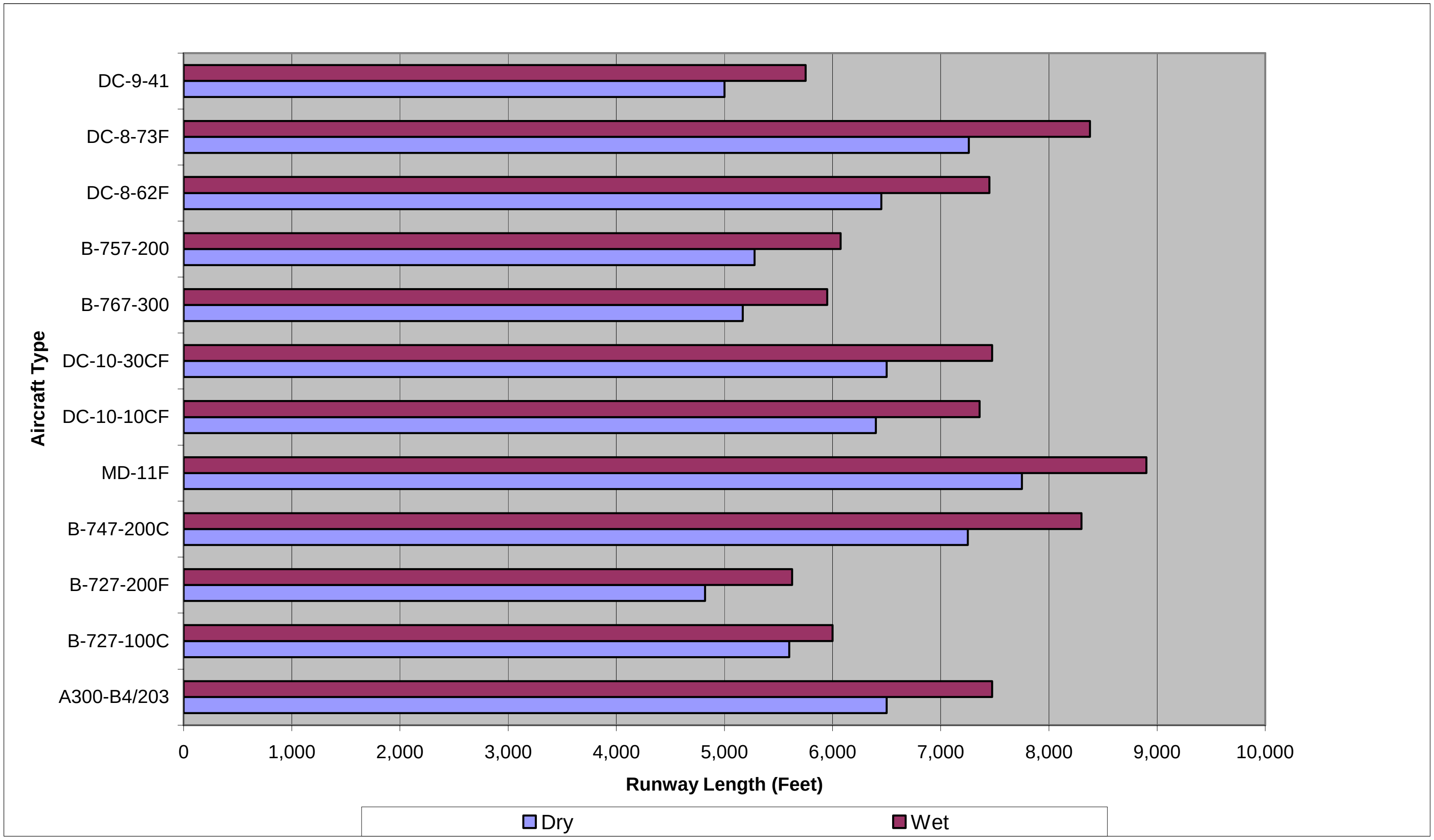
Notes: 1. Mean daily high temperature of 85 degrees F and a pressure altitude of 1,009 feet yields a density altitude of approximately 3,000 feet.
2. Runway lengths calculated based on specific aircraft manufacturers manuals for standard day temperature (15 degrees C) and adjusted for density altitude.

Source: Aircraft Characteristic Manuals
H:\DAY\Runway Length\[Rwy 6R Length Analysis_12-04.xls]Cargo T-O Graph 01/27/05

Dayton International Airport

Runway Landing Length Requirements Commuter Aircraft

Exhibit 5



Notes: 1. Mean daily high temperature of 65 degrees F and a pressure altitude of 1,009 feet yields a density altitude of approximately 1,900 feet.
2. Runway lengths calculated based on specific aircraft manufacturers manuals for standard day temperature (15 degrees C) and adjusted for density altitude.

Source: Aircraft Characteristic Manuals
H:\DAY\Runway Length\[Rwy 6R Length Analysis_12-04.xls]Cargo T-O Graph 01/27/05

Dayton International Airport

Runway Landing Length Requirements Cargo Aircraft

Exhibit 6

APPENDIX A

EXHIBIT A-1
DENSITY ALTITUDE CALCULATOR FOR AIR CARRIER AIRCRAFT

Density altitude is defined as the altitude in the International Standard Atmosphere that has the same air density as the air being evaluated.

Density Altitude Calculator

Altitude	1009	feet
Air Temperature	85	degrees F
Altimeter Setting	29.92	inches Hg
Dew Point	50	degrees F

Reset

Density Altitude	3054	feet
Absolute Pressure	28.845	inches Hg
Relative Density	91.37	percent

EXHIBIT A-2
DENSITY ALTITUDE CALCULATOR FOR CARGO AIRCRAFT

Density altitude is defined as the altitude in the International Standard Atmosphere that has the same air density as the air being evaluated.

Density Altitude Calculator

Altitude	1009	feet
Air Temperature	65	degrees F
Altimeter Setting	29.92	inches Hg
Dew Point	60	degrees F

Reset

Density Altitude	1867	feet
Absolute Pressure	28.845	inches Hg
Relative Density	94.65	percent

ATTACHMENT C

Runway 18/36 Relocation and Extension Feasibility Study

RUNWAY 18/36 RELOCATION AND EXTENSION FEASIBILITY STUDY

DAYTON INTERNATIONAL AIRPORT

DRAFT – FEBRUARY 15, 2005

PREPARED BY:
LANDRUM & BROWN

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

1.1 INTRODUCTION

This Runway 18/36 Feasibility Study will assess the need and operational benefits of the proposed Runway 18/36 extension and decoupling with Runway 6R/24L. As part of the Dayton International Airport (DAY) Master Plan Update, the City of Dayton Department of Aviation is proposing to extend existing Runway 18/36 from 8,500 feet to 9,500 feet in length. In addition, the Runway 36 threshold will be shifted 2,975 feet to the north and the Runway 18 threshold will be extended 3,975 feet to the north.

1.2 EXISTING CONDITIONS

The Dayton International Airport (DAY) has two parallel runways in the 6/24 direction, and one crosswind runway in the 18/36 direction. Runway 18/36 is 8,500 feet in length and intersects with Runway 6R/24L approximately 1,066 feet from the Runway 36 threshold. Runway 18 has Category I ILS approach capability and Runway 36 has visual approach capability. The runway intersection and inability to conduct Land and Hold Short Operations (LAHSO) has significantly reduced the utilization of Runway 18/36 and the ability to conduct simultaneous arrivals on Runway 18 and 24L. The intersecting runways also reduces the ability to conduct simultaneous arrivals on Runway 6R and departures on Runway 36.

Wind and weather dictate that north and south flows on Runway 18/36 occurs approximately 1.5 percent of the time. Actual usage of Runway 18/36 for arrivals and departures is significantly higher than that required due to wind and weather. Recent Automated Radar Terminal System (ARTS) data from December 27, 2003 through January 28, 2004 indicates that Runway 18/36 was used approximately 10.6 percent of the time. The majority of these operations consisted of arrivals on Runway 18 and departures on Runway 36.

1.3 PROJECT NEED

The primary objective of the Dayton International Airport Master Plan is to enhance safety, to reduce delays, increase airfield operational flexibility, and to lessen environmental impacts. The proposed Runway 18/36 extension and relocation project will meet the following airport needs:

- The need to provide sufficient runway length to accommodate the existing and future aircraft fleet mix during normal operations and when Runway 18/36 is needed exclusively due to wind and weather.
- The need to decouple Runways 6R/24L and 18/36 to enhance the flow of aircraft movements and reduce the number of aircraft runway crossings.
- The need to enhance the runway safety areas of the airport by providing an airfield layout that meets current FAA design standards.

- The need to enhance the flow and safety of the on-airport service road system by eliminating all vehicle runway crossings.
- The need to increase airfield capacity to meet future demand levels during all weather conditions.

Section 1.4 describes the proposed mechanism for addressing the needs listed above.

1.4 PROJECT BENEFITS

The following projects will enhance the operation and safety of DAY, and are recommended to address the airport's needs as identified in Section 1.3, above:

1.4.1 Runway 18/36 Extension to 9,500 Feet

As noted in the FAA Advisory Circular 150/5325-4A, *Runway Length Requirements for Airport Design*, a crosswind runway should have a length of at least 80 percent of the primary runway length. Based on these criteria, the takeoff length of Runway 18/36 is justified at 11,120 feet, which is 80 percent of the justified 13,900 feet for Runways 6R/24L and 6L-24R. However, the draft Future Airport Layout Plan dated January 19, 2005 shows a length of 9,500 feet for Runway 18/36. This runway length is less than the justified length of 11,120 feet due to various local considerations such as land use and cost-benefit. This proposed runway length could accommodate the air carrier fleet with a 95 percent or greater maximum takeoff weight, with the exception of the B-757-200 (88 percent), B-757-300 (93 percent), B-737-900 (90 percent), and DC-9-32 (85 percent) aircraft. In addition, the flight range distance for each aircraft is adequate to serve the current commercial markets at DAY.

The exclusive use of Runway 18/36 by air carrier and large commuter aircraft during 16-knot crosswind conditions is approximately 1.07 percent of the time, or approximately 94 hours per year. For a 20-knot crosswind condition, exclusive use of Runway 18/36 by cargo aircraft is approximately 0.2 percent of the time, or approximately 18 hours per year. And for a 13-knot crosswind condition, exclusive use of Runway 18/36 by small commuter and general aviation aircraft is approximately 2.1 percent of the time. The length, instrumentation, and location of Runway 18/36 should be capable of accommodating these aircraft type with the least amount of operational restrictions, and provide for the safe movement of aircraft.

According to recent Automated Radar Terminal System (ARTS) data from December 27, 2003 through January 28, 2004, Runway 18/36 was used approximately 10.6 percent of the time. This increased use of Runway 18/36 beyond the crosswind requirement, is a result of its close proximity to the terminal gate area and minimal taxi distance required during takeoff and landing operations. The added utilization of Runway 18/36 beyond its need for wind and weather places an increased importance on providing an adequate runway length to serve the existing and future aircraft fleet mix at DAY.

1.4.2 Runway 36 Airside Service Road

The relocated Runway 36 threshold 2,975 feet to the north will provide ample space for an “at grade” airside service road for vehicle access between the east services area and terminal gates. This service road will help to eliminate between 46 and 81 daily vehicle crossings of Runway 18/36 and the possibility of a serious runway incursion. This service road will provide a short and direct route with significant time and cost savings for ground operations. More importantly, it will eliminate the need for ground vehicles to contact the air traffic control tower for clearance when crossing the runway. There will also be a daily vehicle operating savings of approximately $476 with the use of this new service road (fuel and personnel time) compared to using the service road around the Runway 6R extension.

1.4.3 Decoupling of Runways 18/36 and 6R/24L

The relocation of Runway 18/36 to the north will reduce the number of aircraft runway crossings by passenger, general aviation, and cargo aircraft during takeoff and landing operations. It will also help to minimize taxi times, operational delays, and the potential for runway incursions. The number of aircraft runway crossings will be reduced from 12 to 5 (58 percent reduction) during takeoff operations, and from 11 to 4 (64 percent reduction) during landing operations.

Relocation of the Runway 36 threshold to the north will shift the pavement to the north of Runway 6R/24L and eliminate the runway intersection. This decoupling of the runways will allow Runway 6R/24L to run mixed operations while Runways 18/36 and 6R/24L can run dedicated arrival or departure operations based on the wind and traffic flow direction. This will provide a 28 percent increase in VMC capacity during non-peak arrival and departure periods. This proposed runway configuration could accommodate the anticipated 2024 design day flight schedule in conjunction with the increased utilization of Runway 18/36 when wind direction and speed require its exclusive use.

Relocation of Runway 18/36 to the north will provide a reduction in aircraft taxi distance for arrivals and departures to and from the aircraft operational areas (terminal, cargo, and east services area). The reduced taxi distance equates to approximately 192 miles per day (2004 flight schedule), or a daily savings of $10,358 in airline operating costs. There will also be less air emissions due to the reduced aircraft taxi distances.

The relocated Runway 18/36 can provide a significant savings in flight time and fuel costs in the amount of $242,506 per year. These savings would be realized with changes in airspace routes during southwest flow conditions. The results show a net savings of 79 nautical miles per day, which equates to 30 minutes per day in flight time. This would be a significant savings to the airlines in light of the continued increase in fuel costs.

1.5 CONCLUSIONS

This Runway 18/36 Feasibility Study shows that there are ample operational and safety benefits resulting from the proposed runway extension and relocation to the north. The increased runway length to 9,500 feet will accommodate the air carrier and commuter aircraft fleet with respectable takeoff weights, and will also accommodate air cargo aircraft when wind and weather dictate its exclusive use. The decoupling of Runway 18/36 and 6R/24L will provide a 28 percent increase in VMC capacity during non-peak arrival and departure periods. The Runway 36 threshold will be closer to the terminal gate area and require minimal taxi distance for departures, and will place aircraft closer to the terminal area during arrivals on Runway 18.

From a safety and controller workload standpoint, there will be a full 1,000-foot safety area on both runway ends. The number of vehicle runway crossings will be reduced, thereby avoiding unnecessary communications between the control tower and ground vehicles. The number of aircraft runway crossings will be reduced and improve the operational safety of the airfield geometry. In short, the proposed relocation and extension of Runway 18/36 will enhance the overall safety of aircraft and vehicular movements, and reduce operating cost to the airlines and users.

2. EXISTING CONDITIONS

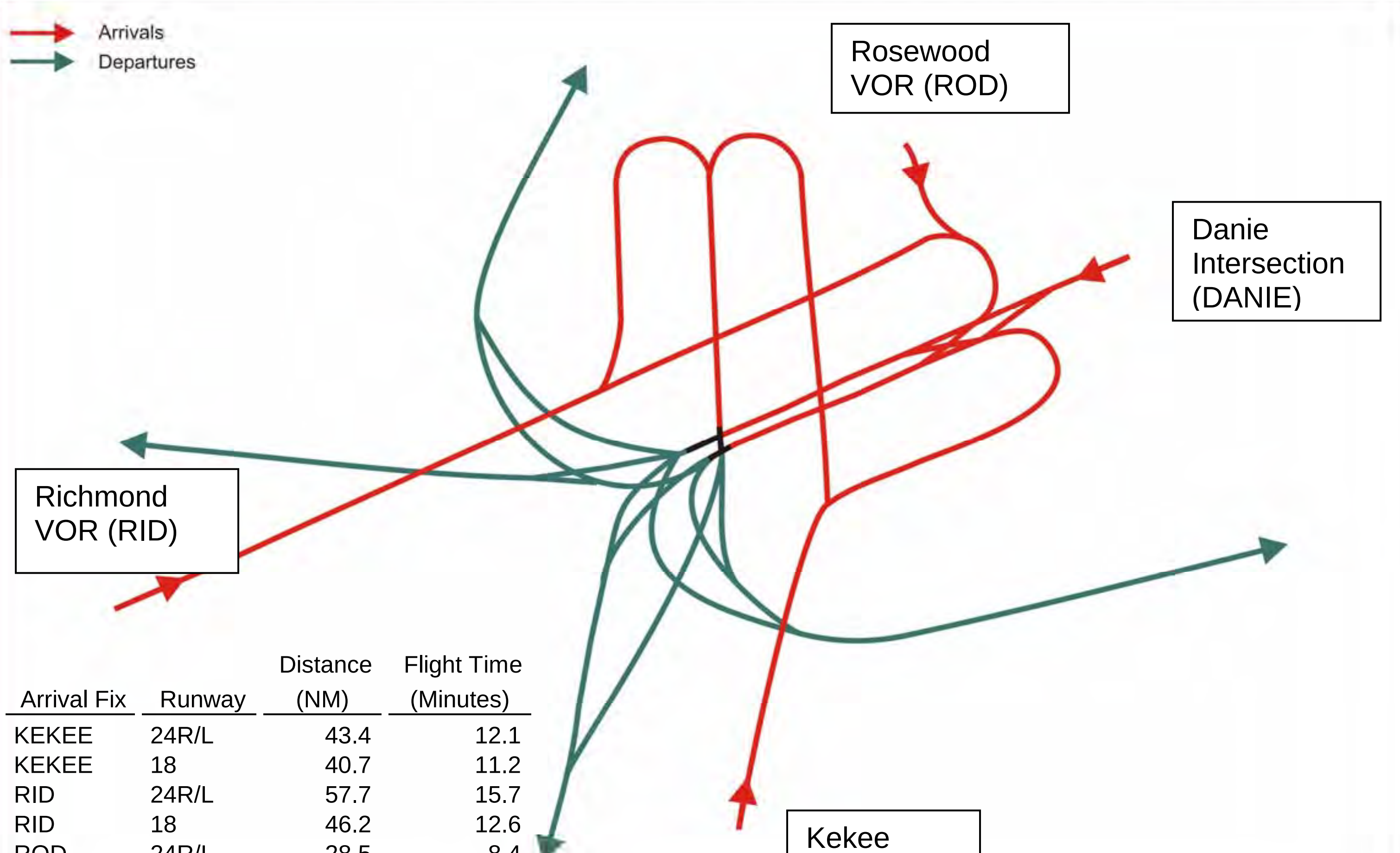
2.1 AIRPORT CHARACTERISTICS

Dayton International Airport (DAY) has two parallel runways. Runway 6R/24L is 7,000 feet in length and Runway 6L/24R is 10,900 feet in length. DAY also has one crosswind Runway 18/36 at 8,500 feet in length. Runway 18/36 intersects Runway 6R/24L approximately 1,066 feet from the Runway 36 threshold and about 3,400 feet from the Runway 24L threshold.

- Runway 6R/24L has Category I ILS approach capability (200-foot ceiling and ½ mile visibility) on the 24L end and non-precision Non-Directional Beacon (NDB) approach capability (471-foot ceiling and 1 mile visibility) on the 6R end.
- Runway 6L/24R has Category II/IIIb ILS approach capability (0-foot ceiling and 600-foot visibility) on the 6L end and Category I ILS approach capability (200-foot ceiling and ½ mile visibility) on the 24R end.
- Runway 18/36 has Category I ILS approach capability (200-foot ceiling and ½ mile visibility) on the 18 end and visual approach capability on the 36 end.

2.2 RUNWAY CONFIGURATIONS

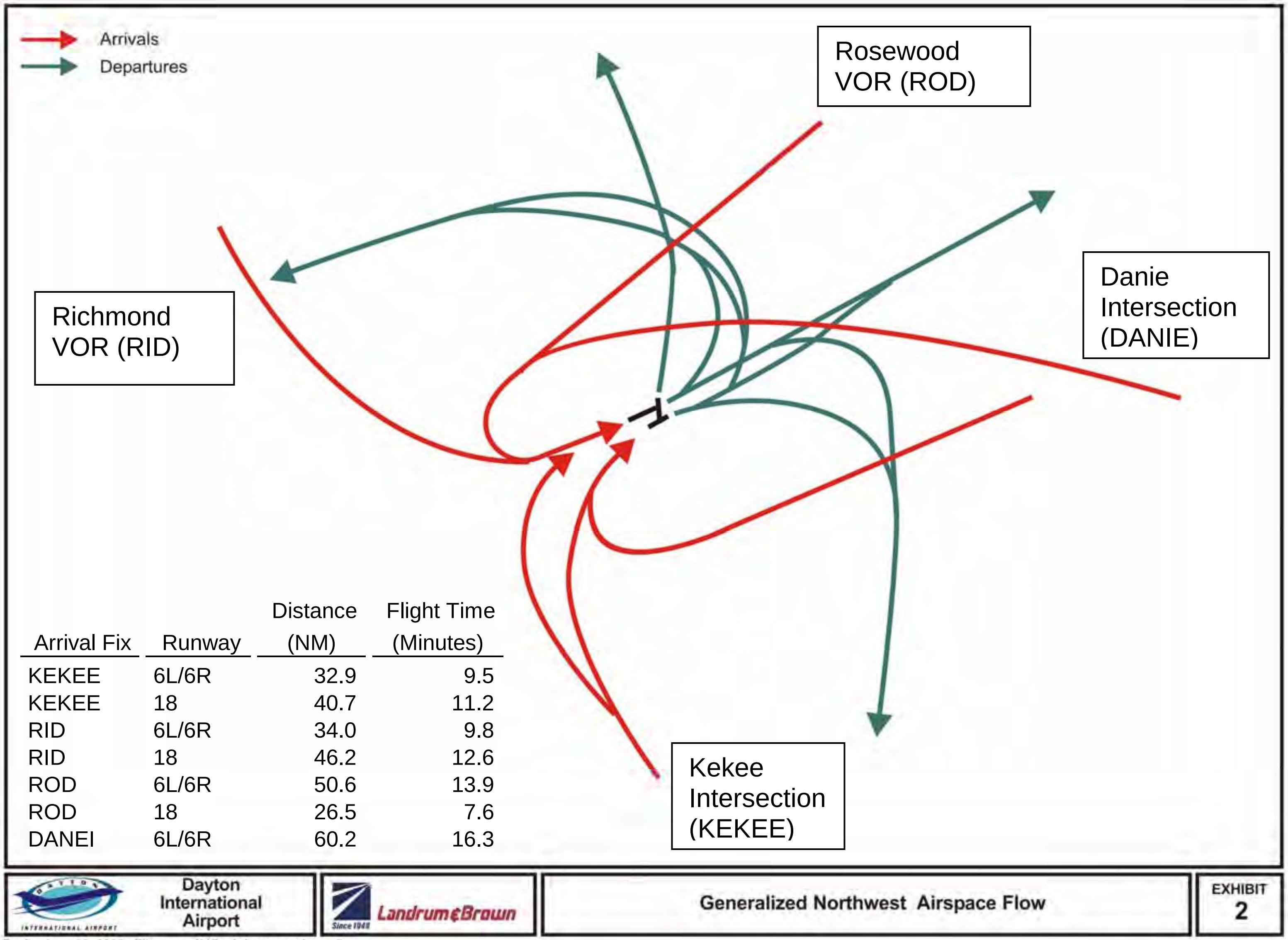
Exhibit 1 and **Exhibit 2** illustrate generalized airspace routes for the southwest and northeast configurations. The following describes the approach procedures taken from the current Jeppesen Charts and were verified by the local Air Traffic Control (ATC) during the March 2000 Simulation Study. Generally, arrivals enter the final approach airspace at altitude of 4,000 feet MSL for Runways 6L and 24R. Using standard IFR approach procedures, the typical length of final approach for these runways is 12 nautical miles. Arrivals enter the final approach airspace for Runway 24L at an altitude of 3,000 feet MSL. Since Runways 24R and 24L have simultaneous approach procedures, Runway 24L typically also has a final approach length of 12 nautical miles. Arrivals can enter the final approach airspace for Runways 18 and 36 at an altitude of 3,000 feet MSL. Since this runway does not have a parallel, the typical standard IFR final approach length for these runways is 9 nautical miles. Exhibits 1 and 2 also show the typical flight distance and travel times from the arrival fix for arriving aircraft based on these altitude and runway assignments.



Arrival Fix	Runway	Distance (NM)	Flight Time (Minutes)
KEKEE	24R/L	43.4	12.1
KEKEE	18	40.7	11.2
RID	24R/L	57.7	15.7
RID	18	46.2	12.6
ROD	24R/L	28.5	8.4
ROD	18	26.5	7.6
DANEI	24R/L	32.0	9.3

Dayton International Airport | Landrum & Brown | Generalized Southwest Airspace Flow | EXHIBIT 1

Draft: June 20, 2003 Filename X:\Day\airspace.cdr pg1



Arrival Fix	Runway	Distance (NM)	Flight Time (Minutes)
KEKEE	6L/6R	32.9	9.5
KEKEE	18	40.7	11.2
RID	6L/6R	34.0	9.8
RID	18	46.2	12.6
ROD	6L/6R	50.6	13.9
ROD	18	26.5	7.6
DANEI	6L/6R	60.2	16.3

Generalized Northwest Airspace Flow

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Ceiling and visibility vary with cloud conditions, fog, precipitation, and haze. The primary ATC procedures at DAY for various ceiling and visibility conditions are grouped into two air traffic categories, Visual Meteorological Conditions (VMC) and Instrument Meteorological Conditions (IMC) as shown in **Table 1**.

TABLE 1
ATC PROCEDURES WEATHER CRITERIA

WEATHER CONDITION	MAXIMUM CEILING AND VISIBILITY	MINIMUM CEILING AND VISIBILITY	NIGHTTIME PERCENT OCCURRENCE	DAYTIME PERCENT OCCURRENCE	ALL DAY PERCENT OCCURRENCE
VMC	Unlimited	1,000 feet, 3 miles	87.43%	86.11%	86.60%
IMC	1,000 feet, 3 miles	0	12.57%	13.89%	13.40%
Total			100.00%	100.00%	100.00%

Source: Landrum & Brown and National Weather Service Data (1973-2003). Assumes maximum 3-knot tailwind and 15-knot crosswind.

Wind and weather conditions play a significant role in dictating the choice of using the airport in a southwest or northeast flow direction. The orientation of the runways and the direction and speed of the wind and other operational criteria (airspace, construction, noise abatement, pilot preference, etc.) determine the direction in which DAY operates. In addition, runway length and taxi distances are major considerations on which the ATC and pilots use runways at DAY. For example, the runways are used differently during the nighttime cargo operations than they are during the daytime hours, when most passenger carrier operations occur. **Table 2** summarizes the annual occurrence of each runway operating plan by nighttime, daytime, and all day. As shown, southwest flow is the predominant operation with a combined VMC and IMC occurrence of approximately 77.7 percent of the time. Northeast flow provides an additional 21.3 percent coverage. The north and south flows occur about 1 percent of the time.

TABLE 2
ANNUAL OCCURRENCE OF RUNWAY OPERATING PLANS

CONFIGURATION	NIGHTTIME		DAYTIME		ALL DAY	
	VMC	IMC	VMC	IMC	VMC	IMC
Southwest	70.72 percent	8.87 percent	66.70 percent	4.92 percent	68.20 percent	9.55 percent
Northeast	16.21 percent	3.51 percent	18.55 percent	3.76 percent	17.67 percent	3.65 percent
South	0.23 percent	0.04 percent	0.38 percent	0.05 percent	0.33 percent	0.04 percent
North	0.27 percent	0.15 percent	0.48 percent	0.16 percent	0.40 percent	0.16 percent

Source: Landrum & Brown and National Weather Service Data (1973-2003).

Nighttime Runway Operational Considerations

The majority of cargo operations occur during the nighttime hours at DAY. UPS, (previously known as Menlo Worldwide Forwarding) has the majority of the cargo operations, which consist mainly of arrivals and departures on Runway 6L/24R due to its close proximity to their hub facility. The Runway 6R/24L length (7,000 feet) is too short for any cargo departures at 100 percent maximum takeoff weight. Under calm winds the preferred operating direction during nighttime hours is southwest flow, which occurs over 87 percent of the time. This southwest flow consists of primary operations on Runway 24R, with secondary operations on Runways 24L and 18. Northeast flow provides an additional 12 percent coverage with preferential use of Runway 6L by all aircraft operators.

When crosswinds exceed 20-knots (dry) or 15-knots (wet), the specific aircraft performance will require use Runway 18/36 exclusively for arrivals and departures. The crosswind component of wind direction and velocity is the resultant vector, which acts at a right angle to the runway. It is equal to the wind velocity multiplied by the trigonometric sine of the angle between the wind direction and the runway direction. Wind and weather dictate that north and south flows on Runway 18/36 occurs about 1 percent of the time. However, actual use of Runway 18/36 is considerably more and provides arrival and departure capability during non-peak operating periods. According to recent Automated Radar Terminal System (ARTS) data from December 27, 2003 through January 28, 2004, Runway 18/36 was used approximately 10.6 percent of the time as shown in **Table 3** below. The majority of these operations consisted of arrivals on Runway 18 and departures on Runway 36. Runway 18/36 is used in combination with the parallel 6/24 runways as a means of reducing taxi distances and improving air traffic flow. Examples of this include simultaneous departures on 36 and 24R, or arrivals on 18 and 24L. In fact, when Land and Hold Short Operations (LAHSO) were permitted, the use of Runway 18 for arrivals was significantly more. The proposed Runway 18/36 relocation to the north will eliminate its intersection with Runway 6R/24L and lessens the dependencies between operations on these two runways, particularly during VMC conditions, which will result in a higher use of Runway 18/36.

TABLE 3
ARTS DATA ANALYSIS

	6L	6R	18	24L	24R	36	Total
Arrival	21.5%	5.5%	12.3%	24.5%	35.5%	0.6%	100%
Departure	12.2%	6.8%	0.7%	22.8%	49.9%	7.5%	100%
Total	16.9%	6.2%	6.6%	23.7%	42.6%	4.0%	100%

Daytime Runway Operational Considerations

Currently, daytime operations consist mainly of passenger activity with some limited cargo activity. Southwest flow is the preferred mode of operation and consists of arrivals on Runway 24R, with occasional use of Runways 24L and 18. Runway 24R is the main departure runway with occasional use of Runway 24L and 18. Northeast flow mainly consists of arrivals on Runway 6L, with some use of Runway 6R during visual weather conditions. Runways 6L and 36 are used predominantly for commercial departures in a northeast flow, with small commercial and commuter aircraft using Runway 6R.

2.3 WIND AND WEATHER ANALYSIS

A wind and weather analysis for DAY was prepared using the Landrum & Brown WIND36 wind analysis computer program and 31 consecutive years of National Weather Service data for DAY (1973-2003). The purpose of this analysis is to determine how often the use of Runway 18/36 would be required considering several categories of weather conditions and with 13-knot, 16-knot, and 20-knot crosswind velocities.

- *All Weather* – All hours of weather data, regardless of cloud ceiling height or horizontal visibility.
- *Visual Meteorological Conditions (VMC)* – All hourly observations favorable to aircraft operations on the given runway when the cloud ceiling was 1,000 feet or higher and the horizontal visibility was 3 statute miles or better.
- *Category I* – All hourly observations favorable to aircraft operations on the given runway when the cloud ceiling was 300 feet to 999 feet, or the horizontal visibility was 3/8 mile to 2½ miles, inclusive.
- *Category II* – All hourly observations favorable to aircraft operations on the given runway when the cloud ceiling was 200 feet to 299 feet, or the horizontal visibility was 1/4 mile to 5/16 mile, inclusive.
- *Category III* – All hourly observations favorable to aircraft operations on the given runway when the cloud ceiling was zero to 199 feet, or the horizontal visibility was zero to 3/16 mile, inclusive.

Table 4 shows the percent of time that weather conditions would dictate use by runway end by weather category for a 13-knot, 16-knot, and 20-knot crosswind. When a runway orientation provides less than 95 percent wind coverage for any aircraft forecasted to use the airport on a regular basis, a crosswind runway is recommended. The 95 percent wind coverage is computed on the basis of the crosswind not exceeding the following:

- 10.5 knots for Airport Reference Codes (ARC) A-I and B-I
- 13 knots for ARC A-II and B-II
- 16 knots for ARC A-III, B-III, and C-I through D-III
- 20 knots for ARC A-IV through D-VI

Based on the existing and future aircraft fleet mix, the majority of the cargo aircraft fall into the 20-knot crosswind limitation, while all of the air carrier and larger commuter aircraft fall into the 16-knot crosswind limitation. Under the 16-knot crosswind, the exclusive use of Runway 18 (CAT I approach capability) is 0.19 percent of the time, while Runway 36 (visual approach capability) exclusive use is 0.29 percent of the time. The combined exclusive use of Runway 18/36 for all air carrier and large commuter aircraft due to crosswind limitations on the parallel 6/24 runways is approximately 0.4 percent of the time, or approximately 35 hours per year.

As part of the future relocated Runway 18/36 project, it is proposed to upgrade the Runway 36 end to have Category I approach capability. This upgrade would increase its exclusive use from 0.29 percent to 0.88 percent of the time for all air carrier and large commuter aircraft due to crosswind limitations. In this case, the combined exclusive use of Runway 18/36 with a 16-knot crosswind would be approximately 1.07 percent of the time, or approximately 94 hours per year. Taking this same operating condition and applying the 20-knot crosswind limitation will result in an exclusive use of Runway 18/36 approximately 0.2 percent of the time for cargo aircraft. This would require all of the cargo aircraft to use Runway 18/36 approximately 18 hours per year due to crosswind limitations on the parallel 6/24 runways.

A small percentage of the existing and future aircraft fleet mix would fall into the 13-knot crosswind limitation (small commuter, corporate, and general aviation aircraft). The majority of these operators would be certified to fly only during visual conditions. Dedicated use of Runway 18/36 would be approximately 2.1 percent of the time, or approximately 184 hours per year due to wind and weather conditions.

TABLE 4
EXCLUSIVE USE OF RUNWAY 18/36 DUE TO CROSSWINDS

Runway	Crosswind 13-Knots					
	Percent Use by Runway End and Weather Category					
	All Weather	VMC	IMC	CAT I	CAT II	CAT III
Runway 24	85.5	86.4	78.9	78.0	81.8	88.5
Runway 6	12.2	11.4	17.7	18.4	15.6	11.0
Runway 18	1.0	1.0	0.9	1.0	0.5	0.1
Runway 36	1.3	1.1	2.4	2.6	2.1	0.4
Total	**100**	**100**	**100**	**100**	**100**	**100**

Runway	Crosswind 16-Knots					
	Percent Use by Runway End and Weather Category					
	All Weather	VMC	IMC	CAT I	CAT II	CAT III
Runway 24	87.0	87.8	80.8	80.0	82.6	88.8
Runway 6	12.4	11.6	18.1	18.9	15.9	11.0
Runway 18	0.22	0.23	0.17	0.19	0.11	0.00
Runway 36	0.36	0.29	0.85	0.88	1.37	0.13
Total	**100**	**100**	**100**	**100**	**100**	**100**

Runway	Crosswind 20-Knots					
	Percent Use by Runway End and Weather Category					
	All Weather	VMC	IMC	CAT I	CAT II	CAT III
Runway 24	87.4	88.3	81.4	80.7	82.9	88.9
Runway 6	12.5	11.7	18.4	19.1	16.4	11.1
Runway 18	0.0	0.0	0.0	0.0	0.1	0.0
Runway 36	0.1	0.0	0.2	0.2	0.6	0.1
Total	**100**	**100**	**100**	**100**	**100**	**100**

Note: Dry runway conditions, 5-knot tailwind

3. FORECAST AIRCRAFT OPERATIONS AND FLEET MIX

3.1 FORECAST OF AVIATION ACTIVITY

Based on the FAA approved February 20, 2004 Forecasts of Aviation Activity, total annual operations are forecast to increase from approximately 125,217 in 2002 to 158,600 in 2020. This represents an average annual increase of 1.4 percent over the forecast period. **Table 5** summarizes the total annual aircraft operations forecast for Dayton International Airport.

Air carrier passenger operations are projected to grow 1.5 percent per year, and the regional passenger operations are projected to grow 1.7 percent per year, beginning in 2004. In addition, the cargo operations are anticipated to grow 3.3 percent per year.

UPS has recently acquired (December 2004) the Menlo Worldwide Forwarding freight hub at DAY that currently has 34 daily flights. The following information was taken from the UPS pressroom web site:

> The acquisition *(Menlo)* reinforces UPS's strategy of providing broad supply chain solutions to enable global commerce. As a result of the acquisition, UPS will expand its global capabilities and add guaranteed heavy airfreight services around the world, enabling customers to reach the global marketplace faster. This also means UPS will introduce new time-definite products such as overnight, two-day and deferred heavy airfreight to North America. *www.pressroom.ups.com (10/5/04).*
>
> "Menlo Worldwide Forwarding's capabilities complement UPS's ability to manage customers' shipments of any size, anywhere and in virtually any time frame," said Bob Stoffel, UPS senior vice president, Supply Chain Group. Menlo Worldwide Forwarding services soon will be sold under the UPS brand, he added. *www.pressroom.ups.com (1/24/05).*

In addition, the following are excerpts from an article in the October 21, 2004, Dayton Daily News:

> "If you look at their *(UPS)* commitment to going into a heavy weight, global, time-definite product, our hub *(DAY)* has those capabilities," Trimarco said. The Menlo executive said he expects to sign on with the new owner. He also said that he expects Dayton hub employment to remain stable under UPS provided the economy continues to grow.

Based on these comments, it has been assumed that UPS will continue to operate and grow the DAY cargo hub as anticipated in the February 20, 2004 Forecast of Aviation Activity.

3.2 AIRCRAFT FLEET MIX

Based on the aviation forecasts, **Table 6** summarizes the anticipated passenger air carrier and regional jet aircraft fleet mix at DAY. The air carrier fleet is projected to remain a narrow-body fleet. Based on the proposed year 2020 air carrier fleet mix, the Boeing 717-200 will represent approximately 57 percent of the fleet, the Airbus 320-200 will represent approximately 28 percent, and the Boeing 737-800/900 will represent approximately 15 percent of the air carrier fleet mix. Based on a total of 14,200 annual air carrier operations in year 2020, each of these aircraft type will exceed 500 annual operations.

Today, the commuter aircraft fleet is dominated with 50-seat regional jets, and small turboprop aircraft. Over the forecast horizon, the regional carriers are expected to phase out virtually all of the turboprop aircraft in favor of regional jets ranging in size from 32 to 90 seats. The Canadair Regional Jet CRJ-200/700 and the Embraer Regional Jet ERJ 135/140/145 will dominate the commuter aircraft fleet mix at approximately 86 percent of the fleet. The remainder of the commuter fleet will be composed of turboprop and other smaller regional jet aircraft as shown in Table 6. Based on a total of 68,200 annual commuter operations in year 2020, each of these aircraft type will exceed 500 annual operations.

With the recent acquisition of Menlo Worldwide Forwarding by UPS (December 2004), it was assumed that all cargo aircraft types that have served the airport over the past five years, along with the current UPS aircraft fleet would be used in this study. **Table 7** summarizes the anticipated cargo aircraft fleet mix.

3.3 EXCLUSIVE USE OF RUNWAY 18/36

As discussed under Section 2.3 above, the anticipated exclusive use of Runway 18/36 for air carrier and large commuter aircraft will be approximately 1.07 percent of the time due to crosswind limitations on the parallel 6/24 Runways. Likewise, exclusive use of Runway 18/36 by cargo aircraft will be approximately 0.2 percent of the time, and 2.1 percent of the time for other aircraft type (small commuter, general aviation, etc.). **Table 8** shows the anticipated number of annual operations that would need to use Runway 18/36 for air carrier, commuter, cargo, and other aircraft type. As shown, all of the aircraft serving DAY will be required to use Runway 18/36 during some period of time due wind and weather. Therefore, the physical characteristics of Runway 18/36 (length, instrumentation, threshold location, etc.) should be such that it can be used with the least amount of operational restrictions, and provide for the safe movement of aircraft throughout the airport.

TABLE 5
FORECAST OF AIRCRAFT OPERATIONS

	Year	Passenger Air Carrier	Passenger Regional	Cargo	Other	Total	Annual Change
Actual	1998	24,148	31,398	42,540	53,393	151,479 \1	
	1999	24,239	30,330	38,987	58,448	152,004 \1	0.3%
	2000	25,540	33,466	35,118	51,277	145,401 \2	-4.3%
	2001	21,795	40,114	22,706	47,994	132,609 \2	-8.8%
	2002	15,079	44,940	16,066	49,132	125,217 \2	-5.6%
Estimate	2003	11,000	51,500	14,700	47,100	124,300	-0.7%
Forecast	2004	12,200	54,400	14,800	47,300	128,700	3.5%
	2005	12,400	58,400	15,300	47,500	133,600	3.8%
	2006	12,600	59,600	15,800	47,700	135,700	1.6%
	2007	12,700	60,800	16,400	47,900	137,800	1.5%
	2008	12,900	62,000	17,000	48,100	140,000	1.6%
	2009	13,000	62,900	17,600	48,300	141,800	1.3%
	2010	13,100	63,500	18,200	48,500	143,300	1.1%
	2011	13,200	63,800	18,800	48,700	144,500	0.8%
	2012	13,400	64,200	19,500	48,900	146,000	1.0%
	2013	13,500	64,600	20,200	49,100	147,400	1.0%
	2014	13,600	65,000	20,900	49,300	148,800	0.9%
	2015	13,700	65,400	21,600	49,500	150,200	0.9%
	2016	13,800	65,900	22,400	49,700	151,800	1.1%
	2017	13,900	66,400	23,200	49,900	153,400	1.1%
	2018	14,000	67,000	24,000	50,100	155,100	1.1%
	2019	14,100	67,600	24,800	50,300	156,800	1.1%
	2020	14,200	68,200	25,700	50,500	158,600	1.1%
Average Annual Growth Rates							
	1998-2003	-14.6%	10.4%	-19.1%	-2.5%	-3.9%	
	2003-2010	2.5%	3.0%	3.1%	0.4%	2.1%	
	2010-2020	0.8%	0.7%	3.5%	0.4%	1.0%	
	2003-2020	1.5%	1.7%	3.3%	0.4%	1.4%	

Notes:

Other Operations includes military, non-commercial air taxi, and general aviation.

\1 Total from FAA TAF

\2 Total from Airport records

TABLE 6
FUTURE PASSENGER AIRCRAFT FLEET MIX

Air Carrier Aircraft	Seats	2003	2005	2010	2015	2020
757	180	17.1%	5.9%	5.6%	0.0%	0.0%
739	177	0.0%	0.0%	0.0%	5.3%	5.1%
738	162	0.0%	0.0%	0.0%	10.7%	10.3%
320	144	0.5%	0.0%	0.0%	26.6%	27.8%
M80	142	23.3%	35.6%	39.8%	0.0%	0.0%
733	134	10.4%	5.9%	5.6%	0.0%	0.0%
M80	129	3.3%	11.9%	5.6%	0.0%	0.0%
319	126	0.2%	0.0%	0.0%	0.0%	0.0%
717	117	15.8%	28.9%	32.4%	46.7%	56.8%
735	116	6.3%	11.9%	11.1%	10.7%	0.0%
D9S	106	13.3%	0.0%	0.0%	0.0%	0.0%
100	87	9.4%	0.0%	0.0%	0.0%	0.0%
DC9	78	0.5%	0.0%	0.0%	0.0%	0.0%
Total		100.0%	100.0%	100.0%	100.0%	100.0%
Total Operations		11,152	12,400	13,100	13,700	14,200

Regional Aircraft	Seats	2003	2005	2010	2015	2020
142/146 (NB)	85	1.0%	1.2%	2.3%	2.2%	2.1%
ARJ	82	0.2%	0.0%	0.0%	0.0%	0.0%
CR7	70	1.9%	2.3%	3.4%	4.5%	5.4%
CRJ/ERJ/ER4	50	40.6%	69.5%	69.4%	75.8%	80.9%
DH3 (TP)	50	0.6%	0.0%	0.0%	0.0%	0.0%
ATR (TP)	46	0.0%	0.0%	0.0%	0.0%	0.0%
ERD (RJ)	44	2.2%	1.1%	2.3%	3.0%	3.2%
DH8 (TP)	37	1.5%	2.5%	0.0%	0.0%	0.0%
ER3 (RJ)	37	4.0%	4.5%	4.6%	4.5%	4.1%
SF3 (TP)	34	12.3%	8.5%	8.0%	2.2%	0.0%
FRJ (RJ)	32	5.2%	4.7%	4.6%	4.5%	2.1%
EM2/SF3	30	0.0%	0.0%	0.0%	0.0%	0.0%
D38/J41	29	25.8%	3.8%	3.5%	3.3%	2.1%
BEH/BE1/J31	19	4.6%	2.0%	1.8%	0.0%	0.0%
Total		100.0%	100.0%	100.0%	100.0%	100.0%
Total Operations		52,234	58,500	63,500	65,400	68,200

TABLE 7
FUTURE CARGO AIRCRAFT FLEET MIX

Aircraft Type	Model	ARC	Engine Type	MTOW (pounds)
Airbus 300	B4/203	C-IV	CF6-50C2	363,756
Boeing 727	100C	C-III	JT8D-7	169,000
Boeing 727	200F	C-III	JT8D-15	209,500
Boeing 747	200C	D-V	JT9D-7Q	833,000
MD-11	11F	D-IV	PW4460	602,500
DC-10	10CF	C-IV	CF6-6D	440,000
DC-10	30CF	D-IV	CF6-50C	555,000
Boeing 767 (future)	300	C-IV	CF6-80A	350,000
Boeing 757 (future)	200	C-IV	RB211-535E-4B	255,000
DC-8	62	C-IV	JT3D-3B	350,000
DC-8	73	D-IV	CFM56-2	355,000
DC-9	41	C-III	JT8D-15	114,000

MTOW = Maximum Takeoff Weight
ARC = Airport Reference Code
Source: 2001-2002 Cargo Landings from FAA Form 5100-108

TABLE 8
EXCLUSIVE USE ANNUAL OPERATIONS ON RUNWAY 18/36

	ANNUAL AIRCRAFT OPERATIONS				
Year	Air Carrier	Commuter	Cargo	Others	Total
2004	130	582	30	993	1,735
2009	139	673	35	1,014	1,861
2014	145	695	42	1,035	1,917
2020	152	730	51	1,060	1,993

Air Carrier = 1.07 percent
Commuter = 1.07 percent
Cargo = 0.2 percent
Other = 2.1 percent

4. RUNWAY LENGTH REQUIREMENTS

As part of the Dayton International Airport Master Plan, it is proposed to extend existing Runway 18/36 from 8,500 feet to 9,500 feet in length. In addition, the Runway 36 threshold will be shifted 2,975 feet to the north and the Runway 18 threshold will be extended 3,975 feet to the north.

In accordance with FAA Advisory Circular 150/5325-4A, *Runway Length Requirements for Airport Design,* and the aircraft manufacturers' characteristics manuals, an analysis was conducted to determine the runway length requirements for passenger air carrier, commuter, and cargo aircraft operating at Dayton International Airport (DAY). Based on 100 percent maximum takeoff and landing weights, the table below shows the runway lengths that are justified for use by the three aircraft groups.

Runway Length Requirements

AIRCRAFT TYPE	TAKEOFF LENGTH AT MTOW (FT.)	LANDING LENGTH (FT./WET)
Air Carrier	12,800	7,000
Commuter	9,350	6,400
Cargo	13,900	8,900

These runway lengths are based on individual aircraft performance charts, and take into consideration the elevation and average temperature of the airport, runway conditions, and the operating weight and engine type of the aircraft. This analysis did not take into consideration local conditions, such as, environmental, topographical (except for runway gradient), physical, land use, political, or economic factors. However, these factors were taken into consideration for determination of the proposed runway lengths as depicted on the draft Future Airport Layout Plan (ALP) dated January 19, 2005.

4.1 TAKEOFF RUNWAY LENGTH

Runway 6L/24R is anticipated to have heavy use by cargo aircraft due to its close proximity to the UPS freight facility. All aircraft type and users are anticipated to use Runway 6R/24L; while mainly air carrier and commuter aircraft will use Runway 18/36, with use by cargo aircraft when wind and weather dictate. Based on these runway use assumptions, the following runway takeoff lengths are justified at DAY.

Justified Takeoff Runway Lengths

RUNWAY	RUNWAY LENGTH (FT.)
6R/24L	13,900
6L-24R	13,900
18/36	11,120

In accordance with Advisory Circular 150/5325-4A, a crosswind runway should have a length of at least 80 percent of the primary runway length. Based on these criteria, Runway 18/36 is justified at a takeoff length of 11,120 feet, which is 80 percent of the justified 13,900 feet for Runways 6R/24L and 6L-24R.

The draft Future ALP proposed a length of 9,500 feet for Runway 18/36. This runway length is less than the justified length of 11,120 feet in accordance with FAA Advisory Circular due to various local factors as previously noted. The proposed runway length of 9,500 feet can accommodate the air carrier fleet with a 95 percent or greater MTOW, with the exception of the B-757-200 (88 percent), B-757-300 (93 percent), B-737-900 (90 percent), and DC-9-32 (85 percent) aircraft. In addition, the flight range distance for each aircraft is adequate to serve the current commercial markets at DAY.

Based on the draft *Runway Length Requirements Analysis*, dated February 9, 2005, it has been demonstrated that the 9,500-foot Runway 18/36 length as depicted on the January 19, 2005 Future ALP is justified based on the existing and future aircraft fleet mix, and anticipated runway usage. The proposed runway length is less than what is justified per the FAA Advisory Circular planning standards due to local considerations such as land use and cost-benefits. The proposed runway length will provide adequate aircraft takeoff and landing performance based on current markets being served from DAY.

4.2 LANDING RUNWAY LENGTH

Landing runway length requirements were also determined for the existing and future air carrier, commuter, and cargo aircraft fleet mix at DAY. These runway landing length requirements are based on 100 percent maximum landing weights. All of the air carrier aircraft will be able to land on a 7,000-foot long runway, while all of the commuter aircraft will be able to land on a 6,400-foot long runway under wet conditions. In addition, all of the cargo aircraft fleet will be able to land on an 8,900-foot runway under wet conditions. Based on these landing runway length requirements, all of the existing and future aircraft fleet mix at DAY will be able to land at 100 percent of its landing weight on the proposed 9,500-foot long Runway 18/36 as depicted on the January 19, 2005 Future ALP.

5. RUNWAY INCURSIONS

5.1 VEHICLE RUNWAY CROSSINGS

Ground vehicles encroaching onto the runway surface or within their defined safety area have the potential to cause a significant number of airport runway incursions. A survey was taken from April 5 through April 10, 2004 to document all runway crossings made by ground vehicles at DAY. Throughout this time period there were between 46 and 81 vehicle crossings of Runway 18/36 per day, with a total of 103 runway (18, 24R, 24L) crossings in a single day. Runway 18/36 receives approximately 78 percent of all vehicle runway crossings throughout the airport. Every crossing has the potential to conflict with aircraft utilizing the runways for takeoffs and landings. Also, every runway crossing has the potential to lead to an operational error on the part of the air traffic controller or vehicle operator, resulting in an aircraft accident with potential fatalities.

According to recent data from Airport Operations, DAY has had seven incursions over the past 3-½ years. Of these, five have involved Runway 18/36. Two of these incursions involved vehicles either being on a runway or crossing a runway with an aircraft on the runway.

The main goal should be to avoid all vehicle runway crossings with the exception of those performing maintenance or inspection on the runway. Although current vehicle crossings to deliver maintenance parts and pick up employees have been reduced, there is still a need to find a preeminent solution that will avoid all runway crossings.

Currently, there is no dedicated airside service road between the passenger terminal area and the east side of the airport that does not cross a runway. Airline maintenance facilities, the airport maintenance complex, fuel farms, and other airline and airport support facilities are located on the opposite side of Runway 18/36 from the passenger terminal. Each runway crossing requires direct contact with air traffic control and requires them to divert their attention from the managing of aircraft operations (air and ground movements). This coordination with vehicle traffic also results in additional controller workload.

Relocating the Runway 36 threshold 2,975 feet to the north provides space for a dedicated “at-grade” airside service road between the east services area and terminal gates. The only other “at-grade” alternative service road route that does not require a runway crossing is around the proposed Runway 6R extension project. **Exhibit 3** illustrates these two “at-grade” service road routes between the east services area and terminal gates. **Table 9** shows the vehicle travel distance and time, operating cost, and potential cost savings for the two service road routes.

TABLE 9
VEHICLE SERVICE ROAD ROUTES

Route	Travel Distance (mi.)	Travel Time (min.)	Average Vehicle Operating Cost 1/	Daily Vehicle Operating Cost
Route 1 – South Side of Extended Runway 6R/24L	6.1	14.6	$30	$620.50
Route 2 – Behind Relocated Runway 36 Threshold	1.4	3.4	$30	$144.5

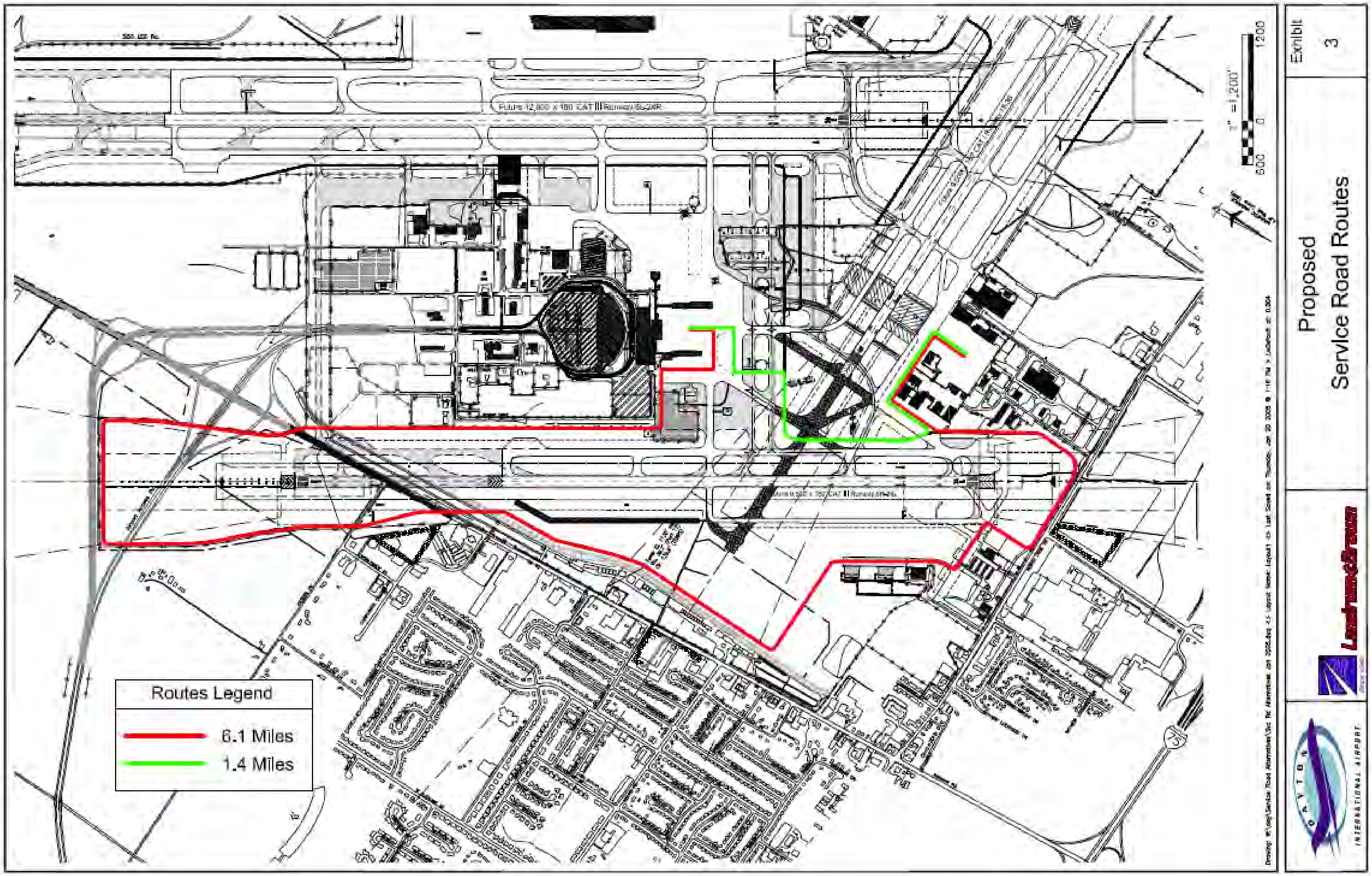
Notes: Travel speed of 25 mph
Average vehicle operating cost of $30 per hour
Assumes 85 daily vehicle crossings
1/ Vehicle operating costs for DAY field maintenance pick-up truck (includes maintenance, operator wages, benefits, fuel, etc.)

On a daily bases, there will be a significant time and cost savings with the proposed service road located behind the relocated Runway 36 threshold when traveling between the east services area and terminal gates. There should be a daily vehicle operating savings of approximately $476 with the use of this service road. In addition, this service road would be in full compliance with the FAR height clearances, it is also outside of the runway safety area and navigational aid critical areas; and most importantly, it can be used without contacting the control tower for clearance. This proposed service road will provide the following benefits:

- Unrestricted access by approved airside vehicles and personnel
- Eliminates 78 percent of all airfield runway crossings
- Eliminates all vehicle crossings of Runway 18/36
- Eliminates verbal contact with control tower
- Reduce the potential for runway incursions
- Reduce air traffic controller workload
- Reduced vehicle travel distance
- Improve worker productivity
- Reduce vehicle operating costs

These benefits and cost savings are based on the assumption that the Runway 6R extension will be constructed, and all vehicles would be required to use the service road around the Runway 6R end. That this would be the only “at-grade” service road route available to connect the terminal and east services area without requiring a runway crossing. An additional service road alternative looked at constructing a service road tunnel under existing Runway 18/36 to avoid an at grade cross of the runway. However, preliminary analysis of this alternative indicates that the tunnel would need to be approximately 450 feet long with additional distance for transition ramps to meet existing ground elevations. If the proposed relocation of Taxiway ‘A’ (600-foot separation) were constructed as shown on the Future ALP, the tunnel length would increase to approximately 650 feet. It is believed that the service road tunnel alternative would be very cost prohibitive in lieu of an “at grade” service road around the relocated Runway 36 or 6R ends.

EXHIBIT 3
PROPOSED SERVICE ROAD ROUTES



5.2 REDUCED AIRCRAFT TAXI DISTANCE AND RUNWAY CROSSINGS

Benefits resulting from the relocation of Runway 18/36 include a reduction in taxi distance for arrivals and departures. In addition, there is a delay savings and safety benefit from the de-coupling of Runways 18/36 and 6R/24L. Air carrier and cargo aircraft accessing Runway 24L for departures, or returning to the cargo hub and terminal gates after arriving on Runway 6R are required to cross Runway 18/36. By shifting the 36 threshold to the north side of Taxiway Bravo, aircraft can taxi behind the 36 threshold along Taxiway Echo and have no impact on Runway 36 departures and Runway 18 arrivals.

A taxi distance analysis was performed based on the existing airfield configuration and the proposed Runway 18/36 relocation. Arrival and departure taxi distances were calculated from the cargo hub and terminal gate area. Departure distances were measured to the runway threshold and arrival distances were measured from the midpoint of each runway.

Table 10 shows the taxi distance by aircraft type for arrivals and departures, and by runway end for both the existing airfield configuration and the proposed relocated Runway 18/36 configuration. The existing airfield configuration would have a total aircraft taxi distance of approximately 1,450 miles per day, and the proposed relocated Runway 18/36 airfield configuration would have a taxi distance of 1,258 miles per day. The difference in taxiway distance would be approximately 192 miles (166 nautical miles) per day. Using an average taxi speed of 15 knots would yield a taxi timesaving of 11 hours (664 minutes) per day. Based on an average passenger aircraft ground delay operating cost of $15.60 per minute for the 2003 aircraft fleet mix, this equates to a taxi savings of $10,358 per day. **Table 11** shows the direct operating expenses per minute, for air carrier and commuter aircraft based on the current fleet mix operating at DAY. In addition, the reduced taxi distance will also result in less air emissions.

The relocation of Runway 18/36 to the north would reduce the number of runway crossings by passenger, general aviation, and cargo aircraft during takeoff and landing operations. **Table 12** shows the total number of existing and future runway crossings from each service area for takeoff and landing operations. The existing airfield geometry assumes that the Runway 6R extension has been completed, and the future airfield geometry includes the relocation and extension of Runway 18/36. The specific takeoff and landing taxi routes are shown on **Exhibits 4, 5, 6 and 7** for the existing and future airfield geometries. There will be a significant reduction from 12 to 5 in the total number of runway crossings during takeoff operations from the three operational areas. In addition, the number of runway crossings during landings will be reduced from 11 to 4 crossings. It should be noted that the number of runway crossings <u>does not</u> include crossing of runways during the actual takeoff and landing operation, but only during the ground taxi operation. For example, during landings on Runway 24R, the aircraft will fly over Runway 18/36 and require coordination with operations on this runway. In addition, during departures on existing Runway 18/36, the aircraft will crossover Runway 6R/24L and require coordination with operations on this runway. The reduction in runway crossings will help to minimize taxi times, operational delays, and the potential for runway incursions.

TABLE 10
AIRCRAFT TAXI DISTANCE ANALYSIS

Table 10: Aircraft Taxi Distance Analysis — Dayton International Airport
Aircraft Activity between 7AM and 11PM — Runway 18-36 Relocation and Extension Feasibility Study

EXISTING AIRFIELD GEOMETRY

Southwest Flow (Arrivals Only)

		2004 Arrival Activity				Taxi Distance From Runway (feet)				2004 Existing Taxi Distance (feet)			
From	Runway	Air Carrier	Cargo	Other	Total	Air Carrier	Cargo	Other	Total	Air Carrier	Cargo	Other	Total
	24R	-	4	-	4	7,370	3,340	11,270	21,980	-	13,360	-	87,920
SOUTH	24L	35	-	1	36	3,260	9,320	7,160	19,740	114,100	-	7,160	710,640
	18	-	-	-	-	6,760	9,760	4,920	21,440	-	-	-	-
	24R	2	-	8	10	7,370	3,340	11,270	21,980	14,740	-	90,160	219,800
WEST	24L	-	-	-	-	3,260	9,320	7,160	19,740	-	-	-	-
	18	-	-	-	-	6,760	9,760	4,920	21,440	-	-	-	-
	24R	34	10	13	57	7,370	3,340	11,270	21,980	250,580	33,400	146,510	1,252,860
NORTH	24L	-	-	-	-	3,260	9,320	7,160	19,740	-	-	-	-
	18	-	-	-	-	6,760	9,760	4,920	21,440	-	-	-	-
	24R	-	-	-	-	7,370	3,340	11,270	21,980	-	-	-	-
EAST	24L	32	-	11	43	3,260	9,320	7,160	19,740	104,320	-	78,760	848,820
	18	-	-	-	-	6,760	9,760	4,920	21,440	-	-	-	-
	Total:	103	14	33	150					Southwest Flow Total (7AM-11PM):			3,120,040

Northeast Flow (Departures Only)

		2004 Departure Activity				Taxi Distance To Runway (feet)				2004 Existing Taxi Distance (feet)			
To	Runway	Air Carrier	Cargo	Other	Total	Air Carrier	Cargo	Other	Total	Air Carrier	Cargo	Other	Total
	6L	-	6	-	6	10,970	6,950	14,430	32,350	-	41,700	-	194,100
SOUTH	6R	27	-	10	37	7,940	14,000	11,840	33,780	214,380	-	118,400	1,249,860
	36	-	-	-	-	2,240	6,880	1,900	11,020	-	-	-	-
	6L	2	4	5	11	10,970	6,950	14,430	32,350	21,940	27,800	72,150	355,850
WEST	6R	-	-	-	-	7,940	14,000	11,840	33,780	-	-	-	-
	36	-	-	-	-	2,240	6,880	1,900	11,020	-	-	-	-
	6L	31	8	8	47	10,970	6,950	14,430	32,350	340,070	55,600	115,440	1,520,450
NORTH	6R	-	-	-	-	7,940	14,000	11,840	33,780	-	-	-	-
	36	-	-	-	-	2,240	6,880	1,900	11,020	-	-	-	-
	6L	-	-	-	-	10,970	6,950	14,430	32,350	-	-	-	-
EAST	6R	27	-	9	36	7,940	14,000	11,840	33,780	214,380	-	106,560	1,216,080
	36	-	-	-	-	2,240	6,880	1,900	11,020	-	-	-	-
	Total:	87	18	32	137					Northeast Flow Total (7AM-11PM):			4,536,340

Existing Taxi Distance Per Day (feet): 7,656,380
In miles: 1,450

FUTURE RELOCATED 18-36 GEOMETRY

Southwest Flow (Arrivals Only)

		2004 Arrival Activity				Taxi Distance From Runway (feet)				2004 Future Taxi Distance (feet)			
From	Runway	Air Carrier	Cargo	Other	Total	Air Carrier	Cargo	Other	Total	Air Carrier	Cargo	Other	Total
	24R	-	4	-	4	7,370	3,340	11,270	21,980	-	13,360	-	87,920
SOUTH	24L	35	-	1	36	3,260	9,320	7,160	19,740	114,100	-	7,160	710,640
	18	-	-	-	-	6,760	9,760	4,920	21,440	-	-	-	-
	24R	-	-	-	-	7,370	3,340	11,270	21,980	-	-	-	-
WEST	24L	-	-	-	-	3,260	9,320	7,160	19,740	-	-	-	-
	18	2	-	8	10	6,760	9,760	4,920	21,440	13,520	-	39,360	214,400
	24R	-	10	-	10	7,370	3,340	11,270	21,980	-	33,400	-	219,800
NORTH	24L	-	-	-	-	3,260	9,320	7,160	19,740	-	-	-	-
	18	34	-	13	47	6,760	9,760	4,920	21,440	229,840	-	63,960	1,007,680
	24R	-	-	-	-	7,370	3,340	11,270	21,980	-	-	-	-
EAST	24L	32	-	11	43	3,260	9,320	7,160	19,740	104,320	-	78,760	848,820
	18	-	-	-	-	6,760	9,760	4,920	21,440	-	-	-	-
	Total:	103	14	33	150					Southwest Flow Total (7AM-11PM):			3,089,260

Northeast Flow (Departures Only)

		2004 Departure Activity				Taxi Distance To Runway (feet)				2004 Future Taxi Distance (feet)			
To	Runway	Air Carrier	Cargo	Other	Total	Air Carrier	Cargo	Other	Total	Air Carrier	Cargo	Other	Total
	6L	-	6	-	6	10,970	6,950	14,430	32,350	-	41,700	-	194,100
SOUTH	6R	27	-	10	37	7,940	14,000	11,840	33,780	214,380	-	118,400	1,249,860
	36	-	-	-	-	2,240	6,880	1,900	11,020	-	-	-	-
	6L	-	4	-	4	10,970	6,950	14,430	32,350	-	27,800	-	129,400
WEST	6R	-	-	-	-	7,940	14,000	11,840	33,780	-	-	-	-
	36	2	-	5	7	2,240	6,880	1,900	11,020	4,480	-	9,500	77,140
	6L	-	8	-	8	10,970	6,950	14,430	32,350	-	55,600	-	258,800
NORTH	6R	-	-	-	-	7,940	14,000	11,840	33,780	-	-	-	-
	36	31	-	8	39	2,240	6,880	1,900	11,020	69,440	-	15,200	429,780
	6L	-	-	-	-	10,970	6,950	14,430	32,350	-	-	-	-
EAST	6R	27	-	9	36	7,940	14,000	11,840	33,780	214,380	-	106,560	1,216,080
	36	-	-	-	-	2,240	6,880	1,900	11,020	-	-	-	-
	Total:	87	18	32	137					Northeast Flow Total (7AM-11PM):			3,555,160

Future Taxi Distance Per Day (feet): 6,644,420
In miles: 1,258

COMPARISON

Existing Taxi Distance Per Day (feet):	7,656,380
Future Taxi Distance Per Day (feet):	6,644,420
Increase/(Decrease) Per Day (feet) Under Proposed Scenario:	**(1,011,960)**
In miles:	(192)

NOTES:
1. Air Carrier numbers are taken from the 2004 Design Day Flight Schedule.
2. Cargo and Other numbers are proportional estimates derived from sample day radar data (22 Jan 2004) and the 2004 Design Day Flight Schedule totals.
3. Taxi Distance equals aircraft activity multiplied by the taxi distance to/from the respective runways.
4. Shaded rows indicate runways not used by this traffic under the indicated scenario.
5. Traffic from the west and north is assumed to use Runway 18/36. Traffic from the south and east is assumed to continue using the 6/24 runways.

TABLE 11
AIRCRAFT DIRECT OPERATING EXPENSES

Aircraft Group	Aircraft Type	Number of Annual Operations	Percent of Operations	Average Cost (min.)		Cost Weight (min.)
Large Jet	B-757	1,908	3.0%	$51.39		$1.55
	A320	54	0.1%	$39.32		$0.03
	MD80	2,960	4.7%	$43.15		$2.02
	B-737-300	1,164	1.8%	$46.68		$0.86
	A319	22	0.0%	$40.77		$0.01
	B-717	1,762	2.8%	$32.10		$0.89
	B-737-500	698	1.1%	$38.82	1/	$0.43
	D9S	1,482	2.3%	$29.98	1/	$0.70
	F100	1,048	1.7%	$27.82		$0.46
	DC9	54	0.1%	$35.57	1/	$0.03
Total Large Jet		11,152	17.6%	$39.66		$6.98
Commuter/GA	142/146 (NB)	524	0.8%	$39.20		$0.32
	ARJ	124	0.2%	$23.37	1/	$0.05
	CR7	990	1.6%	$17.81	1/	$0.28
	CRJ/ERJ/ER4	21,208	33.5%	$19.22	1/	$6.43
	DH3 (TP)	326	0.5%	$18.04		$0.09
	ERD (RJ)	1,142	1.8%	$13.36	1/	$0.24
	DH8 (TP)	798	1.3%	$18.04		$0.23
	ER3 (RJ)	2,106	3.3%	$16.10	1/	$0.54
	SF3 (TP)	6,404	10.1%	$14.32	1/	$1.45
	FRJ (RJ)	2,708	4.3%	$17.62		$0.75
	D38/J41	13,484	21.3%	$16.79	1/	$3.57
	BEH/BE1/J31	2,420	3.8%	$14.19	2/	$0.54
Total Commuter		52,234	82.4%	$17.58		$14.49
Total Operations		63,386	100.0%			$21.47

Airspace Delay Cost (per minute)	$22.13
Ground Delay Cost (per minute)	$15.49

1/ Cost data was not available for some of the airlines that fly these aircraft. Therefore, cost data for the carriers that were available was used.
2/ J41 costs were used for this category of aircraft.

Note: Costs presented in 2004 dollars.

Source: Form 41 Cost per Block Hour reports to the Department of Transportation.

TABLE 12
AIRCRAFT RUNWAY CROSSINGS

Takeoffs - Existing Airfield Geometry

	6R	6L	24R	24L	18	36	Total
Cargo To:	1	0	0	2	0	2	**5**
Terminal Core To:	0	0	0	1	1	1	**3**
East Services To:	1	1	1	0	0	1	**4**
Total	**2**	**1**	**1**	**3**	**1**	**4**	**12**

Takeoffs - Relocated Runway 18/36 Airfield Geometry

	6R	6L	24R	24L	18	36	Total
Cargo To:	1	0	0	1	0	1	**3**
Terminal Core To:	0	0	0	0	1	0	**1**
East Services To:	0	0	1	0	0	0	**1**
Total	**1**	**0**	**1**	**1**	**1**	**1**	**5**

Landings - Existing Airfield Geometry

	6R	6L	24R	24L	18	36	Total
To Cargo:	2	0	0	1	1	1	**5**
To Terminal Core:	1	0	0	1	0	0	**2**
To East Services:	1	1	1	1	0	0	**4**
Total	**4**	**1**	**1**	**3**	**1**	**1**	**11**

Landings - Relocated Runway 18/36 Airfield Geometry

	6R	6L	24R	24L	18	36	Total
To Cargo:	1	0	0	1	1	0	**3**
To Terminal Core:	0	0	0	0	0	1	**1**
To East Services:	0	0	0	0	0	0	**0**
Total	**1**	**0**	**0**	**1**	**1**	**1**	**4**

EXHIBIT 4 - AIRCRAFT RUNWAY CROSSINGS
EXISTING AIRFIELD GEOMETRY – TAKEOFFS

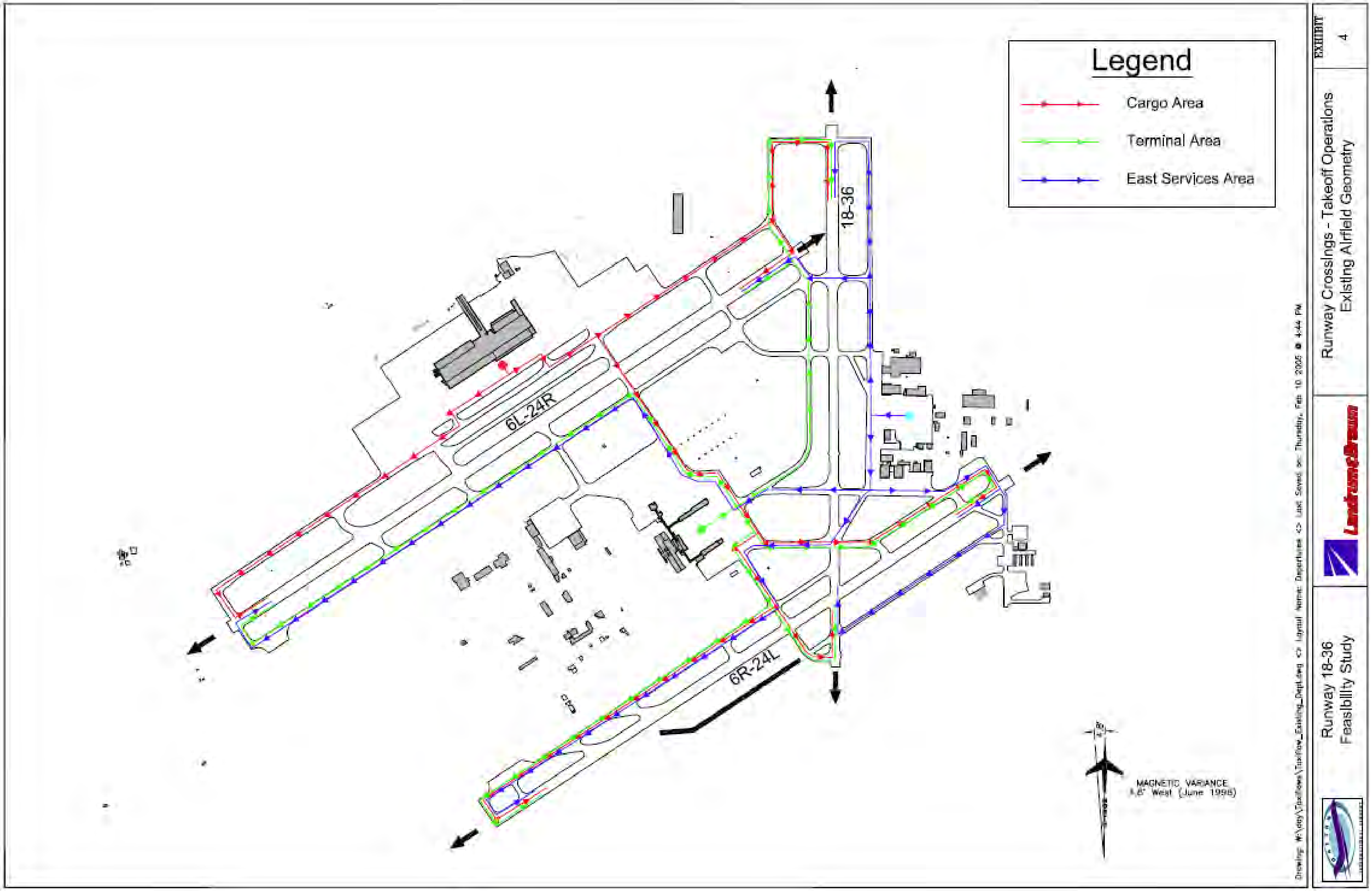


EXHIBIT 5 - AIRCRAFT RUNWAY CROSSINGS
RELOCATED RUNWAY 18/36 AIRFIELD GEOMETRY – TAKEOFFS

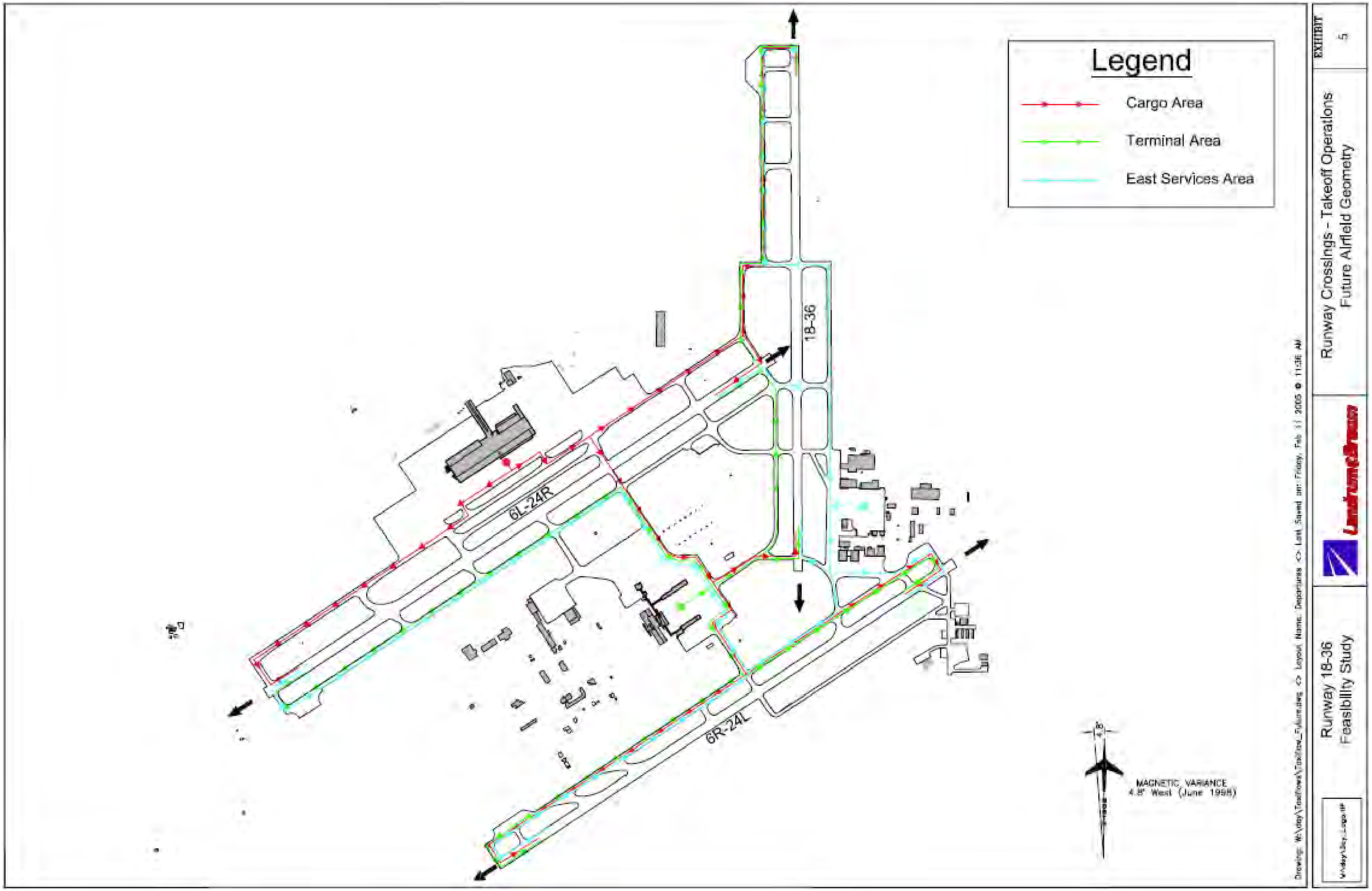


EXHIBIT 6 - AIRCRAFT RUNWAY CROSSINGS
EXISTING AIRFIELD GEOMETRY – LANDINGS

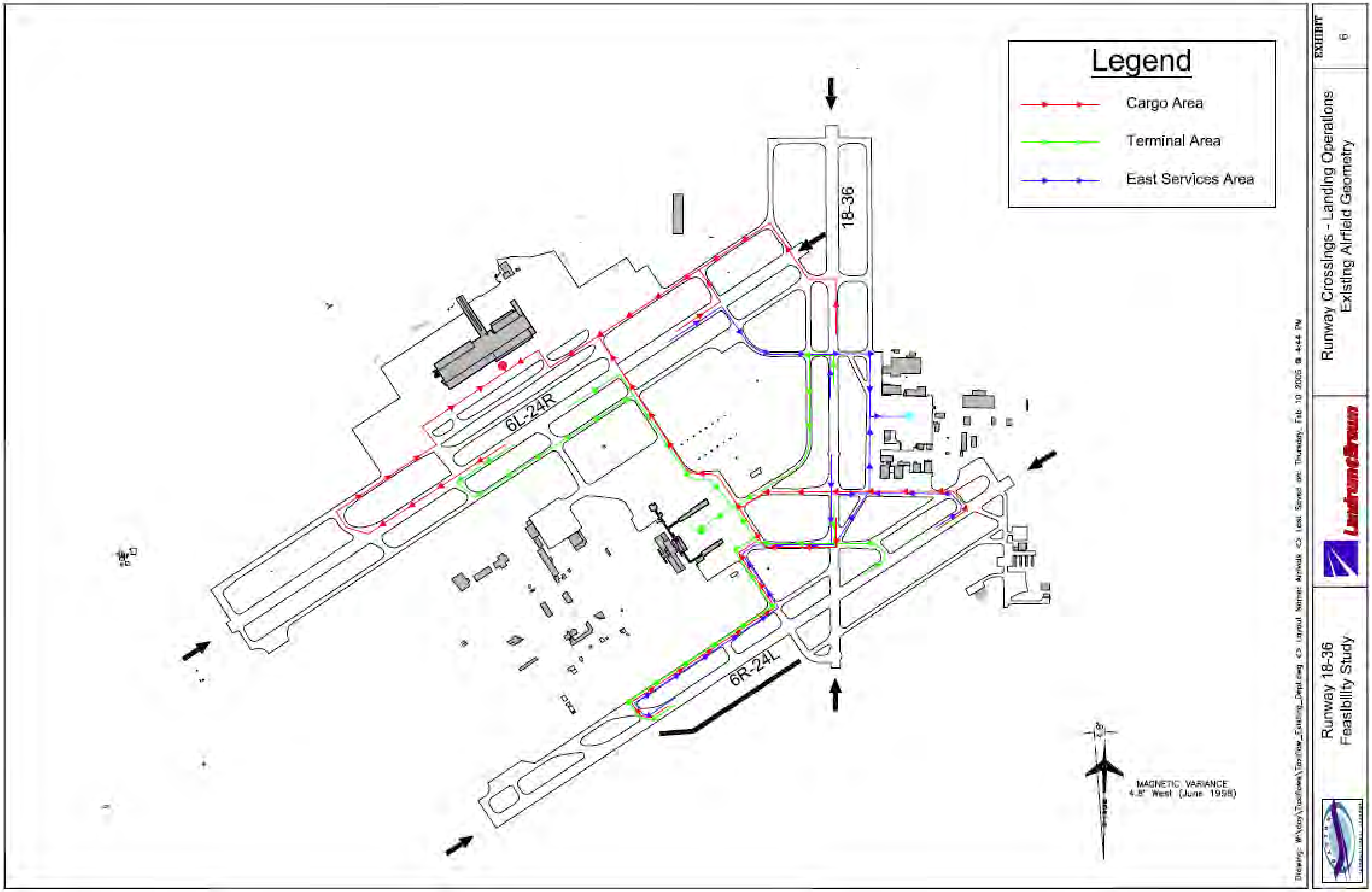
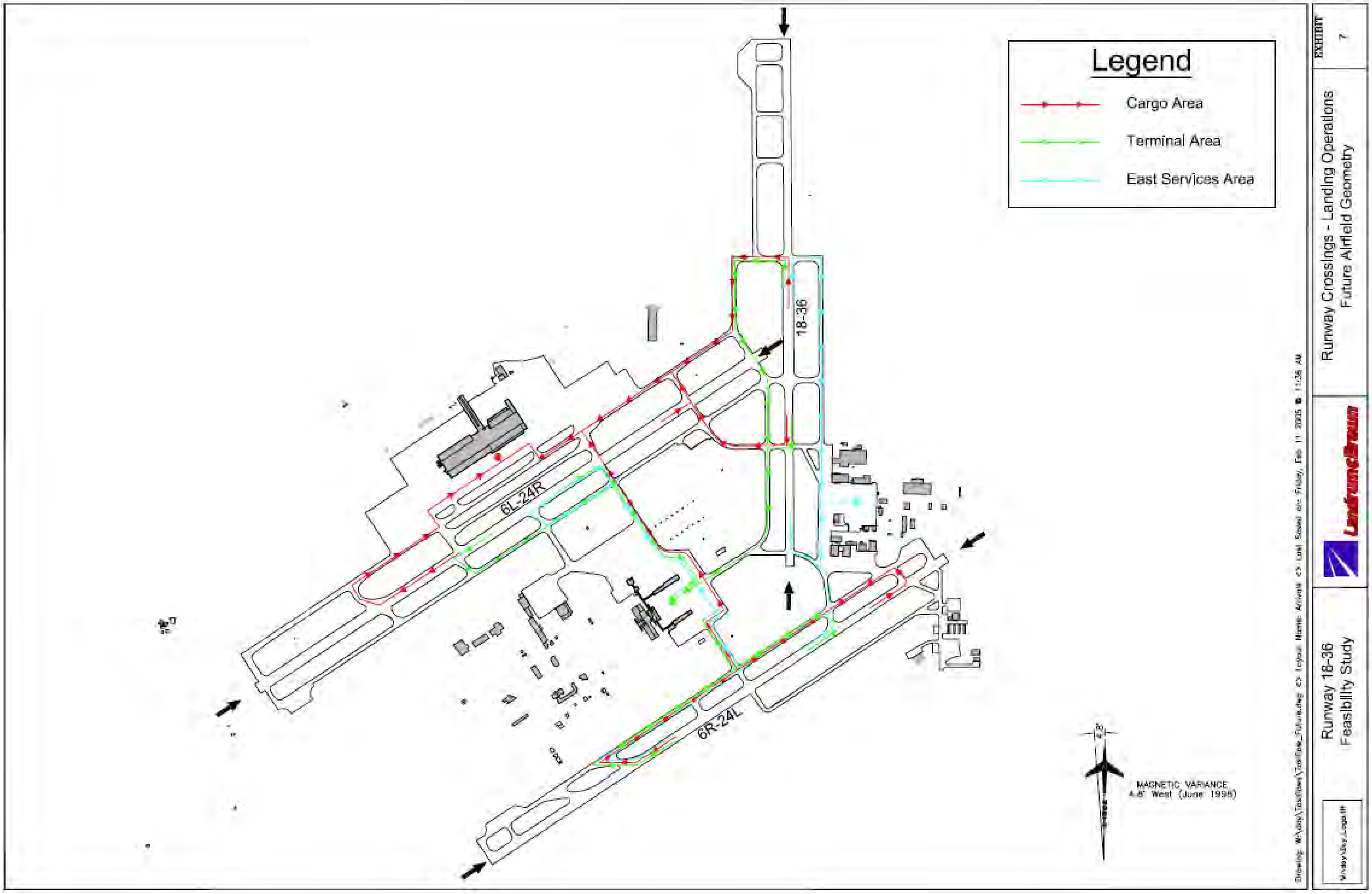


EXHIBIT 7 - AIRCRAFT RUNWAY CROSSINGS
RELOCATED RUNWAY 18/36 AIRFIELD GEOMETRY – LANDINGS



5.3 AIRSPACE ROUTE LENGTH ANALYSIS

An increase in the use of the proposed relocated Runway 18/36 could also provide a significant savings in flight time and fuel costs for passenger aircraft operations. These benefits would be realized with changes in airspace routes during southwest flow, which occurs approximately 87 percent of the time due to wind or weather. It was assumed that the vast majority of commercial passenger traffic coming from the north and west could use Runway 18/36, while traffic from the east and south could use the parallel 24 runway ends. All cargo aircraft would continue to use Runway 24R due to its close proximity to the cargo hub facility.

This analysis was conducted for operations between the hours of 7:00 a.m. and 11:00 p.m. A current OAG flight schedule was used to determine the departure city, and the tower ARTS data was used to determine the appropriate arrival direction and corner post used. **Table 13** shows the potential time, distance, and cost savings based on this proposed change in airspace routing. The results show a net savings of 79 nautical miles per day, which equates to 30 minutes per day in flight time. Based on an average airspace operating cost of $22 per minute, there would be a net savings to the operators of $242,506 per year.

TABLE 13
AIRSPACE ROUTE ANALYSIS

					2004 Arrivals (24R/24L only)				2004 Arrivals (24R/24L and 18)			
Arrival Fix	Direction	Runway	Distance	Flight Time	Air Carrier	Cargo	Other	**Total**	Air Carrier	Cargo	Other	**Total**
KEKEE	SOUTH	24R/L	43.4	12.1	35	4	1	**40**	35	4	4	**43**
		18	40.7	11.2	-	-	-	**-**	-	-	-	**-**
RID	WEST	24R/L	57.7	15.7	2	-	8	**10**	-	-	-	**-**
		18	46.2	12.6	-	-	-	**-**	2	-	8	**10**
ROD	NORTH	24R/L	28.5	8.4	34	10	13	**57**	-	10	-	**10**
		18	26.5	7.6	-	-	-	**-**	34	-	13	**47**
DANEI	EAST	24R/L	32.0	9.3	32	-	11	**43**	32	-	11	**43**
		18	NA	NA	-	-	-	**-**	-	-	-	**-**
Total Aircraft Arrivals:					103	14	33	**150**	103	14	36	**153**
Daily Flight Time (Minutes):					1,036	132	348	**1,516**	1,004	132	350	**1,486**
Daily Flight Distance (Nautical Miles):					3,627	459	1,228	**5,314**	3,536	459	1,240	**5,235**

Net Time Savings:	**30**	minutes per day
Net Distance Savings:	**79**	nautical miles per day
Net Cost Savings:	**$242,506**	per year (assuming $22 per minute)

NOTES:
1. These figures exclude arrivals between 11:00 PM and 7:00 AM, since Runway 18/36 cannot be used for departures during that time.
2. Traffic from the west and north is assumed to use Runway 18/36. Traffic from the south and east is assumed to continue using Runways 24R and 24L.
3. Air carrier numbers are taken from the 2004 Design Day Flight Schedule.
4. Cargo and other numbers are proportional estimates derived from sample day radar data (22 Jan 2004) and the 2004 Design Day Flight Schedule totals.

H:\DAY\EIS_Capacity\18-36 Demand Capacity Report\[DAY_WEST_ARR_DIST.xls] Airspace Route Length

6. AIRPORT DEMAND AND CAPACITY

6.1 AIRFIELD DEMAND

The ability of the existing airfield to meet future demand was determined by comparing the runway capacity to profiles of future daily activity. Aircraft demand consists of a 24-hour flight schedule representative of design day activity. Flight demand profiles were developed for the years 2004, 2009, 2014 and 2024 based on the airport's current passenger and aircraft operations forecasts, and the design day to annual operations ratio of the FAA approved Master Plan Forecast dated February 20, 2004. Actual OAG flight information and FAA radar data (Dec 2003 – Jan 2004) for arrivals and departures were used to define the distribution of activity throughout the day.

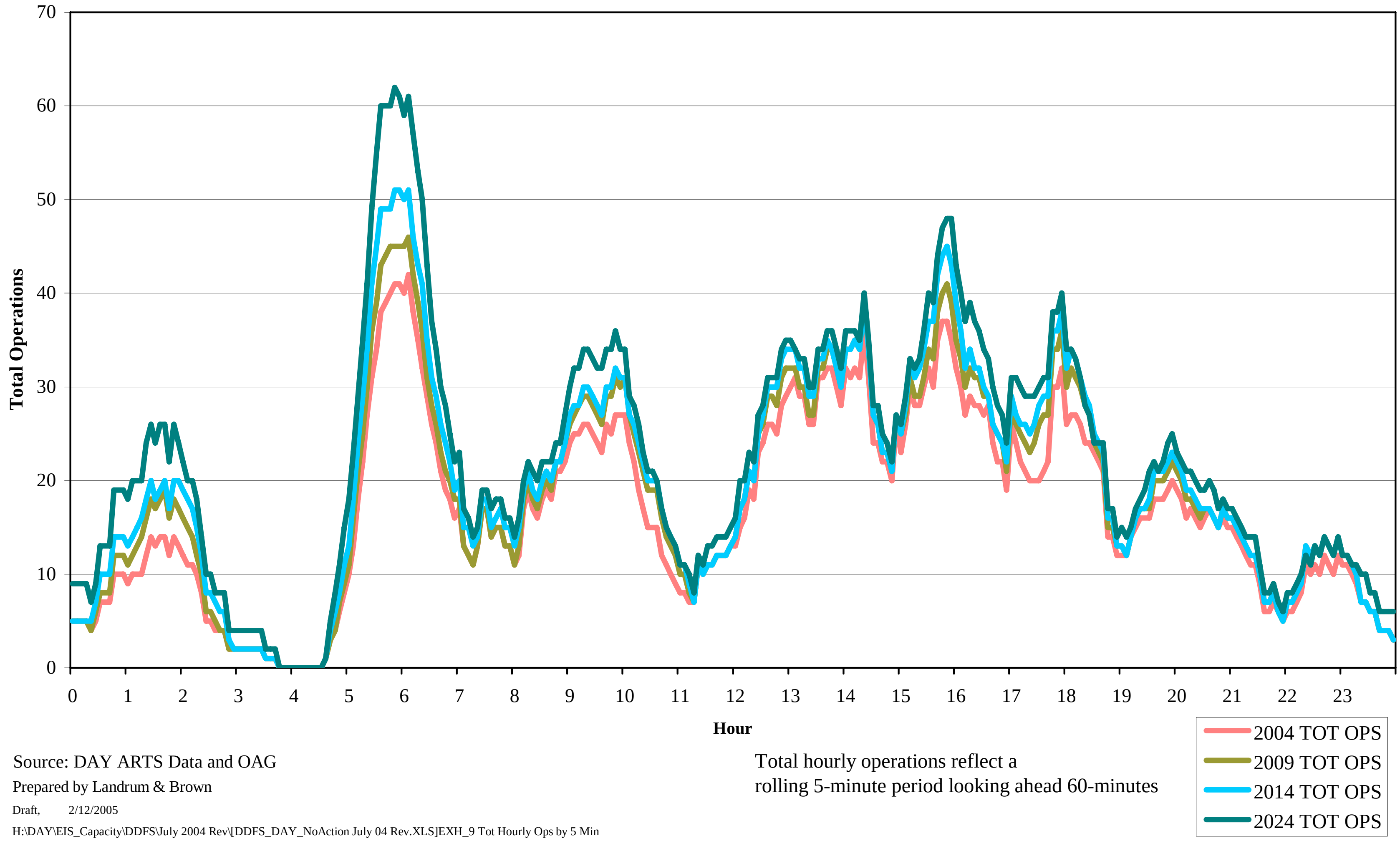
At DAY, the design day schedule reflects 397 average daily operations in 2004—196 passengers, 62 cargo and 139 other operations. Both annual and average daily operations for 2004, 2009, 2014 and 2024 can be found in **Table 14**. Note that this analysis takes into account the assumption that cargo operates on a 5 day per week schedule, as opposed to passenger and other operations, which operate 7 days per week. Further, the average daily operations are based on the peak month, not an average month. As a result, average daily operations will not reflect simple division of annual operations by the number of days in a year.

TABLE 14
OPERATIONS IN DESIGN DAY SCHEDULE

	PASSENGER OPERATIONS		CARGO OPERATIONS		OTHER OPERATIONS		TOTAL OPERATIONS	
Year	**Annual**	**Ave. Daily**	**Annual**	**Ave. Daily**	**Annual**	**Ave. Daily**	**Annual**	**Ave. Daily**
2004	66,600	196	14,800	62	47,300	139	**128,700**	**397**
2009	75,900	223	17,600	74	48,300	142	**141,800**	**439**
2014	78,600	231	20,900	88	49,300	145	**148,800**	**464**
2024	92,100	270	28,900	121	51,300	151	**172,300**	**542**

Note: The daily operations represent an average derived from FAA peak month data.
Year 2024 operations are extrapolated using 2010-2020 growth rates.

The design day schedule breaks down these average daily operations into rolling 5-minute periods that look ahead 60-minutes. **Exhibit 8** demonstrates this breakdown on a 24-hour scale for each of the planning years indicated. As an example, between the hours of 0500 and 0600 there is a maximum of 62 operations. **Exhibit 9** further separates those operations into arrivals and departures. **Exhibits 10, 11, 12 and 13** separate the demand into passenger, cargo and other operations for 2004, 2009, 2014 and 2024, respectively.



Source: DAY ARTS Data and OAG

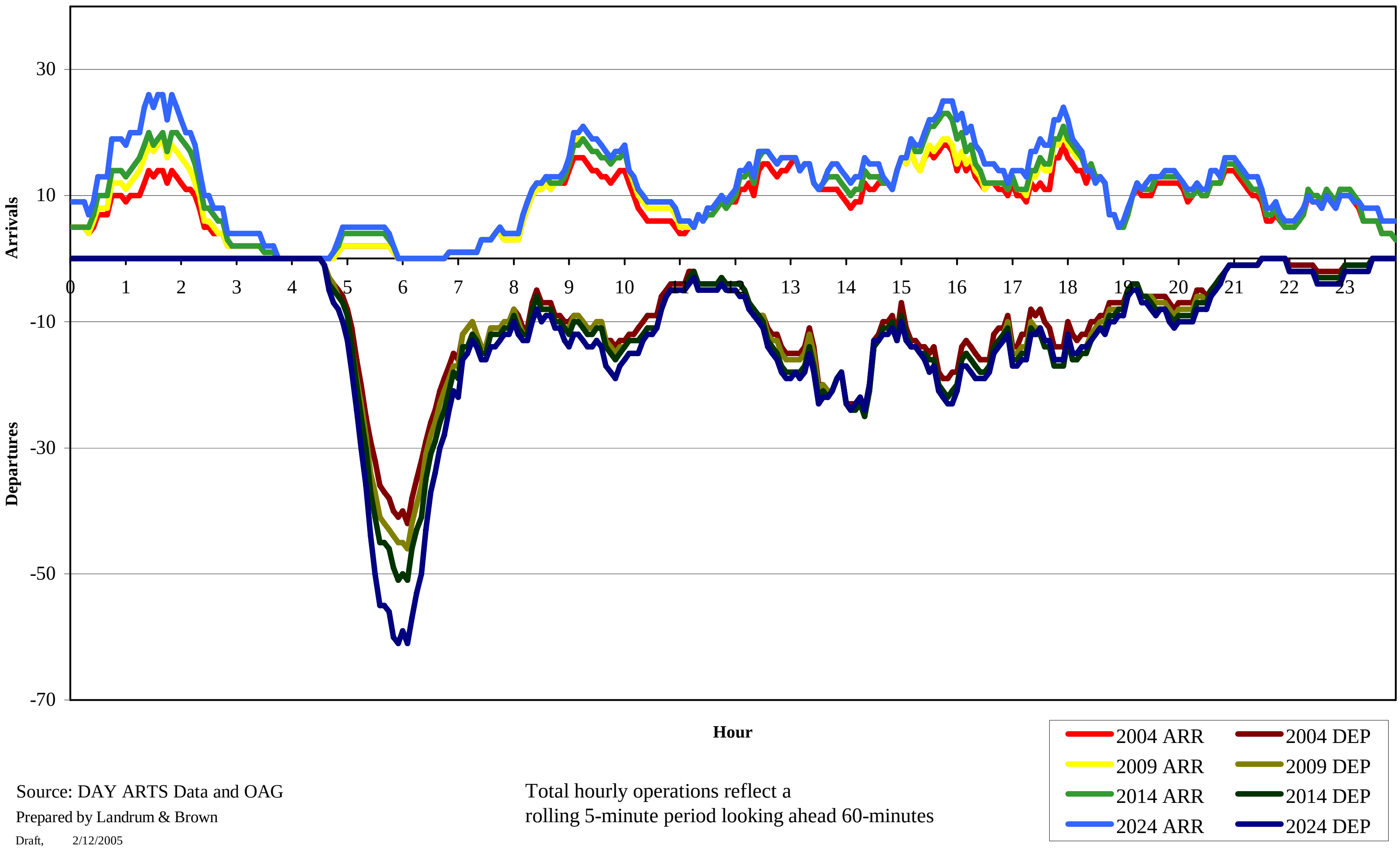
Prepared by Landrum & Brown

Draft, 2/12/2005

H:\DAY\EIS_Capacity\DDFS\July 2004 Rev\[DDFS_DAY_NoAction July 04 Rev.XLS]EXH_9 Tot Hourly Ops by 5 Min

Total hourly operations reflect a rolling 5-minute period looking ahead 60-minutes

Dayton International Airport	Design Day Flight Schedule Total Hourly Operations in Five-Minute Intervals	EXHIBIT 8



Source: DAY ARTS Data and OAG

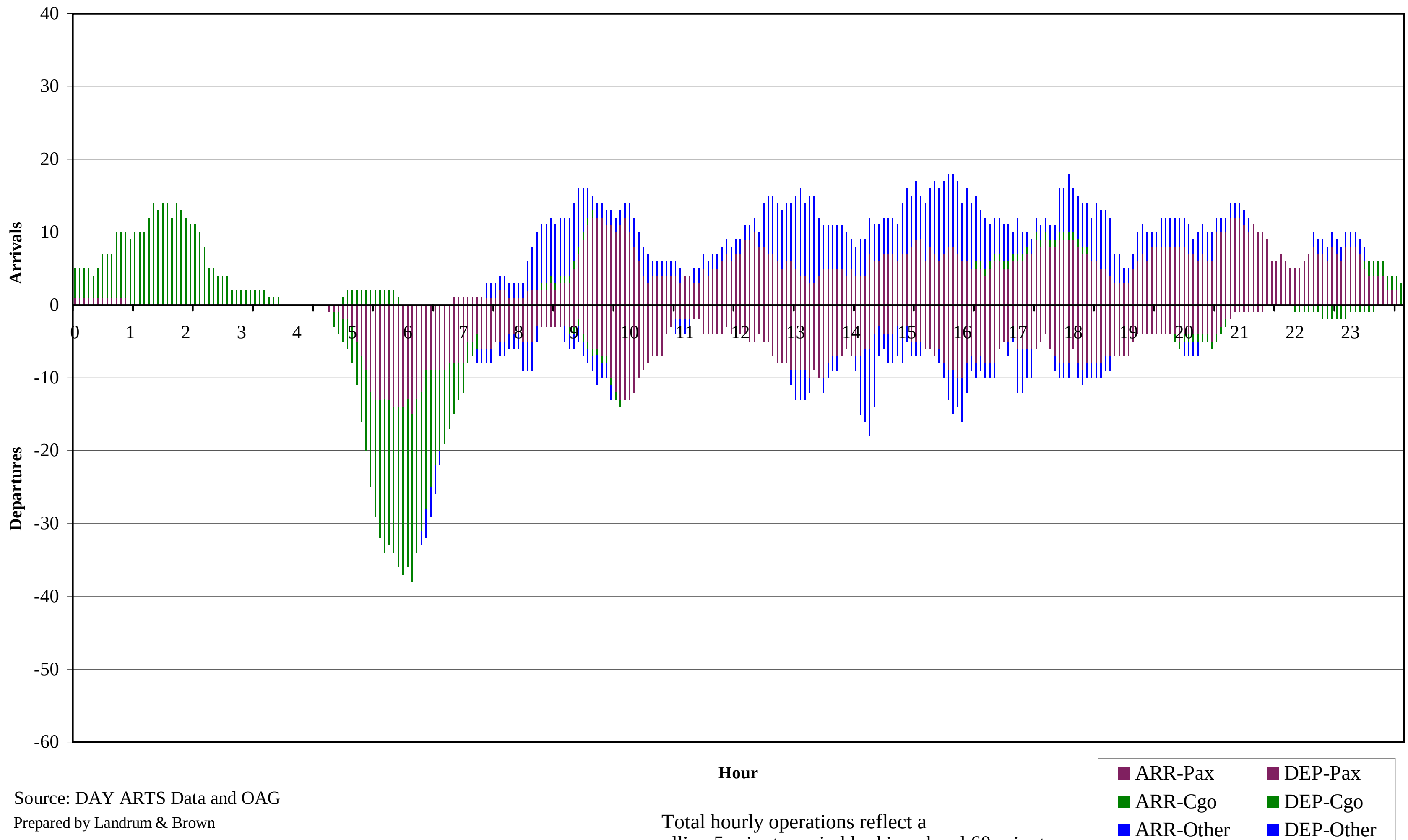
Prepared by Landrum & Brown

Draft, 2/12/2005

H:\DAY\EIS_Capacity\DDFS\July 2004 Rev\[DDFS_DAY_NoAction July 04 Rev.XLS]EXH_10 Hourly Ops by 5 Min

Total hourly operations reflect a rolling 5-minute period looking ahead 60-minutes

Dayton International Airport	Design Day Flight Schedule Hourly Arrivals and Departures in Five-Minute Intervals	EXHIBIT 9



Source: DAY ARTS Data and OAG

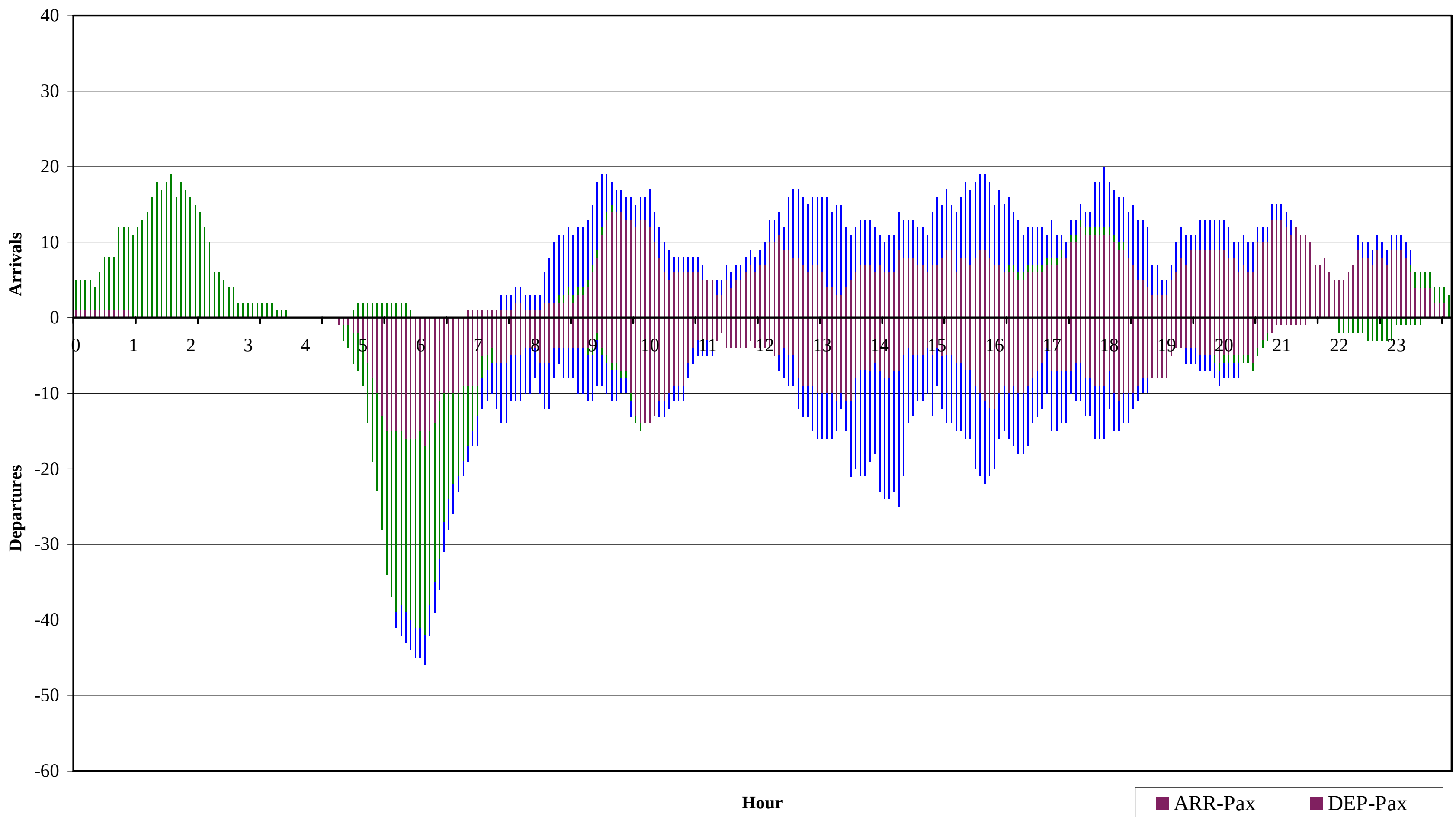
Prepared by Landrum & Brown

Draft, 2/12/2005

H:\DAY\EIS_Capacity\DDFS\July 2004 Rev\[DDFS_DAY_NoAction July 04 Rev.XLS]EXH_11 2004 User Groups Hourly

Total hourly operations reflect a rolling 5-minute period looking ahead 60-minutes

Dayton International Airport	2004 Design Day Flight Schedule Hourly Operations Rate in Five-Minute Intervals	EXHIBIT 10



Source: DAY ARTS Data and OAG

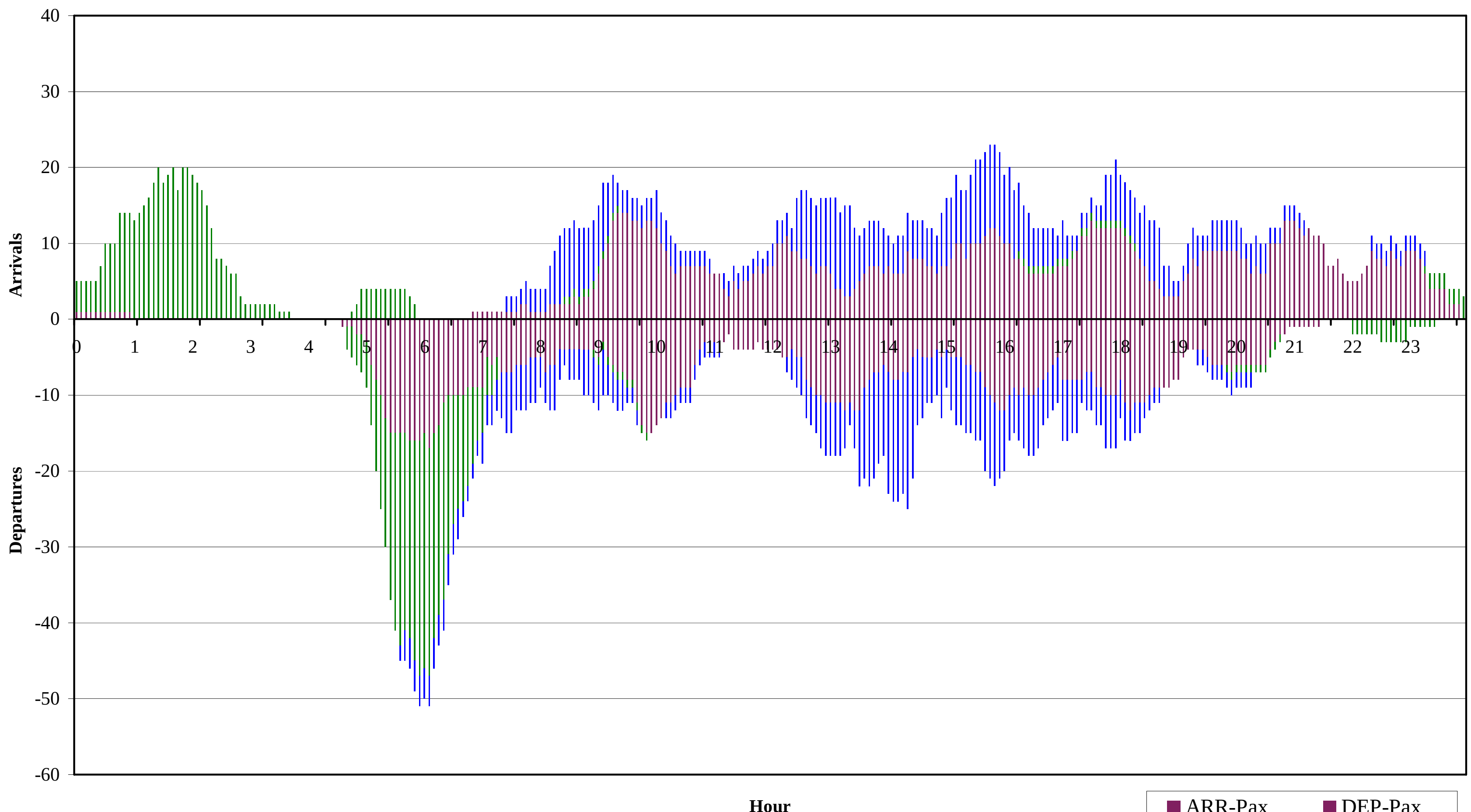
Prepared by Landrum & Brown

Draft, 2/12/2005

H:\DAY\EIS_Capacity\DDFS\July 2004 Rev\[DDFS_DAY_NoAction July 04 Rev.XLS]EXH_12 2009 User Groups Hourly

Total hourly operations reflect a rolling 5-minute period looking ahead 60-minutes

Dayton International Airport	2009 Design Day Flight Schedule Hourly Operations Rate in Five-Minute Intervals	EXHIBIT 11



Source: DAY ARTS Data and OAG

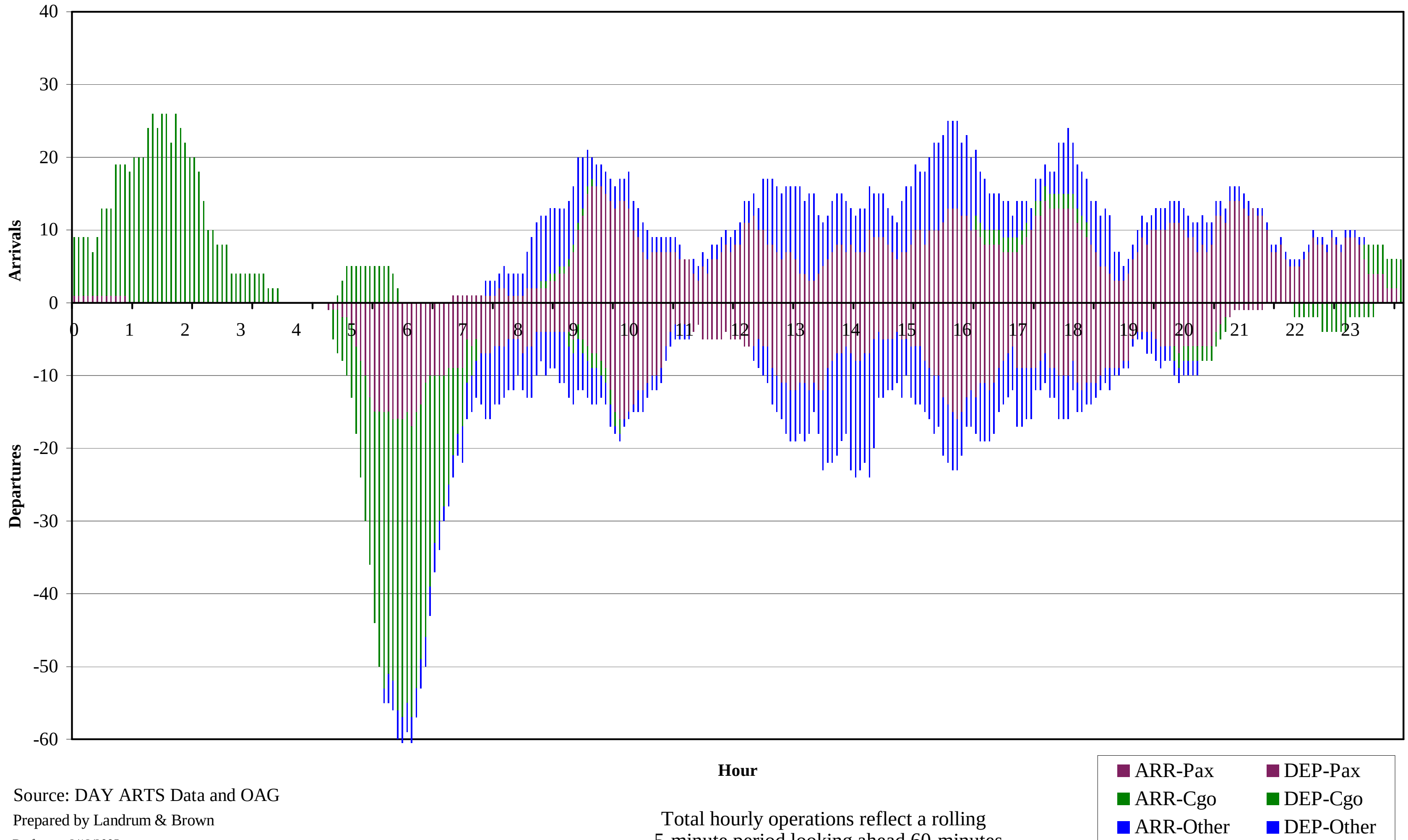
Prepared by Landrum & Brown

Draft, 2/12/2005

H:\DAY\EIS_Capacity\DDFS\July 2004 Rev\[DDFS_DAY_NoAction July 04 Rev.XLS]EXH_13 2014 User Groups Hourly

Total hourly operations reflect a rolling 5-minute period looking ahead 60-minutes

Dayton International Airport	2014 Design Day Flight Schedule Hourly Operations Rate in Five-Minute Intervals	EXHIBIT 12



Source: DAY ARTS Data and OAG

Prepared by Landrum & Brown

Draft, 2/12/2005

H:\DAY\EIS_Capacity\DDFS\July 2004 Rev\[DDFS_DAY_NoAction July 04 Rev.XLS]EXH_14 2024 User Groups Hourly

Total hourly operations reflect a rolling 5-minute period looking ahead 60-minutes

Dayton International Airport	2024 Design Day Flight Schedule Hourly Operations Rate in Five-Minute Intervals	EXHIBIT 13

6.2 AIRFIELD CAPACITY

Runway 18/36 is not intended to provide a significant increase in airfield capacity. Its primary purpose is to provide arrival and departure capability for those times when the primary runway(s) do not meet the crosswind limitations. The actual usage of Runway 18/36 is approximately 10.6 percent of the time versus between 0.2 percent and 2.1 percent of the time it is used exclusively due to wind and weather. When a runway orientation provides less than 95 percent wind coverage for any aircraft forecasted to use the airport on a regular basis, a crosswind runway is recommended. The 95 percent wind coverage is computed on the basis of the crosswind not exceeding the following:

- 10.5 knots for Airport Reference Codes (ARC) A-I and B-I
- 13 knots for ARC A-II and B-II
- 16 knots for ARC A-III, B-III, and C-I through D-III
- 20 knots for ARC A-IV through D-VI

The capacity of the Dayton International Airport (DAY) will change as runway use and weather minimums vary during the day. Analysis of the aircraft fleet mix and historical activity at DAY, in conjunction with FAA regulations regarding aircraft spacing, shows that an exclusive-use runway has either 41 arrivals only, or 40 departures only, per hour during Visual Meteorological Conditions (VMC). A mixed-use runway has a capacity of approximately 50 operations per hour (25 arrivals and 25 departures). Based on these typical runway capacities, under VMC, the parallel 6/24 runways can accommodate the anticipated 2024 hourly arrival and departure operations. However, when the parallel runways are outside an aircraft's crosswind limitations, it is important that Runway 18/36 be available to provide the necessary arrival or departure demand. The following sections analyzed various airfield-operating configurations to determine the operational use of Runway 18/36 under its current configuration and relocation to the north.

6.3 BASELINE AIRFIELD CONFIGURATION

The baseline airfield configuration in this analysis assumes that the proposed Runway 6R extension has been approved by the FAA and is operational. Runway 6R/24L will have a length of 9,500 feet with Category I approach capability on both runway ends. It is also assumed that both Runway 6R/24L and 6L/24R would run mixed operations 100 percent of the time. There will be minimal use of Runway 18/36 because it's operation is currently dependent on both of the 6/24 parallel runways in its current configuration, and it would provide minimal additional peak hour arrival or departure capacity.

The baseline airfield configuration yields an airfield capacity of 100 operations per hour (50 arrivals and 50 departures). **Exhibit 14** shows the baseline capacity of 25 arrivals and 25 departures on both parallel 6/24 runways in a southwest and northeast flow, with no operations on Runway 18/36. These capacity numbers reflect the assumption that arrivals and departures on both 6/24 runways are evenly balanced. Also shown, is the percent allocation by operator group (air carrier, cargo, and other) for each runway end. Based on this operating configuration, the parallel 6/24 runways will be able to accommodate the peak arrival and departure demand levels based on the 2024 design day flight schedule.

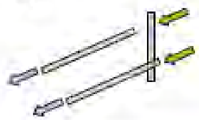
EXHIBIT 14
AIRFIELD CAPACITY ANALYSIS FOR RELOCATED RUNWAY 18 / 36

Exhibit 14: Airfield Capacity Analysis

Dayton International Airport
Runway 18-36 Relocation and Extension Feasibility Study

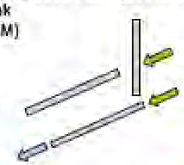
Southwest Flow

Baseline Configuration:
Mixed Operations
(7 AM - 11 PM)



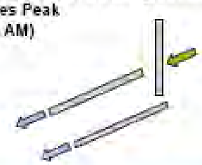
Capacity	24L	24R	18	TOTAL
ARR:	25	25	0	50
DEP:	25	25	0	50
TOT:	50	50	0	100

Baseline & Proposed Configuration:
Arrivals Peak
(11 PM - 4 AM)



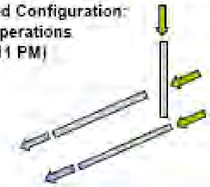
Capacity (11 PM - 4 AM)	24L	24R	18	TOTAL
ARR:	37	41	0	78
DEP:	6	0	0	6
TOT:	43	41	0	84

Baseline & Proposed Configuration:
Departures Peak
(4 AM - 7 AM)



Capacity (4 AM - 7 AM)	24L	24R	18	TOTAL
ARR:	0	5	0	6
DEP:	40	36	0	76
TOT:	40	43	0	83

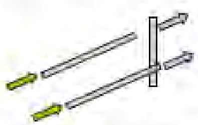
Proposed Configuration:
Mixed Operations
(7 AM - 11 PM)



Capacity (7 AM - 11 PM)	24L	24R	18	TOTAL
ARR:	25	2	37	64
DEP:	25	39	0	64
TOT:	50	41	37	128

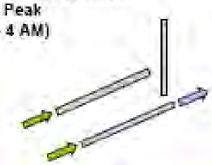
Northeast Flow

Baseline Configuration:



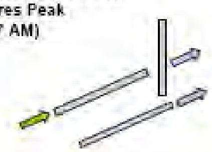
Capacity	6R	6L	36	TOTAL
ARR:	25	25	0	50
DEP:	25	25	0	50
TOT:	50	50	0	100

Proposed Configuration:
Arrivals Peak
(11 PM - 4 AM)



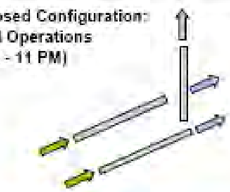
Capacity (11 PM - 4 AM)	6R	6L	36	TOTAL
ARR:	37	41	0	78
DEP:	6	0	0	6
TOT:	43	41	0	84

Proposed Configuration:
Departures Peak
(4 AM - 7 AM)



Capacity (4 AM - 7 AM)	6R	6L	36	TOTAL
ARR:	0	5	0	6
DEP:	40	36	0	76
TOT:	40	43	0	83

Proposed Configuration:
Mixed Operations
(7 AM - 11 PM)



Capacity (7 AM - 11 PM)	6R	6L	36	TOTAL
ARR:	25	40	0	65
DEP:	25	2	36	63
TOT:	50	42	35	128

Aircraft Mix

Overall	AC	Cargo	Other	TOTAL
ARR:	25%	8%	17%	50%
DEP:	25%	9%	16%	50%
TOT:	50%	17%	33%	100%

11 PM - 4 AM	AC	Cargo	Other	TOTAL
ARR:	0%	100%	0%	100%
DEP:	0%	0%	0%	0%
TOT:	0%	100%	0%	100%

4 AM - 7 AM	AC	Cargo	Other	TOTAL
ARR:	0%	4%	0%	4%
DEP:	32%	56%	8%	96%
TOT:	32%	60%	8%	100%

7 AM - 11 PM	AC	Cargo	Other	TOTAL
ARR:	31%	2%	20%	53%
DEP:	26%	2%	19%	47%
TOT:	56%	4%	39%	100%

Notes;
1. Capacity figures are based on the DAY fleet mix and FAA guidelines regarding minimum aircraft separation.
2. Capacity is given in operations per hour. Capacity gains are realized in VFR conditions only.
3. The Aircraft Mix figures are derived from the DAY OAG schedule and ARTS data.
4. The Aircraft Mix tables show the distribution of activity between air carrier (AC), cargo and other operations, in terms of percentage of total demand during the periods identified. They do not compare airfield demand to capacity.
5. During the arrivals priority period, it is assumed that the mixed-use runway (24L/6R) will actually run mixed operations 25% of the time and dedicated arrival operations 75% of the time.
6. During the departures priority period, it is assumed that the mixed-use runway (24R/6L) will actually run mixed operations 25% of the time and dedicated departure operations 75% of the time.

6.4 PROPOSED AIRFIELD CONFIGURATION

The Dayton International Airport is proposing to extend existing Runway 18/36 from 8,500 feet to 9,500 feet in length. In addition, the Runway 36 threshold will be shifted 2,975 feet to the north and the Runway 18 threshold will be extended 3,975 feet to the north. Relocation of the 36 threshold will shift the pavement to the north of Runway 6R/24L and eliminate the runway intersection. This decoupling of the runways will allow Runway 6R/24L to run mixed operations while Runways 18/36 and 6R/24L can run dedicated arrival or departure operations based on the wind and traffic flow direction. This would provide a 28 percent increase in VMC capacity during non-peak arrival and departure periods.

The airfield capacity will vary depending on the traffic flow direction and which runways are being used for arrivals and/or departures. As the percentage of dedicated use (arrival or departure use) increases for a runway, so does its capacity for that type of operation. For example, a typical runway at DAY can accommodate 25 arrivals and 25 departures, or 50 total operations in one-hour, assuming the percentage of arrivals and departures are fairly balanced. However, that same runway can only accommodate 40 operations if solely dedicated for arrivals, or 41 operations if solely dedicated for departures. Thus, the capacity of a runway begins to increase as either its dedicated arrival or departure capacity begins to decrease.

The proposed operating configurations and corresponding airfield capacities at DAY for the three time periods are shown in Exhibit 10. The runway capacity is shown for southwest flow and northeast flow directions, and for arrivals and departures.

- *Arrival Priority (11:00 p.m. to 4:00 a.m.)* – During this time period the arrival demand is exclusively from cargo aircraft. Since Runway 6L/24R is adjacent to the cargo facilities, this runway has been dedicated for exclusive use by landing cargo aircraft. The capacity of Runway 6L/24R is 41 arrivals per hour in both operating directions.

  Even though this is a peak arrival period, the airfield must also be able to accommodate some level of departure activity in the event there are weather or mechanical delays. Therefore, Runway 6R/24L has been designated for mixed operations (arrivals and departures). During this time period the flight schedule shows that there is no departure demand, nor is there any arrival demand from the air carriers or other operators. Therefore, it is assumed that Runway 6R/24L would be used 25 percent of the time for mixed operations and 75 percent of the time for dedicated cargo arrivals. This allocation of aircraft operations results in a total Runway 6R/24L hourly capacity of 37 arrivals and 6 departures.

  The total peak hour airfield capacity during this time period would be 78 arrivals and 6 departures, which would accommodate the anticipated 2024 design day flight schedule. During the arrival peak periods, Runway 18/36 is not used in a southwest or northeast flow direction due to its required coordination and complexity with the parallel 6/24 runway operations. In addition, the current DAY-ATCT Order 7110.30A, *Dayton International Airport Runway Use Program/Noise Abatement Procedures*, dated May 3, 1995, states the following: "During the hours of 10:00 p.m. to 7:00 a.m. (local), use of Runway 18 for departures and Runway 36 for arrivals is prohibited unless operational or safety criteria require its use." Based on these restrictions, there would be no capacity gain from the relocation of Runway 18/36 during the peak arrival operating hours.

- *Departure Priority (4:00 a.m. to 7:00 a.m.)* – During this time period the departure demand is approximately 60 percent cargo, 32 percent air carrier, and 8 percent other operators. Runway 6L/24R would be used for mixed cargo operations, with the majority (56 percent) of this being cargo departures and a small amount (4 percent) being cargo arrivals. Since the number of arrivals anticipated on Runway 6L/24R is minimal, it can be assumed that 25 percent of the time the runway will be used for mixed operations and 75 percent of the time for dedicated departures. This allocation of aircraft operations results in a total Runway 6L/24R hourly capacity of 6 arrivals and 36 departures.

  Runway 6R/24L will be used mostly for departures by air carrier and other operators, and will have an hourly capacity of 40 departures in a southwest and northeast flow direction.

  The total peak hour airfield capacity when departures take priority is 76 departures and 6 arrivals in a southwest and northeast flow direction, which would accommodate the anticipated 2024 design day flight schedule. Again, under this operating configuration Runway 18/36 is not used due to it conflict with the parallel 6/24 runway operations and noise abatement restrictions. Therefore, there would be no capacity gain from the relocation of Runway 18/36 during the peak departure operating hours of 4:00 a.m. to 7:00 a.m.

- *Mixed Operations (7:00 a.m. to 11:00 p.m.)* – During this time period, demand is from the air carrier and other operators, and is evenly distributed between arrival and departure operations. The arrival demand is 31 percent air carrier, 20 percent other operators, and 2 percent cargo operations. The departure demand is 26 percent air carrier, 19 percent other operators, and 2 percent cargo operations. The following assumptions have been used for this operating configuration:

  - Cargo operations will use Runway 6L/24R exclusively for arrivals and departures
  - Air carrier and other operators will use Runway 6R/24L for departures in the southwest flow and for arrivals in the northeast flow. This assumes the Runway 6R extension is completed for a total runway length of 9,500 feet with Category I approach capability.
  - Air carrier and other operators will be distributed between Runways 18 and 24L for arrivals in the southwest flow, and between Runways 36 and 6R for departures in the northeast flow.

There is a small need to accommodate some cargo arrivals during this time period. Therefore, during southwest flow, Runway 24R shows a capacity of 2 arrivals and 39 departures. The remainder of the arrivals are accommodated on Runway 24L (25 arrivals) and Runway 18 (37 arrivals). During northeast flow, these capacities change slightly to reflect a Runway 6L capacity of 40 arrivals and a Runway 36 capacity of 36 departures.

The airfield capacity during mixed operations in southwest flow would be 64 arrivals and 64 departures. During northeast flow the capacity would be 65 arrivals and 63 departures. The primary reason for relocating Runway 18/36 to the north is to reduce its dependency on the use of Runway 6R/24L, and provide the opportunity for two dedicated-use runways, as opposed to two mixed use runways as shown in the baseline configuration. Runways 18/36 and 6L/24R would be considered as dedicated arrival or departure runways depending on the traffic flow direction. This runway configuration would accommodate the anticipated 2024 design day flight schedule in conjunction with the increased utilization of Runway 18/36 when wind direction and speed require its use by specific aircraft type. The relocated Runway 18/36 airfield configuration will provide a 28 percent increase in VFR hourly capacity over the baseline airfield configuration.

7. SUMMARY

The results of this Runway 18/36 Feasibility Study show that the proposed runway extension and relocation to the north will enhance the operational safety of the airport and address the airport's specific development needs.

7.1 RUNWAY 18/36 EXTENSION TO 9,500 FEET

As noted in the FAA Advisory Circular 150/5325-4A, *Runway Length Requirements for Airport Design*, a crosswind runway should have a length of at least 80 percent of the primary runway length. Based on these criteria, the takeoff length of Runway 18/36 is justified at 11,120 feet, which is 80 percent of the justified 13,900 feet for Runways 6R/24L and 6L-24R. However, the draft Future Airport Layout Plan dated January 19, 2005 shows a length of 9,500 feet for Runway 18/36. This runway length is less than the justified length of 11,120 feet due to various local considerations such as land use and cost-benefit. This proposed runway length could accommodate the air carrier fleet with a 95 percent or greater maximum takeoff weight, with the exception of the B-757-200 (88 percent), B-757-300 (93 percent), B-737-900 (90 percent), and DC-9-32 (85 percent) aircraft. In addition, the flight range distance for each aircraft is adequate to serve the current commercial markets at DAY.

The exclusive use of Runway 18/36 by air carrier and large commuter aircraft during 16-knot crosswind conditions is approximately 1.07 percent of the time, or approximately 94 hours per year. For a 20-knot crosswind condition, exclusive use of Runway 18/36 by cargo aircraft is approximately 0.2 percent of the time, or approximately 18 hours per year. And for a 13-knot crosswind condition, exclusive use of Runway 18/36 by small commuter and general aviation aircraft is approximately 2.1 percent of the time. The length, instrumentation, and location of Runway 18/36 should be capable of accommodating these aircraft type with the least amount of operational restrictions, and provide for the safe movement of aircraft.

According to recent Automated Radar Terminal System (ARTS) data from December 27, 2003 through January 28, 2004, Runway 18/36 was used approximately 10.6 percent of the time. This increased use of Runway 18/36 beyond the crosswind requirement, is a result of its close proximity to the terminal gate area and minimal taxi distance required during takeoff and landing operations. The added utilization of Runway 18/36 beyond its need for wind and weather places an increased importance on providing an adequate runway length to serve the existing and future aircraft fleet mix at DAY.

7.2 RUNWAY 36 AIRSIDE SERVICE ROAD

The relocated Runway 36 threshold 2,975 feet to the north will provide ample space for an "at grade" airside service road for vehicle access between the east services area and terminal gates. This service road will help to eliminate between 46 and 81 daily vehicle crossings of Runway 18/36 and the possibility of a serious runway incursion. This service road will provide a short and direct route with significant time and cost savings for ground operations. More importantly, it will eliminate the need for ground vehicles to contact the air traffic control tower for clearance when crossing the runway. There will also be a daily vehicle operating savings of approximately $476 with the use of this new service road (fuel and personnel time) compared to using the service road around the Runway 6R extension.

7.3 DECOUPLING OF RUNWAYS 18/36 AND 6R/24L

The relocation of Runway 18/36 to the north will reduce the number of aircraft runway crossings by passenger, general aviation, and cargo aircraft during takeoff and landing operations. It will also help to minimize taxi times, operational delays, and the potential for runway incursions. The number of aircraft runway crossings will be reduced from 12 to 5 (58 percent reduction) during takeoff operations, and from 11 to 4 (64 percent reduction) during landing operations.

Relocation of the Runway 36 threshold to the north will shift the pavement to the north of Runway 6R/24L and eliminate the runway intersection. This decoupling of the runways will allow Runway 6R/24L to run mixed operations while Runways 18/36 and 6R/24L can run dedicated arrival or departure operations based on the wind and traffic flow direction. This will provide a 28 percent increase in VMC capacity during non-peak arrival and departure periods. This proposed runway configuration could accommodate the anticipated 2024 design day flight schedule in conjunction with the increased utilization of Runway 18/36 when wind direction and speed require its exclusive use.

Relocation of Runway 18/36 to the north will provide a reduction in aircraft taxi distance for arrivals and departures to and from the aircraft operational areas (terminal, cargo, and east services area). The reduced taxi distance equates to approximately 192 miles per day (2004 flight schedule), or a daily savings of $10,358 in airline operating costs. There will also be less air emissions due to the reduced aircraft taxi distances.

The relocated Runway 18/36 can provide a significant savings in flight time and fuel costs in the amount of $242,506 per year. These savings would be realized with changes in airspace routes during southwest flow conditions. The results show a net savings of 79 nautical miles per day, which equates to 30 minutes per day in flight time. This would be a significant savings to the airlines in light of the continued increase in fuel costs.

7.4 CONCLUSIONS

This Runway 18/36 Feasibility Study shows that there are ample operational and safety benefits resulting from the proposed runway extension and relocation to the north. The increased runway length to 9,500 feet will accommodate the air carrier and commuter aircraft fleet with respectable takeoff weights, and will also accommodate air cargo aircraft when wind and weather dictate its exclusive use. The decoupling of Runway 18/36 and 6R/24L will provide a 28 percent increase in VMC capacity during non-peak arrival and departure periods. The Runway 36 threshold will be closer to the terminal gate area and require minimal taxi distance for departures, and will place aircraft closer to the terminal area during arrivals on Runway 18.

From a safety and controller workload standpoint, there will be a full 1,000-foot safety area on both runway ends. The number of vehicle runway crossings will be reduced, thereby avoiding unnecessary communications between the control tower and ground vehicles. The number of aircraft runway crossings will be reduced and improve the operational safety of the airfield geometry. In short, the proposed relocation and extension of Runway 18/36 will enhance the overall safety of aircraft and vehicular movements, and reduce operating cost to the airlines and users.

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ATTACHMENT D

Runway Safety Area Alternatives Analysis
Runway 6R-24L

RUNWAY SAFETY AREA ALTERNATIVES ANALYSIS

RUNWAY 6R-24L
DAYTON INTERNATIONAL AIRPORT

Final
April 3, 2006

TABLE OF CONTENTS

RUNWAY SAFETY AREA ALTERNATIVES ANALYSIS

1. INTRODUCTION

On October 1, 1999, the Federal Aviation Administration (FAA) issued Order 5200.8, *Runway Safety Area Program*, which requires the FAA to collect and maintain data on the Runway Safety Area (RSA) for each runway at federally obligated airports and airports certified under Federal Aviation Regulation (FAR) Part 139. The objective of this requirement is to ensure that RSA's at all airports with federal funding obligations and airports certificated under *14 Code of Federal regulations (CFR) Part 139* conform to the standards contained in Advisory Circular 150/5300-13, *Airport Design*, to the extent practicable. It is the responsibility of the Regional Airports Division Manager to ensure that the RSA Program is implemented in accordance with the procedures provided in Order 5200.8.

This Runway Safety Area Alternatives Analysis for Dayton International Airport (DAY) will identify viable options for addressing the RSA deficiencies at each end of Runway 6R-24L. The current Runway 6R-24L RSA is constrained at both ends of the runway and will require some type of action to improve the RSA conditions.

1.1 Survey of the Runway 6R-24L RSA Deficiencies

In a letter dated January 21, 2000 (see **Appendix A**), the FAA Detroit Airports District Office (ADO) requested that the Department of Aviation, City of Dayton conduct a survey of the RSA deficiencies for the three runways at the Airport (6R-24L, 6L-24R, and 18-36). The RSA survey was conducted by the Department of Aviation and was submitted to the FAA for review. In a letter dated September 25, 2000 (see **Appendix A**) the FAA summarized a determination plan for rectifying the RSA deficiencies. In addition, in June of 2005, the FAA provided a detailed description and location information for each of the RSA deficiencies for the three runways at DAY based on 2001 survey information (see **Appendix A**).

The following was stated in the FAA's September 6, 2000 (see **Appendix A**) Runway 6R-24L RSA determination study: "Based solely on the review of the above referenced documents, it has been determined that, at this time, the Runway 6R-24L safety area does not meet the current standards contained in AC 150/5300-13, but it is practicable to improve the RSA so that it will meet current standards. It appears technically feasible to meet the standard."

1.2 Status of Runway 6R-24L RSA Deficiencies

The Department of Aviation has been proactive in correcting many of the identified RSA deficiencies for Runway 6R-24L at DAY. The RSA determinations have been classified into the following three categories for follow-up action:

- Category 1 – Relatively minor repairs/changes. Most of these items can be remedied within the next 6 to12 months.
- Category 2 – Relatively major repairs/changes. May involve major re-grading of large areas and/or a change in design or engineering

specifications. Correction of these items will require submission of proposed action to FAA for review and approval.

- Category 3 – Major repairs/changes requiring major design and engineering work by the FAA (such as relocation of the localizer for Runway 6L-24R) or the Dayton International Airport and may be included in Master Plan actions possibly requiring an EA or EIS and Record of Decision (ROD) prior to correcting.

Tables B-1 and B-2 in **Appendix B** depicts the current status of each of the RSA deficiencies and identifies which items have been resolved and what action is anticipated for the remaining items.

Table 1 below provides a summary of remaining deficiencies for Runway 6R-24L.

Table 1
Current Runway 6R-24L RSA Deficiencies

RUNWAY END 6R	RUNWAY END 24L
Windsock	Windsock
Airport service road	Security fence
REILS[1]	Airport service road
VASI and VASI power unit	North Dixie Drive
Concrete slabs for trap launchers and pads	
Trap shoot access roads (2) and walkway	
Drainage swale	
Natural gas line markers	

[1] Runway End Identifier Lights

For this analysis, it is assumed that the Amateur Trap Shooters Association (ATA) facilities will be removed in the early to mid-2006 timeframe.

2. DESCRIPTION OF RSA ALTERNATIVES

The first alternative to be considered is constructing the traditional graded RSA surrounding the runway. Where it is not practicable to obtain the entire safety area in this manner, as much as possible should be obtained. The following RSA alternatives will be addressed in this report, where applicable:

- "Do-Nothing" to improve the RSA deficiencies
- Relocation, shifting, or realignment of the runway
- Reduction in runway length where the existing runway length exceeds that which is required for the existing or projected design aircraft
- A combination of runway relocation, shifting, grading, realignment, or reduction in length

- Use of declared distance
- Runway extension

- Use of Engineered Materials Arresting Systems (EMAS)

Other alternatives to remove RSA deficiencies, which combine potential solutions for both runway ends will be presented and discussed. It is the desire of the City of Dayton to maintain as a minimum, the existing 7,000-foot runway length for aircraft operations. It is imperative to maintain to the extent possible, the longest runway length to maintain current operational capability during takeoff and landing operations. Based on the draft February 9, 2005 *Runway Length Requirements Analysis*, none of the current air carrier and cargo aircraft fleet mix will be able to depart from Runway 6R-24L at a length of 7,000 feet and at maximum takeoff weight. In addition, a large majority of the larger Regional Jet fleet will not be able to depart from this runway at maximum takeoff weight. The Runway 6R-24L length requirements analysis is presented in **Appendix E**.

In addition, a “Do-Nothing” alternative will be addressed to determine what amount of runway will be available if none or a portion of the outstanding RSA deficiencies are resolved. In accordance with FAA Advisory Circular 150/5300-13 “Airport Design”, Table 3-2, the RSA dimensions prior to the landing threshold is 600 feet long by 500 feet wide, while the RSA dimensions beyond the runway end is 1,000 feet long by 500 feet wide. These RSA requirements will be taken into consideration for each of the proposed alternatives. The proposed RSA alternatives are graphically shown in **Appendix C** and presented below.

2.1 “Do-Nothing” Alternatives

Under the “Do-Nothing” scenario, the following two alternatives will be presented:

- The “Do-Nothing” Alternative 1 assumes that the majority of the RSA deficiencies identified in Table 1 will be rectified, with exception of the roadways (service and public) and security fence. A full RSA will not be provided and a Modification to Standards (MOS) will be requested.
- “Do-Nothing” Alternative 2 assumes that none of the outstanding RSA deficiencies identified in Table 1 will be rectified. This alternative will make adjustments to the landing and takeoff threshold locations based on the need to provide a full RSA (landing and takeoff) within the existing airport property boundary.

2.1.1 “Do-Nothing” Alternative 1, as shown on **Exhibit 1** will keep the landing and takeoff thresholds at their current location. This will require that a Modification to Standards (MOS) be granted for a less than standard RSA dimension on both runway ends. The following modifications will be undertaken for the appropriate runway end:

Runway 6R (Exhibit 1)

- Relocate windsock and place on 3-inch frangible mount;
- Place REILS on 3-inch frangible mounts;

- Drainage swale to be re-graded;
- Install at-grade gas pipeline markers; and
- Removal of one concrete shooter pad and associated walkway, and one trap house assembly within the ATA facility is currently being undertaken.

The southern edge of the 6R RSA dimension will be 837 feet in length and then run parallel with the airport service road to a distance of 1,000 feet from the threshold. A triangular area measuring approximately 163 feet by 89 feet (170.5 sq. ft.) at the southwest corner will not be clear of obstacles. This RSA area will represent approximately 99.9% of the overall requirement.

Runway 24L (Exhibit 2)

- Relocate and place windsock on 3-inch frangible mount

The southern edge of the 24L RSA dimension will be 715 feet in length, while the northern edge will be 915 feet in length. The controlling obstacle is the existing airside service road that runs west of and parallel to North Dixie Drive. This RSA area will represent approximately 84% of the overall requirement.

Due to the need for a MOS request on both RSA's, it has been determined that the "Do-Nothing" Alternative 1 will not be carried forward for further evaluation.

2.1.2 "Do-Nothing" Alternative 2 assumes that none of the outstanding RSA deficiencies identified in Table 1 will be rectified. This alternative will make adjustments to the landing and takeoff threshold locations based on the need to provide a full RSA (landing and takeoff) within the existing airport property boundary. The use of declared distance criteria will be necessary on both runway ends and will reduce the Landing Distance Available (LDA), Accelerate-Stop Distance Available (ASDA), and Takeoff Run Available (TORA). The following modification will be undertaken for the appropriate runway end:

Runway 6R (Exhibit 3)

- Displace threshold 220 feet;
- Runway markings and signage will be changed as necessary;
- The runway lights (edge, centerline and threshold lights) will be moved and/or adjusted accordingly;
- Relocate PAPI and place on 3-inch frangible mounts;
- Relocate windsock and place on 3-inch frangible mount; and
- Revise the navigational charts.

The drainage swale is the critical obstacle that defines the RSA location.

Runway 24L (Exhibit 4)

- Relocate windsock and place on 3-inch frangible mount.

The controlling obstacle is the existing airside service road that runs west of and parallel with North Dixie Drive. The existing runway threshold can remain in its current location, however the use of declared distance criteria will be necessary to assure a full landing and takeoff RSA is maintained. .

Using declared distance criteria, the Runway 6R-24L length for the "Do-Nothing" Alternative 2 is summarized below:

	TORA (ft.)	LDA (ft.)	ASDA (ft.)
Runway End 6R	6,715	6,495	7,000
Runway End 24L	6,380	6,380	7,000

(TORA) Takeoff Run Available
(LDA) Landing Distance Available
(ASDA) Accelerate-Stop Distance Available

The combined RSA modifications of the "Do-Nothing" Alternative 2 do not provide the minimum 7,000-foot runway length requirement for landing and takeoff as indicated earlier in this report. The usable length of Runway 6R-24L will be greatly reduced, thereby significantly changing the utilization of this runway for arrivals and departures by a large percentage of the existing and future aircraft fleet mix at DAY. Based on the February 9, 2005 Runway Length Requirements Analysis, none of the air carrier and cargo aircraft will be able to depart from this runway at maximum takeoff weight (MTOW). In addition, a large majority of the larger Regional Jet fleet will also not be able to depart from this runway at maximum takeoff weight (MTOW). The ability for aircraft to safely land on Runway 6R-24L will also be minimized for many of the aircraft types.

The "Do-Nothing" Alternative 2 presents various positive and negative aspects in providing the required landing and takeoff RSA requirements. These attributes are listed below:

POSITIVE ATTRIBUTES

1. Minimal construction costs
2. Minimal environmental impacts
3. No land acquisition required

NEGATIVE ATTRIBUTES

1. Reduced landing and takeoff runway length
2. Minimal improvement to the runway safety area
3. Reduced runway utilization
4. Unbalanced airfield system
5. Increased operational delays

It is evident that the negative aspects of the "Do-Nothing" Alternative 2 clearly outweigh the positive aspects. There are more viable alternative solutions that will improve the RSA, maintain runway length, increase safety, and be in compliance with FAA design standards. Therefore, the "Do-Nothing" Alternative 2 will not be carried forward for additional analysis. Additional RSA alternatives and their evaluation are presented in the following sections.

2.2 Runway 6R RSA Alternatives

2.2.1 **Runway 6R RSA Alternative 1A**, as shown on **Exhibit 5** assumes that the Amateur Trapshooting Association (ATA) facilities will be demolished in early to mid-2006. The following modifications and/or additions will be required:

- Relocate windsock and place on 3-inch frangible mount;
- Removal of one concrete shooter pad and associated walkway, and one trap house assembly within the ATA facility is currently being undertaken;
- Demolish approximately 540 linear feet of the previous ATA service road;
- Remove drainage swale and re-grade to FAA specifications; and
- Install at grade natural gas pipeline markers.

This alternative will provide a full graded RSA per FAA design standards, however, it does not provide for a secure perimeter service road around 6R on the south side of the Airport. The existing 6R threshold location will be usable for takeoff and landings, and the use of declared distance criteria is not necessary for this alternative. Therefore, the full 7,000 foot runway length will be available. However, this alternative will not be carried forward for further analysis due to its inability to provide a perimeter service road around the 6R threshold.

2.2.2 **Runway 6R Alternative 1B**, as shown on **Exhibit 6**, provides for a future 25-foot wide airside service road that runs parallel with U.S. 40. The application of declared distance criteria will be required in order to provide the full RSA for arrivals and takeoffs in the 24L direction. The use of declared distances will reduce the 24L Landing Distance Available (LDA), the Takeoff Accelerate-Stop Distance Available (ASDA), and the Takeoff Run Available (TORA) as shown below.

	TORA (ft.)	LDA (ft.)	ASDA (ft.)
Runway End 6R	7,000	7,000	7,000
Runway End 24L	6,975	6,975	6,975

The following modifications and/or additions will be required:

- Apply declared distance criteria for 24L operations;
- Construct a new 25-foot wide airside service road approximately 10 feet offset and parallel with the existing airport security fence and U.S. 40;
- Demolish approximately 150 linear feet of the airport service road;
- Relocate and place windsock on 3-inch frangible mount;
- Removal of one (1) concrete shooter pads and associated walkways, and one (1) trap house assemblies within the Amateur Trap Shooters Association (ATA) facility is currently being undertaken;
- Demolish approximately 540 linear feet of previous ATA service road;
- Remove drainage swale and re-grade to FAA specifications;

- Install at-grade natural gas pipeline markers; and
- Revise navigational charts to reflect usable runway length changes.

As indicated earlier, it is the desire of the Airport to maintain the current 7,000-foot runway length for landing and takeoff operations, thereby minimizing aircraft operational restrictions. Therefore, since Alternative 1B does not meet this criteria, it will not be carried forward for further analysis.

2.2.3 Runway 6R Alternative 1C, as shown on **Exhibit 7**, involves relocating the Runway 6R threshold 25 feet to provide a full RSA within the existing Airport boundary. The controlling obstacle for location of the 6R threshold is a proposed 25-foot wide airside service road that runs parallel with U.S. 40. The relocation of the runway threshold will reduce the usable runway length to 6,975 feet in both directions. The following modifications and/or additions will be required:

- Relocate the Runway 6R threshold 25 feet;
- Construct a new 25-foot wide airside service road approximately 10 feet offset and parallel with the existing airport security fence that runs parallel to U.S. 40;
- Demolish approximately 150 linear feet of the airport service road;
- Removal of one (1) concrete shooter pads and associated walkways, and one (1) trap house assemblies within the Amateur Trap Shooters Association (ATA) facility is currently being undertaken;
- Relocate and place windsock on 3-inch frangible mount;
- Relocate and place REILS on 3-inchy frangible mounts;
- Demolish approximately 540 linear feet of the previous ATA service road;
- Remove drainage swale and re-grade to FAA specifications;
- Install at-grade natural gas pipeline markers;
- Runway markings, lighting and signage will be changed as necessary;
- Possible adjustment to PAPI aiming angle required; and
- Revise navigational charts.

As indicated earlier, it is the desire of the Airport to maintain the current 7,000-foot runway length for landing and takeoff operations, thereby minimizing aircraft operational restrictions. Therefore, Alternative 1C will not be carried forward for further analysis.

2.2.4 Runway 6R Alternative 1D, as shown on **Exhibit 8**, involves maintaining the existing Runway 6R threshold location to provide a slightly less than full RSA within the existing Airport boundary. A triangular area measuring approximately 9 feet by 5 feet (22.5 square feet) at the southwest corner of the 6R RSA will have a proposed 25-foot wide airside service road running through it. The following modifications and/or additions will be required:

- Construct a new 25-foot wide airside service road approximately 10 feet offset and parallel with the existing airport security fence that runs parallel to U.S. 40;
- Demolish approximately 600 linear feet of the existing airport service road;
- Removal of one (1) concrete shooter pads and associated walkways, and one (1) trap house assemblies within the Amateur Trap Shooters Association (ATA) facility is currently being undertaken;
- Relocate windsock and place on 3-inch frangible mount;
- Demolish approximately 540 linear feet of the previous ATA service road;
- Remove drainage swale and re-grade to FAA specifications; and
- Install at grade natural gas pipeline markers.

This alternative will provide the full 7,000-foot runway length for takeoff and landing in both directions. This alternative will provide 99.99% of the required RSA and will be carried forward for further analysis.

2.2.5 **Runway 6R Alternative 1E**, as shown on **Exhibit 9**, involves maintaining the existing Runway 6R threshold location to provide a full RSA within the existing Airport boundary. The following modifications and/or additions will be required:

- Relocate a 350-foot section of the airport security fence approximately 15 feet south and parallel with U.S. 40;
- Construct a new 25-foot wide airside service road approximately 10 feet offset and parallel with the existing airport security fence;
- Modification to the north side U.S. 40 right-of-way width;
- Demolish approximately 150 linear feet of the airport service road;
- Removal of one (1) concrete shooter pads and associated walkways, and one (1) trap house assemblies within the Amateur Trap Shooters Association (ATA) facility is currently being undertaken;
- Demolish approximately 540 linear feet of the previous ATA service road;
- Relocate windsock and place on 3-inch frangible mount;
- Remove drainage swale and re-grade to FAA specifications; and
- Install at-grade natural gas pipeline markers.

Modification of the U.S. 40 right-of-way width may be very costly due to an existing utility corridor and will involve close coordination with the City of Vandalia and the Ohio Department of Transportation (ODOT). However, Alternative 1E is still a viable RSA solution and will be carried forward for further evaluation.

2.2.6 **Runway 6R Alternative 1F**, as shown on **Exhibit 10**, involves construction of an Engineered Materials Arresting Systems (EMAS) in accordance with the FAA Advisory Circular 150/5220-22A, *Engineered Materials Arresting Systems (EMAS) for Aircraft Overruns*, dated September 30, 2005. For planning purposes, the DC-10 aircraft was used with an exit speed of 72 knots. A 480-foot long by 150-foot wide EMAS bed is recommended, along with a 100-foot long ramp between the runway threshold and EMAS bed. The actual EMAS design method must be derived from field or laboratory tests. In addition to the EMAS bed, the following actions will be required:

- Relocate a portion of the natural gas pipeline that falls underneath the EMAS and install at-grade markers;
- Relocate windsock and place on 3-inch frangible mount;
- Remove drainage swale and re-grade to FAA specifications; and
- Removal of one (1) concrete shooter pads and associated walkways, and one (1) trap house assemblies within the Amateur Trap Shooters Association (ATA) facility is currently being undertaken.

According to FAA Advisory Circular 150/5220-22A, "A standard EMAS provides a level of safety that is generally equivalent to a full RSA built to the dimensional standards in AC 150/5300-13, *Airport Design*. It also provides an acceptable level of safety for undershoots." This alternative will provide a full RSA while maintaining the existing 7,000-foot runway length in both directions, and therefore will be carried forward for further analysis.

2.2.7 **Runway 6R Alternative 1G**, as shown on **Exhibit 11**, proposes to extend the Runway 6R threshold to the southwest by approximately 2,900 feet in order to provide a full RSA. This runway extension will cross over the current U.S. 40 alignment and will require the following modifications:

- Tunnel U.S. 40 under the runway extension or a by-pass roadway;
- Relocation of the Airport Access Road;
- Extension of Terminal Drive;
- Utility relocation (gas, water, telephone, electric, etc.);
- Land acquisition;
- Runway markings, lighting and signage will be changed as necessary; and
- Possible upgrade to Category I approach category (MALSR, RVR, GS, LOC, etc.)

Under this alternative, the 6R threshold is extended in accordance with the current Master Plan recommendation. The runway extension will provide an ultimate runway length of 9,500 feet that can be used by the majority of the existing and future aircraft fleet mix for landings and takeoffs at maximum takeoff and landing weights (see Appendix C, *Runway Length Requirements Analysis*). Alternative 1G will be carried forward for further analysis.

2.2.8 **Runway 6R Alternative 1H**, as shown on **Exhibit 12**, proposes to extend the Runway 6R threshold to the southwest by 285 feet. There will be an area measuring 9 feet by 5 feet at the southwest corner of the 6R RSA that will have a proposed 25-foot wide airside service road running through it. The following modifications and/or additions will be required:

- Extend the Runway 6R threshold and parallel taxiway 285 feet;
- Construct a new 25-foot wide airside service road approximately 10 feet offset and parallel with the existing airport security fence and U.S. 40;
- Demolish approximately 600 linear feet of the airport service road;
- Removal of one (1) concrete shooter pads and associated walkways, and one (1) trap house assemblies within the Amateur Trap Shooters Association (ATA) facility is currently being undertaken;
- Relocate windsock and place on 3-inch frangible mount;
- Demolish approximately 540 linear feet of the previous ATA service road;
- Remove drainage swale and re-grade to FAA specifications; and
- Relocation of natural gas pipeline and install at grade markers.

Under this alternative the 6R extension will help to compensate for the loss of takeoff and landing length of the non-standard RSA on 24L. It also means that no modifications to the Runway 24L end will be necessary to provide the necessary runway length and RSA requirements. However, the application of declared distance criteria will be required in order to provide the full RSA for arrivals and takeoffs in the 24L direction. This alternative will be carried forward for further analysis because it provides a full RSA within the existing Airport property and maintains or increases the current runway length.

2.2.9 Runway 6R RSA Summary

Base on the above analysis, Runway 6R RSA Alternatives 1D, 1E, 1F, 1G, and 1H will be carried forward for further analysis. These alternatives will be combined with viable Runway 24L RSA alternatives for additional comparison and evaluation.

2.3 Runway 24L RSA Alternatives

2.3.1 **Runway 24L Alternative 2A**, as shown on **Exhibit 13**, proposes displacing the Runway 24L threshold 285 feet to provide a full RSA within the existing Airport property boundary. The controlling obstacle for location of the displaced threshold is the existing airside service road that runs west of and parallel to North Dixie Drive. The application of declared distance criteria will be required in order to provide the full RSA for landings and takeoffs in both directions. The proposed displaced threshold and use of declared distances will reduce the LDA, ASDA, and TORA. The following modifications and/or additions will be required:

- Displace the Runway 24L threshold 285 feet;
- Apply declared distance criteria;

- Relocate windsock and place on 3-inch frangible mount;
- Relocate the glide slope, and RVR equipment accordingly;
- Relocate the PAPI and place on 3-inch frangible mounts;
- Runway markings, lighting and signage will be changed as necessary;
- Relocate MALSR approach lighting system and place on 3-inch frangible mounts; and
- Revise navigational charts.

This alternative will only be viable if the loss of runway length can be provided for on the Runway 6R end in order to maintain a minimum 7,000-foot runway length for takeoff and landings. This alternative also does not provide for a future 6R localizer facility and critical area clearance. Based on this initial analysis and possible combinations with 6R RSA alternatives, it has been determined that Alternative 2A will not be carried forward for further analysis.

2.3.2 **Runway 24L Alternative 2B**, as shown on **Exhibit 14**, involves displacing the Runway 24L threshold 400 feet to provide a full RSA within the existing Airport boundary. The 400-foot displacement is recommended in order to locate a future 6R localizer per the Master Plan, and maintain its critical area within the Airport boundary. The application of declared distance criteria will be required in order to provide the full RSA for arrivals and takeoffs in both directions. The proposed displaced threshold and use of declared distance criteria will reduce the LDA, ASDA, and TORA. The following modifications and/or additions will be required:

- Displace the Runway 24L threshold 400 feet;
- Apply declared distance criteria;
- Relocate windsock and place on 3-inch frangible mount;
- Relocate the glide slope and RVR equipment accordingly;
- Relocate PAPI and place on 3-inch frangible mounts;
- Relocate the MALSR approach lights and place on 3-inch frangible mounts;
- Runway markings, lighting and signage will be changed as necessary; and
- Revise navigational charts.

This alternative will only be viable if the loss of runway length can be provided for on the Runway 6R end in order to maintain a minimum 7,000-foot runway length for takeoff and landings. Alternative 2B does provide for a future 6R localizer facility and critical area. However, based on this initial analysis and possible combinations with 6R RSA alternatives, it has been determined that Alternative 2B will not be carried forward for further analysis.

2.3.3 **Runway 24L Alternative 2C**, as shown on **Exhibit 15**, involves relocating the Runway 24L threshold 400 feet to provide a full RSA within the existing Airport boundary. The threshold relocation is recommended in this alternative in order to locate a future 6R localizer and maintain its critical area within the Airport boundary as proposed in the Master Plan. The runway threshold relocation will reduce the runway length in both directions. The following modifications and/or additions will be required:

- Relocate the 24L threshold 400 feet;
- Relocate the aircraft hold pad, and Taxiways 'K', 'N', and 'P';
- Relocate windsock and place on 3-inch frangible mount;
- Relocate the glide slope and RVR equipment accordingly;
- Relocate PAPI and place on 3-inch frangible mounts;
- Relocate the MALSR approach lights and place on 3-inch frangible mounts;
- Runway markings, lighting and signage will be changed as necessary;
- Revise navigational charts; and
- Demolish abandoned runway, taxiway, and hold apron pavement.

This alternative will only be viable if the loss of runway length can be provided for on the Runway 6R end in order to maintain a minimum 7,000-foot runway length for takeoff and landings. Alternative 2C does provide for a future 6R localizer facility and critical area. This alternative is also part of the proposed Master Plan recommendation for Runway 6R-24L. Therefore, Alternative 2C will be carried forward in combination with Alternative 1G for the 6R end.

2.3.4 **Runway 24L Alternative 2D**, as shown on **Exhibit 16**, involves maintaining the existing Runway 24L threshold location and relocating North Dixie Drive, airside service road and security fence to provide a full RSA. The following modifications and/or additions will be required:

- Relocate North Dixie Drive to the east and outside the full RSA (at-grade);
- Relocate the Airport security fence and airside service road to the east and outside the full RSA;
- Relocate windsock and place on 3-inch frangible mount;
- Utility relocation (gas, water, telephone, electric, etc.);
- Land acquisition;
- Requires reconfiguration of the air show auto parking east of North Dixie Drive; and
- Demolish existing roadway pavement areas.

This alternative will provide a full 1,000-foot RSA, but will require major roadway and utility relocation, along with some property acquisition. Alternative 2D will be carried forward for further evaluation with other viable 6R alternatives.

2.3.5 **Runway 24L Alternative 2E**, as shown on **Exhibit 17**, involves construction of an EMAS in accordance with FAA Advisory Circular 150/5220-22A, *Engineered Materials Arresting Systems (EMAS) for Aircraft Overruns*. For planning purposes, the DC-10 aircraft was used with an exit speed of 72 knots. This results in a 480-foot long by 150-foot wide EMAS bed, along with a 100-foot long ramp between the runway threshold and EMAS bed. The actual EMAS design method must be derived from field or laboratory tests. In addition to the EMAS bed, the following actions will be required:

- Relocate windsock and place on 3-inch frangible mount.

According to the FAA Advisory Circular 150/5220-22A, "A standard EMAS provides a level of safety that is generally equivalent to a full RSA built to the dimensional standards in AC 150/5300-13, *Airport Design*. It also provides an acceptable level of safety for undershoots." This alternative will provide a full RSA while maintaining the existing 7,000-foot runway length in both directions. Alternative 2E will be carried forward for further evaluation with other viable 6R alternatives.

2.3.6 **Runway 24L Alternative 2F**, as shown on **Exhibit 18**, proposes to extend the Runway 24L threshold to the northeast by approximately 2,300 feet in order to provide a full RSA. This runway extension will cross over the current North Dixie Drive alignment and will require the following modifications:

- Relocation of North Dixie Drive;
- Relocation of railroad line;
- Relocation of airside service road and security fence;
- Relocation of MALSR, Glide Slope, RVR, PAPI and windsock;
- Land acquisition;
- Runway markings, lighting and signage will be changed as necessary; and
- Utility relocation (gas, water, telephone, electric, etc.)

Under this alternative, the 24L threshold is extended in accordance with the Tipp City proposed airport development plan. The ultimate runway length will range between 8,700 feet and 9,300 feet depending on what action is taken on the Runway 6R end to rectify the RSA deficiencies. Alternative 2F will be carried forward for further evaluation with other viable 6R alternatives.

2.3.7 **Runway 24L Alternative 2G**, as shown on **Exhibit 19**, proposes to leave the Runway 24L threshold in its current location and apply the use of declared distance criteria to achieve the necessary takeoff and landing RSA requirements. In addition, the following actions will be required:

- Relocate windsock and place on 3-inch frangible mount.

This alternative will only be viable if the loss of runway length can be provided for on the Runway 6R end in order to maintain a minimum 7,000-foot runway length for takeoff and landings. This alternative also does not provide for a future 6R localizer facility and critical area clearance. Alternative 2G will be carried forward for further evaluation with other viable 6R alternatives.

2.3.8 Runway 24L RSA Summary

Base on the above analysis, Runway 24L RSA Alternatives 2C, 2D, 2E, 2F, and 2G will be carried forward for further analysis. These alternatives will be combined with viable Runway 6R RSA alternatives for comparison and evaluation.

3. ORDER-OF-MAGNITUDE CONSTRUCTION COSTS

An order-of-magnitude construction cost estimates have been prepared for each of the individual RSA alternatives for comparative purposes. **Table 2** lists the construction cost estimates, which include design, engineering, supervision and contingency costs. Cost estimates for the EMAS are based on Order 5200.9 guidelines. All construction costs are in 2005 dollars.

TABLE 2
ORDER-OF-MAGNITUDE CONSTRUCTION COSTS

RSA ALTERNATIVE	CONSTRUCTION COST
"Do-Nothing" Alt. 1	$305,046
"Do-Nothing" Alt. 2	$341,312
6R - 1A	$292,896
6R - 1B	$560,993
6R - 1C	$668,561
6R - 1D	$231,498
6R - 1E	$562,221
6R - 1F	$5,266,283
6R – 1G	$124,890,415
6R – 1H	$1,807,664
24L - 2A	$679,258
24L - 2B	$1,125,989
24L - 2C	$4,008,161
24L - 2D	$1,294,718
24L - 2E	$5,180,976
24L – 2F	$14,144,000
24L – 2G	$9,450

The detailed cost estimates for each of the RSA alternatives are presented in **Appendix D**.

4. FULL RUNWAY 6R-24L RSA ALTERNATIVES

It requires more than just developing and analyzing the individual runway end RSA alternatives as previously presented. A combination of these alternatives must be looked at that maximizes the usable runway length (minimum 7,000 feet) to accommodate the existing and future aircraft fleet mix, while also providing the highest level of operational safety. The optimum RSA alternative should provide these operational benefits, improved level of safety, and also enable the Airport to proceed with the current proposed Master Plan airfield development program when demand warrants.

Not all of the individual runway end alternatives merit further analysis as composite alternatives. The following represent the most viable RSA combinations that were considered for further analysis:

- Alternatives 1E and 2D
- Alternatives 1F and 2E
- Alternatives 1D and 2E
- Alternatives 1D and 2F
- Alternatives 1D and 2F
- Alternatives 1G and 2C
- Alternatives 1H and 2G

Additional analysis was performed on these alternatives and is presented below.

4.1 **<u>6R-24L RSA Alternative 3A</u>**, as shown on **Exhibit 20**, includes elements from Alternatives 1E and 2D. Major modifications to Runway 6R-24L include the following:

Runway 6R Alternative 1E RSA

- Relocate a 350-foot section of the airport security fence approximately 15 feet south and parallel with U.S. 40;
- Construct a new 25-foot wide airside service road approximately 10 feet offset and parallel with the existing airport security fence;
- Modification to the north side U.S. 40 right-of-way width;
- Demolish approximately 150 linear feet of the airport service road;
- Removal of one (1) concrete shooter pads and associated walkways, and one (1) trap house assemblies within the Amateur Trap Shooters Association (ATA) facility is currently being undertaken;
- Demolish approximately 540 linear feet of the previous ATA service road;
- Relocate windsock and place on 3-inch frangible mount;
- Remove drainage swale and re-grade to FAA specifications; and
- Install at-grade natural gas pipeline markers.

Runway 24L Alternative 2D RSA

- Relocate North Dixie Drive to the east and outside the full RSA (at-grade);
- Relocate the Airport security fence and airside service road to the east and outside the full RSA;
- Relocate windsock and place on 3-inch frangible mount;
- Utility relocation (gas, water, telephone, electric, etc.);
- Land acquisition;
- Requires reconfiguration of the air show auto parking east of North Dixie Drive; and
- Demolish existing roadway pavement areas.

The 6R modification can be accommodated within the existing Airport boundary, however modification to the U.S. 40 right-of-way may be difficult and require major utility relocation. The 24L modifications will require some land acquisition from the City of Vandalia and major utility relocation. The existing runway thresholds will remain in their current locations, which means the runway will stay at its current 7,000-foot length for both takeoff and landing operations. Also, the existing navigational and visual aid facilities will not require relocation.

4.2 **6R-24L RSA Alternative 3B**, as shown on **Exhibit 21**, includes elements from Alternatives 1F and 2E. Major modifications to Runway 6R-24L include the following:

Runway 6R Alternative 1F RSA

- Construction of a 480-foot long by 150-foot wide Engineered Materials Arresting System (EMAS);
- Relocate a portion of the natural gas pipeline that falls underneath the EMAS and install at-grade markers;
- Relocate windsock and place on 3-inch frangible mount;
- Remove drainage swale and re-grade to FAA specifications; and
- Removal of one (1) concrete shooter pads and associated walkways, and one (1) trap house assemblies within the Amateur Trap Shooters Association (ATA) facility is currently being undertaken.

Runway 24L Alternative 2E RSA

- Construction of a 480-foot long by 150-foot wide Engineered Materials Arresting System (EMAS);
- Runway 24L MALSR approach light system adjustments; and
- Relocate windsock and place on 3-inch frangible mount.

Actual design of the EMAS will be determined by the EMAS manufacturer. Both EMAS projects can be accomplished within the existing Airport property boundary and will provide a level of safety that is equivalent to a full RSA. The existing runway thresholds will remain in their current locations, which will provide the minimum runway length of 7,000 feet for takeoff and landing operations. Also, the existing navigational and visual aid facilities will not require relocation.

4.3 **6R-24L RSA Alternative 3C**, as shown on **Exhibit 22**, includes elements from Alternatives 1D and 2E. Major modifications to Runway 6R-24L include the following:

Runway 6R Alternative 1D RSA

- Construct a new 25-foot wide airside service road approximately 10 feet offset and parallel with the existing airport security fence that runs parallel to U.S. 40;
- Demolish approximately 600 linear feet of the existing airport service road;
- Removal of one (1) concrete shooter pads and associated walkways, and one (1) trap house assemblies within the Amateur Trap Shooters Association (ATA) facility is currently being undertaken;
- Relocate windsock and place on 3-inch frangible mount;
- Demolish approximately 540 linear feet of the previous ATA service road;
- Remove drainage swale and re-grade to FAA specifications; and
- Install at grade natural gas pipeline markers.

Runway 24L Alternative 2E RSA

- Construction of a 480-foot long by 150-foot wide Engineered Materials Arresting System (EMAS);
- Runway 24L MALSR approach light system adjustments; and
- Relocate windsock and place on 3-inch frangible mount.

An area measuring 9 feet by 5 feet at the southwest corner of the 6R RSA will have a proposed airside service road running through it. Under this alternative the proposed service road does has not be moved farther outward due to the existing right-of-way for U.S. 40. Therefore, a Modification to Standards (MOS) of the RSA requirements will need to be submitted for FAA approval under this alternative.

Both of the RSA projects can be accomplished within the existing Airport property boundary. The EMAS will provide a level of safety that is equivalent to a full RSA. The existing runway thresholds will remain in their current locations and provide the minimum runway length of 7,000 feet for takeoff and landing operations. Also, the existing navigational and visual aid facilities will not require relocation.

4.4 **6R-24L RSA Alternative 3D**, as shown on **Exhibit 23**, includes elements from Alternatives 1D and 2F. Major modifications to Runway 6R-24L include the following:

Runway 6R Alternative 1D RSA

- Construct a new 25-foot wide airside service road approximately 10 feet offset and parallel with the existing airport security fence that runs parallel to U.S. 40;
- Demolish approximately 600 linear feet of the existing airport service road;
- Removal of one (1) concrete shooter pads and associated walkways, and one (1) trap house assemblies within the Amateur Trap Shooters Association (ATA) facility is currently being undertaken;
- Relocate windsock and place on 3-inch frangible mount;
- Demolish approximately 540 linear feet of the previous ATA service road;
- Remove drainage swale and re-grade to FAA specifications; and
- Install at grade natural gas pipeline markers.

Runway 24L Alternative 2F RSA

- Runway 24L threshold 2,300-foot extension;
- Relocation of North Dixie Drive;
- Relocation of railroad line;
- Relocation of airside service road and security fence;
- Relocation of MALSR, Glide Slope, RVR, PAPI and windsock;
- Land acquisition;
- Runway markings, lighting and signage will be changed as necessary; and
- Utility relocation (gas, water, telephone, electric, etc.)

The Runway 24L threshold extension will result in a total runway length of 9,300 feet for takeoff and landing operations in both directions. An area measuring 9 feet by 5 feet at the southwest corner of the 6R RSA will have a proposed airside service road running through it. The proposed service road has not been moved farther outward due to the existing right-of-way for U.S. 40. Therefore, a MOS to the RSA requirements will need to be submitted for FAA approval under this alternative. In addition to providing a full unobstructed RSA on both runway ends, this alternative will also provide sufficient runway length to accommodate the existing and future aircraft fleet mix and increase airfield capacity to meet future demand levels during all weather conditions.

4.5 **<u>6R-24L RSA Alternative 3E</u>**, as shown on **Exhibit 24**, includes elements from Alternatives 1G and 2C. Major modifications to Runway 6R-24L include the following:

<u>Runway 6R Alternative 1G RSA</u>

- Runway 6R threshold 2,900-foot extension;
- Tunnel U.S. 40 under the runway extension or a by-pass roadway;
- Relocation of the Airport Access Road;
- Extension of Terminal Drive;
- Utility relocation (gas, water, telephone, electric, etc.);
- Land acquisition;
- Runway markings, lighting and signage will be changed as necessary; and
- Possible upgrade to Category I approach category (MALSR, RVR, GS, LOC, etc.)

Runway 24L Alternative 2C RSA

- Relocate the 24L threshold 400 feet;
- Relocate the aircraft hold pad, and Taxiways 'K', 'N', and 'P';
- Relocate windsock and place on 3-inch frangible mount;
- Relocate the glide slope and RVR equipment accordingly;
- Relocate PAPI and place on 3-inch frangible mounts;
- Relocate the MALSR approach lights and place on 3-inch frangible mounts;
- Runway markings, lighting and signage will be changed as necessary;
- Revise navigational charts; and
- Demolish abandoned runway, taxiway, and hold apron pavement.

This alternative will increase the runway length to 9,500 feet and provide a significant increase in operational capability for existing and future commercial and cargo aircraft operations. In addition to providing a full unobstructed RSA, this alternative will significantly increase the level of operational safety during all weather conditions.

4.6 **<u>6R-24L RSA Alternative 3F</u>**, as shown on **Exhibit 25**, includes elements from Alternatives 1H and 2G. Major modifications to Runway 6R-24L include the following:

<u>Runway 6R Alternative 1H RSA</u>

- Extend the 6R end 285 feet;
- Construct a new 25-foot wide airside service road approximately 10 feet offset and parallel with the existing airport security fence and U.S. 40;

- Demolish approximately 600 linear feet of the airport service road;
- Removal of one (1) concrete shooter pads and associated walkways, and one (1) trap house assemblies within the Amateur Trap Shooters Association (ATA) facility is currently being undertaken;
- Relocate windsock and place on 3-inch frangible mount;
- Demolish approximately 540 linear feet of the previous ATA service road;
- Remove drainage swale and re-grade to FAA specifications; and
- Relocation of natural gas pipeline and install at grade markers.

<u>Runway 24L Alternative 2G RSA</u>

- Relocate windsock and place on 3-inch frangible mount.

The 24L threshold will remain in its current location and the use of declared distance criteria will be necessary in order to maintain a minimum of 7,000 feet for takeoff and landing operations. An area measuring 9 feet by 5 feet at the southwest corner of the 6R RSA will have a proposed airside service road running through it. The proposed service road has not been moved farther outward due to the existing right-of-way for U.S. 40. Therefore, a MOS to the RSA requirements will need to be submitted for FAA approval under this alternative. Under this alternative the 6R extension will help to compensate for the loss of takeoff and landing length on 24L. It also means that no modifications to the Runway 24L end will be necessary to provide the runway length and RSA requirements. The use of declared distance criteria will provide the following runway distances:

	TORA (ft.)	LDA (ft.)	ASDA (ft.)
Runway End 6R	7,000	7,000	7,285
Runway End 24L	7,000	7,000	7,285

5. RSA Alternatives Evaluation

The six proposed composite Runway 6R-24L RSA alternatives will be evaluated under this section based on the following criteria:

- *Operational Impacts* – The extent to which the alternative does not result in a significant impact to aircraft operations when completed, such as; reduced runway length, loss of navigational aids, reduced approach visibility or approach minimums, etc.
- *RSA Standard Compliance* – The extent to which the alternative complies with the standard full RSA requirements as defined in AC 150/5300-13 and Order 5200.8, or the standards for EMAS design as defined in AC 150/5220-22A and Order 5200.9.
- *Construction Cost/Impacts* – The extent to which the order-of-magnitude construction cost is minimized to provide a full or partial RSA, and that there are minimal impacts to runway operations during construction.

- *Site Constraints* – The extent to which there are minimal site constraints, such as; precipitous terrain drop-off, wetlands, major roadways, railroad, and commercial development at the runway end.
- *Long-Term Development Compatibility* – The extent to which the proposed RSA alternative is compatible with the current Master Plan long-term development program of the airport.
- *Level of Safety* – The extent to which the alternative provides an increased level of safety than what currently exists; such as increased runway length and runway safety area size, secondary runway for use during maintenance and/or snow removal.
- *Timeliness* – Some RSA improvement alternatives might take longer to implement than others. Safety benefits are not realized until the improvement is actually completed. Projects that require land acquisitions or extended environmental review may take longer to complete. In addition, the FAA has requested that funding for the RSA improvements be secured by July 2007. This will require that the design and bid of the project be completed prior to this timeframe.

Construction cost estimates for the six composite RSA alternatives were prepared based on the individual alternative costs presented in Section 3. These composite cost estimates are shown in **Table 3** below.

TABLE 3
ORDER-OF-MAGNITUDE CONSTRUCTION COSTS

RSA Alternative	Construction Cost 1/
3A	$1,856,939
3B	$10,447,259
3C	$5,412,474
3D	$14,375,498
3E	$128,898,576
3F	$1,817,114

1/ 2005 dollars

Each of the proposed composite 6R-24L RSA alternatives were evaluated based on the above criteria and rated on a scale of 1 to 3, with 3 being the best and 1 being the worst score. **Table 4** presents the composite RSA alternatives evaluation scoring.

TABLE 4
6R-24L RSA ALTERNATIVES EVALUATION SCORE

Evaluation Criteria	Alt. 3A	Alt. 3B	Alt. 3C	Alt. 3D	Alt. 3E	Alt. 3F
Operational Impacts	3	3	3	3	3	3
RSA Standard Compliance	3	2	2	3	3	3
Construction Cost/Impacts	3	2	2	2	1	2
Site Constraints	2	3	3	1	1	3
Long-Term Development Compatibility	2	2	2	2	3	3
Level of Safety	3	2	2	3	3	3
Timeliness	2	3	3	1	1	3
Total Score	**18**	**17**	**17**	**15**	**15**	**21**

The results above show that the total score for Alternative 3F is the highest among the six alternatives. Alternatives 3A and 3E scored slightly lower, while Alternatives 3B, 3C and 3D scored the lowest. Alternatives 3D, 3E and 3F provide an added benefit of increased runway length and safety during poor weather conditions, and provides for a viable secondary runway when Runway 6L-24R is closed for maintenance or snow removal. Each alternative has their positive and negative attributes relative to the evaluation criteria, which are presented below.

- *Operational Impacts* – All six alternatives will continue to provide the full 7,000-foot runway length and current operational capability upon completion of the RSA project.
- *RSA Standard Compliance* – Alternatives 3A, 3D, 3E and 3F comply with the standard RSA guidelines and provide a clear 500-foot wide by 1,000-foot long area void of any objects. Alternatives 3B and 3C provide an equal level of safety with use of EMAS on one or both runway ends. The use of EMAS was not ranked as high as having a clear RSA void of any objects or pavement. Alternatives 3D and 3F will require a Modification of Standards due to a proposed service road traversing a small 5-foot by 9-foot rectangular area in the southwest corner of the RSA. This was infraction of the RSA was not penalized due to its location and size.
- *Construction Cost/Impacts* – Order-of-magnitude construction cost estimates were developed for the six composite alternatives (see Table 3). Alternatives 3A and 3F have the lowest construction cost, while Alternatives 3D and 3E have the highest construction costs due to the runway extension, land acquisition, and relocated roadway systems. Alternatives 3B and 3C are in the mid-range cost due to construction of the EMAS. In addition, it is anticipated that there will be additional long-term annual operation & maintenance costs associated with the EMAS. During construction the relocation of North Dixie Drive under Alternative 3A will have less impact on runway operations than the other alternatives that require construction of a runway extension or EMAS. In addition, construction of the EMAS will result in the loss of the Runway 24L MALSR

approach light system, resulting in higher approach minimums during construction.

- *Site Constraints* – Alternatives 3B, 3C and 3F will have no site constraints since they are within the current airport property boundary. Alternatives 3A, 3D and 3E will have the most number of off-airport site constraints which will include; land acquisition, roadway relocation, utility relocation, railroad relocation, and new instrument runway equipment.
- *Long-Term Development Compatibility* - Alternatives 3A, 3B, 3C, and 3D have equal scores for their compatibility with the proposed long-term airport development program. Alternatives 3E and 3F are scored the highest because they represent the beginnings of, or in total, the Airports proposed long-term airfield development program.
- *Level of Safety* – All six RSA alternatives will provide a greater level of safety than what currently exists. However, a higher score was given to Alternatives 3A, 3D and 3E because they provide an area that is more in compliance with the true FAA definition of what an RSA should entail. The use of EMAS on Alternatives 3B and 3C were given a lower rating for not having a clear RSA void of any objects or pavement.
- *Timeliness* – The proposed runway extensions associated with Alternatives 3D and 3E will require an extended time period to design and construct. Also, due to their impact on land outside the airport boundary and potential environmental review process, these two alternatives were given a lower score. The relocation of North Dixie Drive under Alternative 3A will also require additional time and was given a lower score. Construction of Alternatives 3B, 3C, and 3F were given a higher score because they are contained within the existing airport property and should require less time to design and construct.

6. RSA ANALYSIS RESULTS

The results of this study conclude that Alternative 3F would provide the most feasible and cost effective means of rectifying the RSA deficiencies for Runway 6R-24L. Alternative 3F provides a full RSA for both runway ends that are in compliance with current FAA standards, while staying within the current property boundary. This alternative will also maintain the current 7,000-foot length for landing and takeoff operations. The cost to construct Alternative 3F is approximately $1.82M.

APPENDIX A

RUNWAY SAFETY AREA
FAA CORRESPONDENCE

RECEIVED
FEB 14 2000
DEPT. OF AVIATION

U.S. Department of Transportation
Federal Aviation Administration

Airports District Office
Willow Run Airport, East
8820 Beck Road
Belleville, MI 48111

January 21, 2000

Mr. Eugene B. Conrad, Jr., A.A.E.
Director of Aviation
James M. Cox - Dayton International Airport
3600 Terminal Drive, Suite 300
P.O. Box 90039
Dayton, OH 45490-0039

Dear Mr. Conrad:

James M. Cox - Dayton International Airport, Dayton, Ohio
Runway Safety Area (RSA) Survey

On October 1, 1999, the Federal Aviation Administration (FAA) issued Order 5200.8, "Runway Safety Area Program" (copy enclosed), which requires the FAA to collect and maintain data on the RSA for each runway at federally obligated airports. The objective of this requirement is that all RSAs at federally obligated airports and all RSAs at airports certificated under Federal Aviation Regulation (FAR) Part 139 shall conform to the standards contained in Advisory Circular (AC) 150/5300-13, "Airport Design," to the extent practicable. Based on this RSA information, the FAA will make a determination of the acceptability of the RSA and if enhancements are necessary for improved airport safety. For all runways certificated under FAR Part 139 or that plan to be certificated within the next two years, the FAA must accomplish the determinations prior to June 30, 2001.

In support of this objective, we are requesting that each certificated airport sponsor work with its consultant to provide the necessary information for an analysis of the airport runways. It is recommended, in the interest of fiscal responsibility, that **all runways** at certificated airports be analyzed at this time, even though the FAA's June 30, 2001, deadline only applies to certificated runways. We would request that you have your survey results to our office by **June 30, 2000**, so that they can be analyzed prior to an on-site inspection of these areas on your airport. The FAA determination will be made from the review of the data and the on-site inspection.

All work associated with obtaining the RSA information and preparing the analysis will be an eligible expense, and reimbursement may be requested under the Airport Improvement Program (AIP).

We have prepared a document entitled, "Runway Safety Area (RSA) Survey Requirements For Air Carrier Runways," (copy enclosed) to assist you and your consultant in conducting the necessary survey work and in preparing the appropriate drawings. Three copies of the completed analysis package should be submitted to our office. We would like the information as soon as possible, but no later than June 30, 2000.

If you have any questions, please contact your program manager, Larry King (734-487-7293).

Sincerely,

Robert L. Conrad

Robert L. Conrad
Acting Manager
Detroit Airports District Office

2 Enclosures

U.S. Department
of Transportation
**Federal Aviation
Administration**

Airports District Office
Willow Run Airport, East
8820 Beck Road
Belleville, MI 48111

September 25, 2000

Mr. Eugene B. Conrad, Jr., A.A.E., Director of Aviation
Department of Aviation
City of Dayton
James M. Cox-Dayton International Airport
3600 Terminal Drive, Suite 300
Vandalia, OH 45377

James M. Cox-Dayton International Airport
Dayton, Ohio
Runway Safety Area Determinations

Dear Mr. Conrad:

As you are aware, the Runway Safety Area (RSA) is an integral part of the airport environment. RSA dimensions are established in Advisory Circular 150/5300-13, Airport Design and are intended to provide a measure of safety in the event of an aircraft's excursion from the runway by significantly reducing the extent of personal injury and aircraft damage during overruns, undershoots, and veer-offs.

The objective of the Runway Safety Area Program established on October 1, 1999, is that all RSA's at Federally obligated airports and all RSA's at airports certificated under 14 Code of Federal Regulations (CFR) Part 139 shall conform to the standards contained in AC 150/5300-13 Airport Design, to the extent practicable. A requirement of this program is that data be collected and maintained and that a determination be made for each runway at Federally obligated airports and airports certificated under Part 139.

Enclosed for your information is a copy, each, of the Runway Safety Area Determinations made by the Detroit Airports District Office on August 30, 2000 (Runway 6L/24R), September 6, 2000 (Runway 6R/24L), and September 14, 2000 (Runway 18/36). These determinations were completed in accordance with Federal Aviation Administration (FAA) Order 5200.8, Runway Safety Area Program, dated October 1, 1999. The determinations rendered were based on the most current information available in the Detroit ADO. These determinations will be kept on file in the ADO.

Please be advised that in the event that more current or updated information becomes available to our office, we will reevaluate these determinations and revise them. If this should be necessary, you will receive a copy of the revised determinations.

The subject RSA's, referenced in the attached RSA Determinations, do not conform to current RSA design standards. We have outlined in the RSA Determinations some of the options available to bring them into conformance with current FAA standards. We would like to emphasize however that the ultimate responsibility for ensuring that all existing and future RSA's on your airport comply with current standards lies with the airport owner/operator. The Detroit ADO and the Airports Certification Staff will continue to work with you and assist you in your efforts to enhance aviation safety at your airport. If you should have questions regarding these determinations, please feel free to contact your Airport Program Manager, Larry King, at (734) 487-7293.

Arlene Draper

Arlene B. Draper

Acting Assistant Manager
Detroit ADO

Enclosure

cc: Ohio Office of Aviation w/ enclosure
AGL-620 w/ enclosure

U.S. Department of Transportation
Federal Aviation Administration

Memorandum

Subject: Runway Safety Area (RSA) Determination, Runway 6R/24L, James M. Cox-Dayton International Airport, Dayton, Ohio.

Date: September 6, 2000

From: Manager, Detroit Airports District Office DET-ADO-600

Reply to Attn. of: King (734) 487-7293

To: RSA Determination File

REFERENCE DOCUMENTS
Advisory Circular 150/5300-13, current edition.
DRAFT Airport Layout Plan, dated December 22, 1999.
Runway Safety Area Data Sheet, (information surveyed May 8-9, 2000).
Airport Master Record, dated May 6, 1999.
Obstruction Chart, field surveyed September 1996.
Approach Plates dated August 10, 2000.

BACKGROUND INFORMATION -- This runway is a category D group IV runway. The dimensions of Runway 6R/24L are 7,000' long by 150' wide. Runway End 6R has a non-precision instrument approach and has approach minimums of 500-1. Runway End 24L has a straight-in precision instrument approach. Runway End 24L has a medium intensity approach lighting system with runway alignment indicator lights (MALSR) and has straight-in ILS approach minimums of 200-½.

NAVAIDs located within the RSA include a MALSR approach light system in the approach to Runway 24L, which is owned by FAA. The lighting supports at the 200', 400', 600', and 800' bars are frangible, but not frangible to 3". A concrete slab is located 645' from Runway 24L in the approach. It is an abandoned pier for MALSR maintenance rising above grade. It is not frangible and owned by FAA. A second concrete slab with a pipe is located 858' from Runway 24L in the approach. It is not frangible and owned by FAA. The VASI and VASI power unit for Runway 24L are owned by FAA. They are frangible but not to 3". The VASI and VASI power unit for Runway 6R are owned by FAA. They are frangible but not to 3". The REILs for Runway End 6R are frangible to 3". The airport owns them.

Other obstructions in Runway 6R/24L safety area include a windsock located approximately 909 feet from Runway End 24L and approximately 225 feet left of runway centerline. It is frangible to 3" and owned by the airport. Another windsock is located approximately 909' from Runway End 6R and approximately 231' left of runway centerline. It is frangible to 3" and owned by the airport. Numerous concrete slabs for trap launchers and concrete shooters pads are located in the Runway End 6R extended runway safety area. They are not frangible and not owned by the airport or FAA. A road extends through the outer reaches of the Runway 6R extended runway safety area. The airport owns it. An airport service road is located in the Runway 24L extended runway safety area near the runway end. The airport also owns it. A drainage swale is located approximately 578'-598' from Runway 6R end in the ERSA and 250' right of runway centerline. A natural gas line located off the end of Runway 6R is frangible to 3". The airport or FAA does not own it. A fence loops around Runway End 24L approximately 800'-900' from the runway end and in the ERSA. It is not frangible and owned by the airport. An airport service road loops around Runway 24L in the extended runway safety area and is owned by the airport

National Road (U. S. 40) runs through the Runway End 6R ERSA at 650' from the runway end, thus limiting the ERSA length to 650' instead of the required 1,000'. North Dixie Drive runs through the Runway End 24L ERSA at 800' from the runway end, thereby limiting the ERSA length to 800' instead of the required 1,000'.

In accordance with AC 150/5300-13, Table 3-3, Footnote 4, the standard runway safety area for this runway has a required width of 520' and a length of 1,000' beyond each end of the runway. However, DRAFT Change 6 to Advisory Circular 150/5300-13 proposes that the RSA no longer increases in width at higher elevations for Approach Category D aircraft. Therefore, the required RSA width would be 500'.

ALTERNATIVES AVAILABLE – N/A

DISCUSSION - N/A

DETERMINATION - Based solely on the review of the above referenced documents, it has been determined that, at this time, the Runway 6R-24L safety area does not meet the current standards contained in AC 150/5300-13, but it is practicable to improve the RSA so that it will meet current standards. It appears technically feasible to meet the standard by accomplishing the following: Remove the abandoned MALSR maintenance pier and the concrete slab with pipe in the ERSA to Runway 24L; Relocate the numerous concrete slabs for trap launchers and concrete shooters pads in Runway 6R ERSA outside the RSA; Relocate the airport service roads in the ERSA for each runway end outside the RSA; Regrade the drainage swale located in Runway End 6 ERSA to meet RSA standards; Relocate the natural gas line located off the end of Runway 6R outside the RSA; and relocate the fence in the Runway 24L ERSA outside the RSA.

National Road should be relocated outside Runway End 6R ERSA. Runway End 24L threshold should be relocated far enough away from North Dixie Road to provide a 1,000' ERSA.

This determination does not reflect a finding that the existing RSA grades and compaction conform to the appropriate grading and compaction requirements.

Some of the NAVAIDs that have been identified above meet the frangibility requirement but do not meet the 3-inch requirement as specified in the airport design standards for RSA's contained in Advisory Circular 150/5300-13.

This determination is subject to the airspace review, environmental finding, and airport layout plan approval for the removal/relocation of the obstructions noted above to meet the RSA standards.

The FAA is preparing an Environmental Impact Statement (EIS) for proposed development at this airport. A full range of alternatives will be reviewed as required by Council on Environmental Quality (CEQ) regulations.

This interim determination is preliminary and is subject to change if additional information becomes available. An in depth analysis may be necessary to determine if it is practicable and feasible to make or not make the identified improvements to the RSA.

This determination is subject to FAA headquarters determining the practicability of changing the frangibility point for any navaid identified above that does not meet the 3 inches above grade requirement for a navaid located within the RSA.

Prepared by: Lawrence C. King
Lawrence C. King Date September 6, 2000
Project Manager, Detroit Airports District Office
DET-ADO-670.2

Recommended by: Ernest P. Gubry 9/13/00
Ernest P.Gubry Date
Acting Assistant Manager, Detroit Airports District Office, DET-ADO-670

This concurrence is based on our review of the Airway Facilities Division as-built drawings, for the above referenced navaids, and the applicable national standard drawings. It appears all navaids within the RSA are constructed with the frangible point at the lowest practical height that it is possible to achieve at this time.

Concurrence by: Dennis Oldson September 11, 2000
Dennis Oldson Date
Acting Assistant Manager, Operations Branch, AGL-470

Approved by: Arlene B. Draper Date 9/13/00
Arlene B.Draper
Acting Manager, Detroit Airports District Office, DET-ADO-600

Attachment: RSA Data Sheet

APPENDIX B

RUNWAY SAFETY AREA DEFICIENCIES ACTION PLAN

The Dayton International Airport has taken corrective action to eliminate some of the RSA deficiencies as identified by the FAA in their letter dated September 6, 2000. **Tables B-1 and B-2** below presents the current status of this effort for Runway Ends 6R and 24L as of August 22, 2003:

TABLE B-1
RUNWAY 6R END

ITEM	FAA DETERMINATION	PROPOSED ACTION PLAN
Wind sock	Place on 3-inch frangible mount	Relocate and place on 3-inch frangible mount as part of Phase I of Master Plan. **Category 1 – Item not resolved**.
VASI and VASI power unit	Place on 3-inch frangible mount	VASI's for Rwy's 6R and 24L were removed and replaced with PAPI systems. PAPI's were installed to FAA specs. And in compliance with RSA criteria. ***Category 3 - Item resolved.***
REILS	Place on 3-inch frangible mount	Relocate and place on 3-inch frangible mount as part of Phase I of Master Plan. **Category 1 – Item not resolved**.
Numerous concrete slabs for trap houses and shooter pads	Remove concrete trap slabs out of RSA	Current plans are to remove concrete shooters pads and trap house assemblies, including substructure immediately after the last trap shoot in August 2005. ***Category 3 - Item not resolved.***
ATA access road and concrete walk	Remove outside of RSA	Current plans are to remove the service road and walkway sometime after the last ATA shoot in August 2005. ***Category 3 - Item not resolved.***
Drainage swale	Re-grade the drainage swale to meet RSA standards	Swale is part of drainage for U.S. 40 (National Road). Current plan is to remove the swale and bring to grade in Phase I of Master Plan. ***Category 3 - Item not resolved.***
Airport service road	Relocate service road outside of 6R ERSA	Current plan is to relocate service road in Phase I of Master Plan. ***Category 3 - Item not resolved.***
National gas pipeline	Relocate the natural gas line outside of RSA	Pipeline is currently 4-6 feet below grade and marked with frangible plastic markers. Plan is to ensure the pipeline routing design meets FAA specifications in Phase I of Master Plan. ***Category 1 - Item not resolved.***

Note: Current Phase I of the Master Plan includes an extension of Runway 6R.

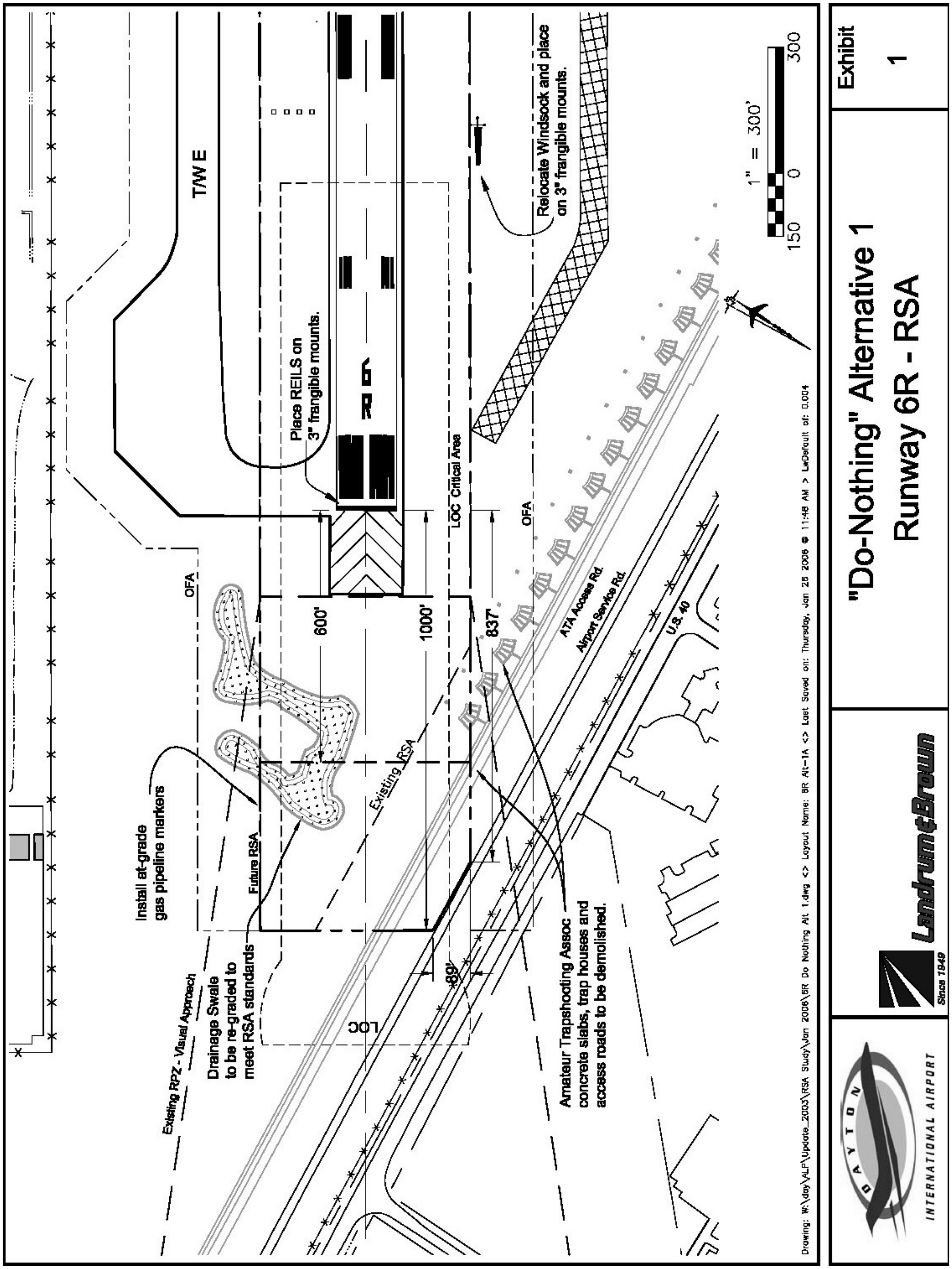
TABLE B-2
RUNWAY END 24L

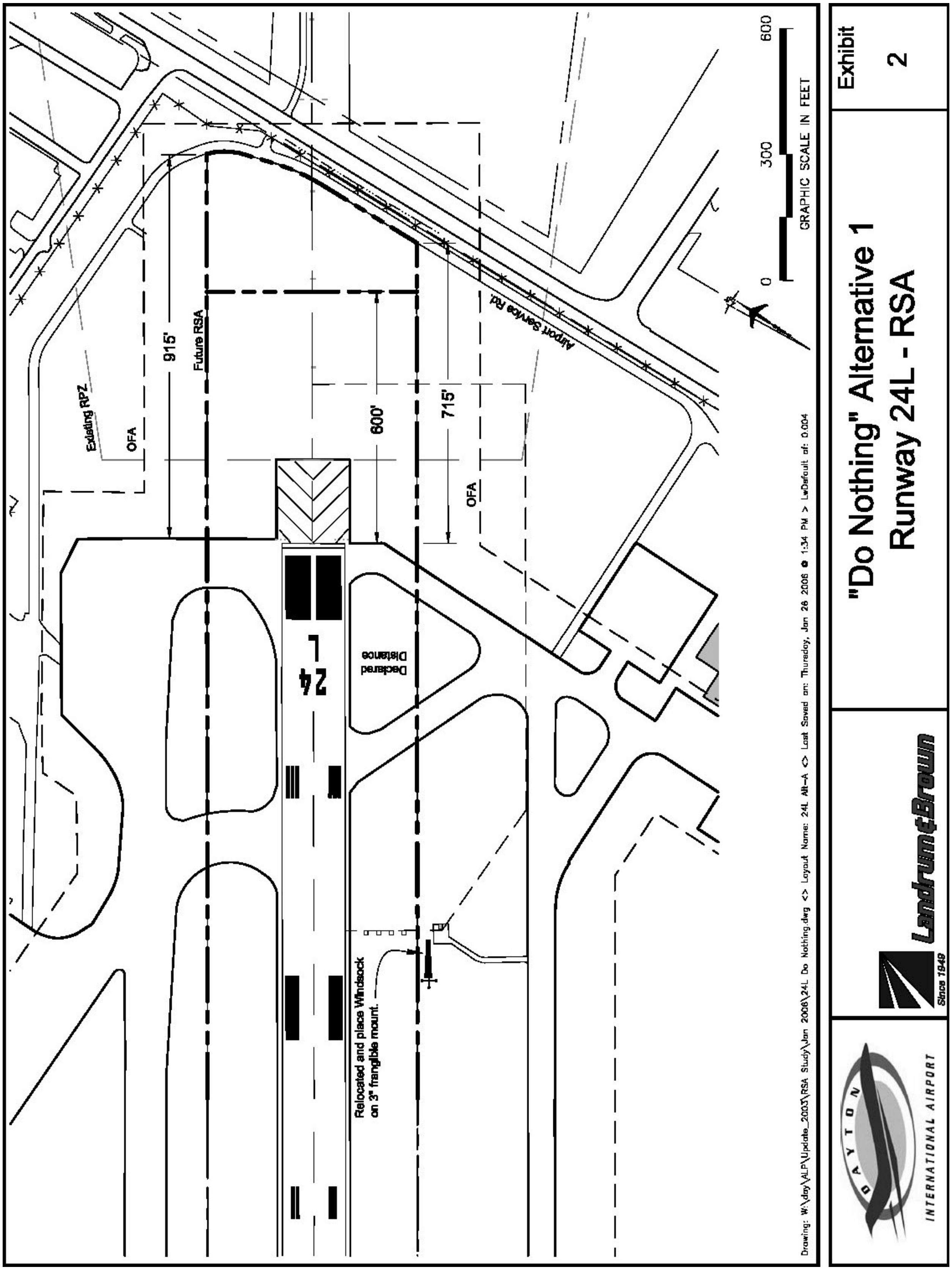
ITEM	FAA DETERMINATION	PROPOSED ACTION PLAN
MALSR light supports (4)	Make frangible to 3-inches	The light supports have been corrected by re-grading around the light supports to within 3-inches of the frangible coupling. ***Category 3 - Item resolved.***
Abandoned MALSR maintenance pier – concrete slab	Remove the abandoned maintenance pier	The concrete pier has been removed. ***Category 3 - Item resolved.***
Concrete slab with a pipe in it	Remove concrete slab	The concrete slab and pipe has been removed. ***Category 1 - Item resolved.***
VASI and VASI power units	Frangible, but not to 3-inches	VASI's for Rwy's 6R and 24L were removed and replaced with PAPI systems. PAPI's were installed to FAA specs. And in compliance with RSA criteria. ***Category 3 - Item resolved.***
Wind sock	Place on 3-inch frangible mount	Relocate and place on 3-inch frangible mount as part of Phase I of Master Plan. **Category 1 – Item not resolved**.
Security fence	Relocate the fence outside the RSA	The Master Plan recommends a relocation of the 24L threshold 400 feet to the southwest. This relocation will place the fence outside of the RSA. ***Category 3 - Item not resolved.***
Airport service road	Relocate outside the RSA	The service road that ran through the blast pad has been removed. The area has been re-graded per FAA specifications. ***Category 1 - Item resolved***.
North Dixie Drive	Runway end 24L threshold should be relocated far enough away from North Dixie Drive to provide a 1,000' RSA	Plan is to relocate the 24L threshold 400 feet to the southwest in Phase I of Master Plan. ***Category 3 - Item not resolved.***

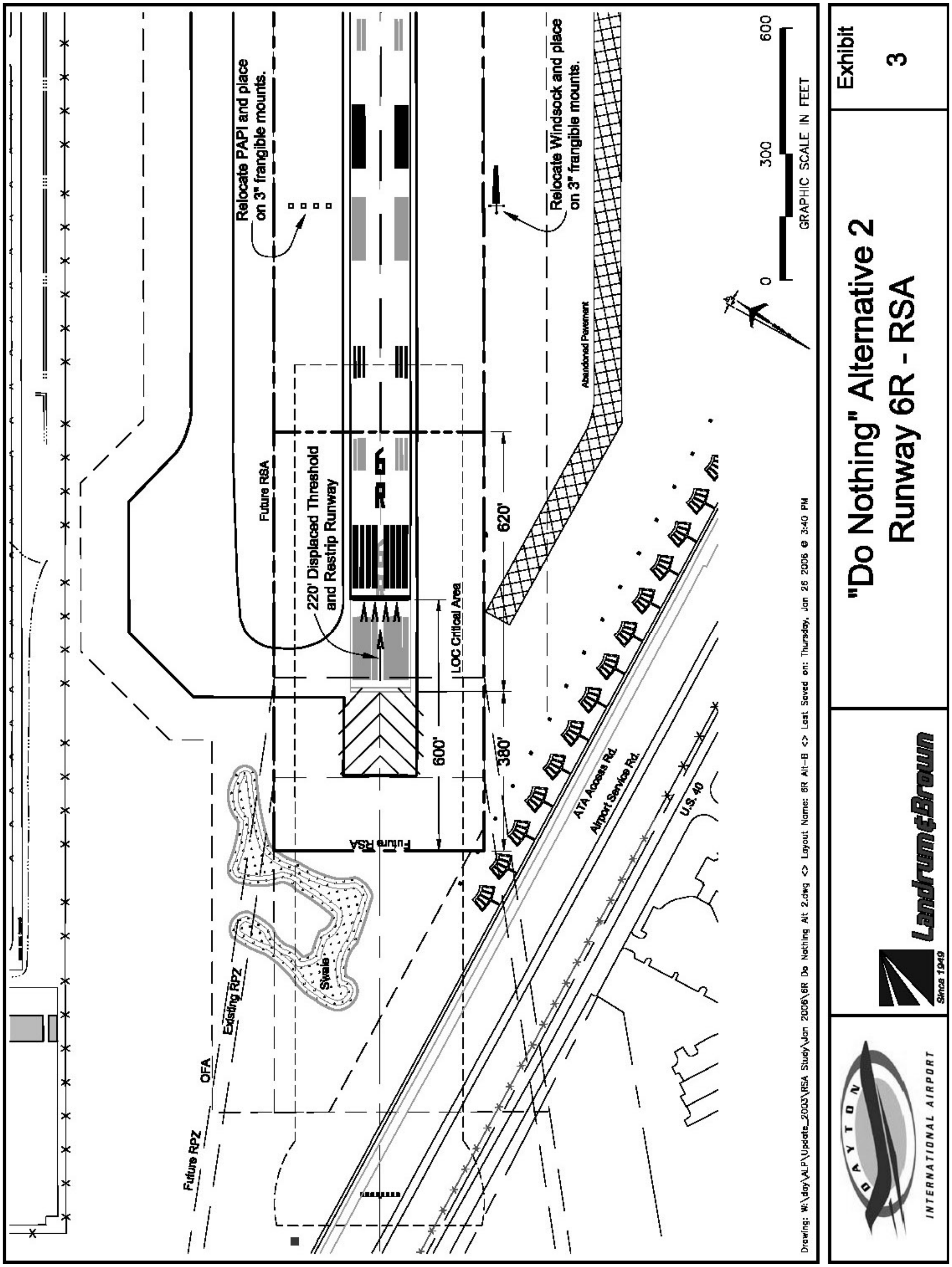
Note: Current Phase I of the Master Plan includes an extension of Runway 6R.

APPENDIX C

RUNWAY SAFETY AREA ALTERNATIVES


T/W E
Place REILS on
3" frangible mounts.
Relocate Windsock and place
on 3" frangible mounts.
LOC Critical Area
OFA
OFA
600'
1000'
837'
89'
Existing RSA
Future RSA
LOC
ATA Access Rd.
Airport Service Rd.
U.S. 40
Install at-grade
gas pipeline markers
Existing RPZ - Visual Approach
Drainage Swale
to be re-graded to
meet RSA standards
Amateur Trapshooting Assoc
concrete slabs, trap houses and
access roads to be demolished.
1" = 300'
150 0 300
"Do-Nothing" Alternative 1
Runway 6R - RSA
Exhibit
1
LandrumBrown
Since 1949
DAYTON
INTERNATIONAL AIRPORT


Existing RPZ
OFA
915'
Future RSA
600'
715'
OFA
Airport Service Rd.
Declared Distance
24L
Relocated and place Windsock on 3" frangible mount.
0
300
600
GRAPHIC SCALE IN FEET
Drawing: W:\day\ALP\Update_2003\RSA Study\Jan 2006\24L Do Nothing.dwg <> Layout Name: 24L Alt-A <> Last Saved on: Thursday, Jan 26 2006 @ 1:34 PM > LwDefault of: 0.004
Exhibit
2
"Do Nothing" Alternative 1
Runway 24L - RSA
Landrum&Brown
Since 1949
DAYTON
INTERNATIONAL AIRPORT


Relocate PAPI and place on 3" frangible mounts.
Relocate Windsock and place on 3" frangible mounts.
Abandoned Pavement
Future RSA
220' Displaced Threshold and Restrip Runway
LOC Critical Area
620'
600'
380'
Future RSA
ATA Access Rd.
Airport Service Rd.
U.S. 40
Swale
Existing RPZ
OFA
Future RPZ
0
300
600
GRAPHIC SCALE IN FEET
Drawing: W:\day\ALP\Update_2003\RSA Study\Jan 2006\6R Do Nothing Alt 2.dwg <> Layout Name: 6R Alt-B <> Last Saved on: Thursday, Jan 26 2006 @ 3:40 PM
Exhibit
3
"Do Nothing" Alternative 2
Runway 6R - RSA
Landrum & Brown
Since 1949
DAYTON INTERNATIONAL AIRPORT

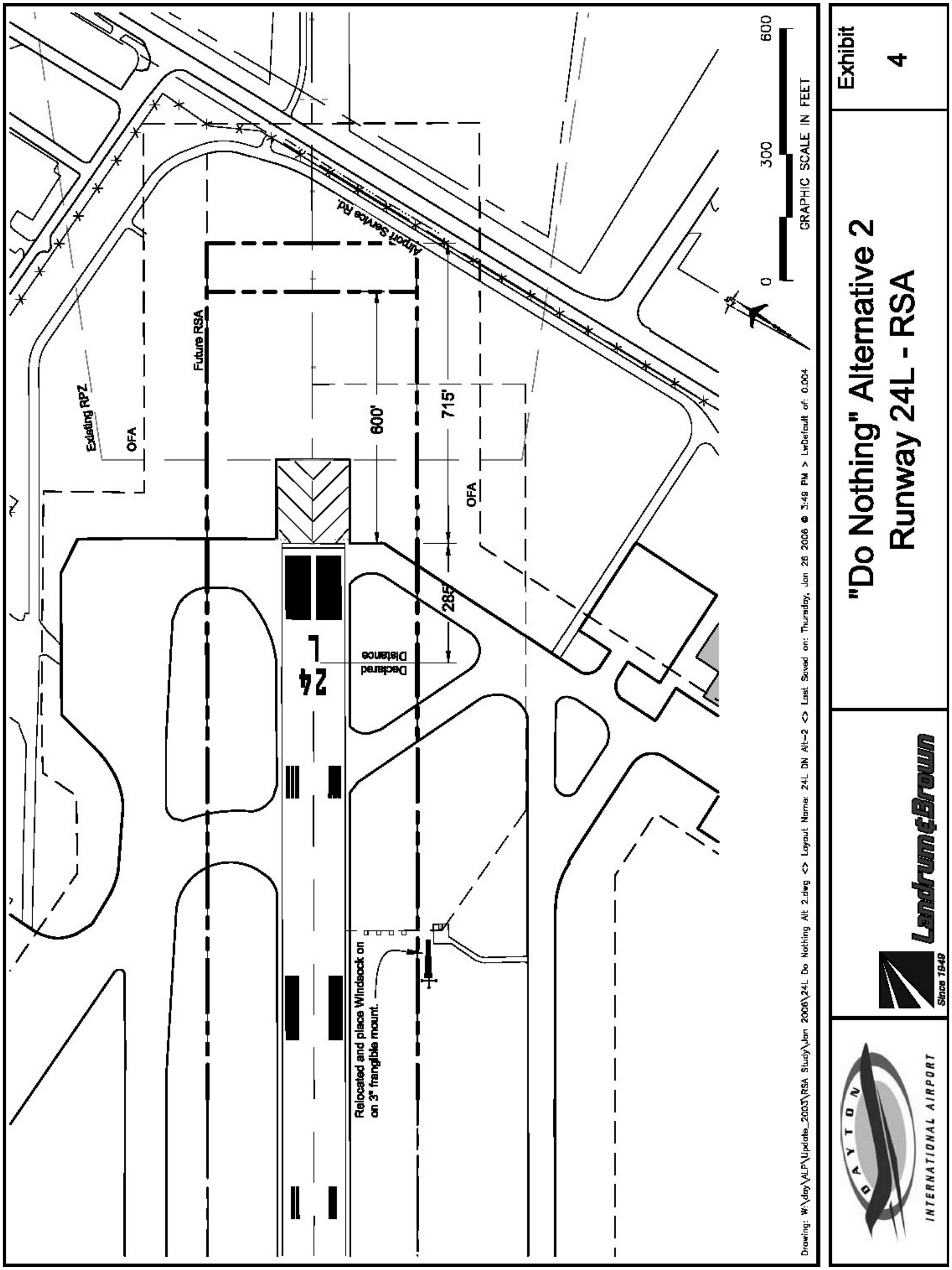
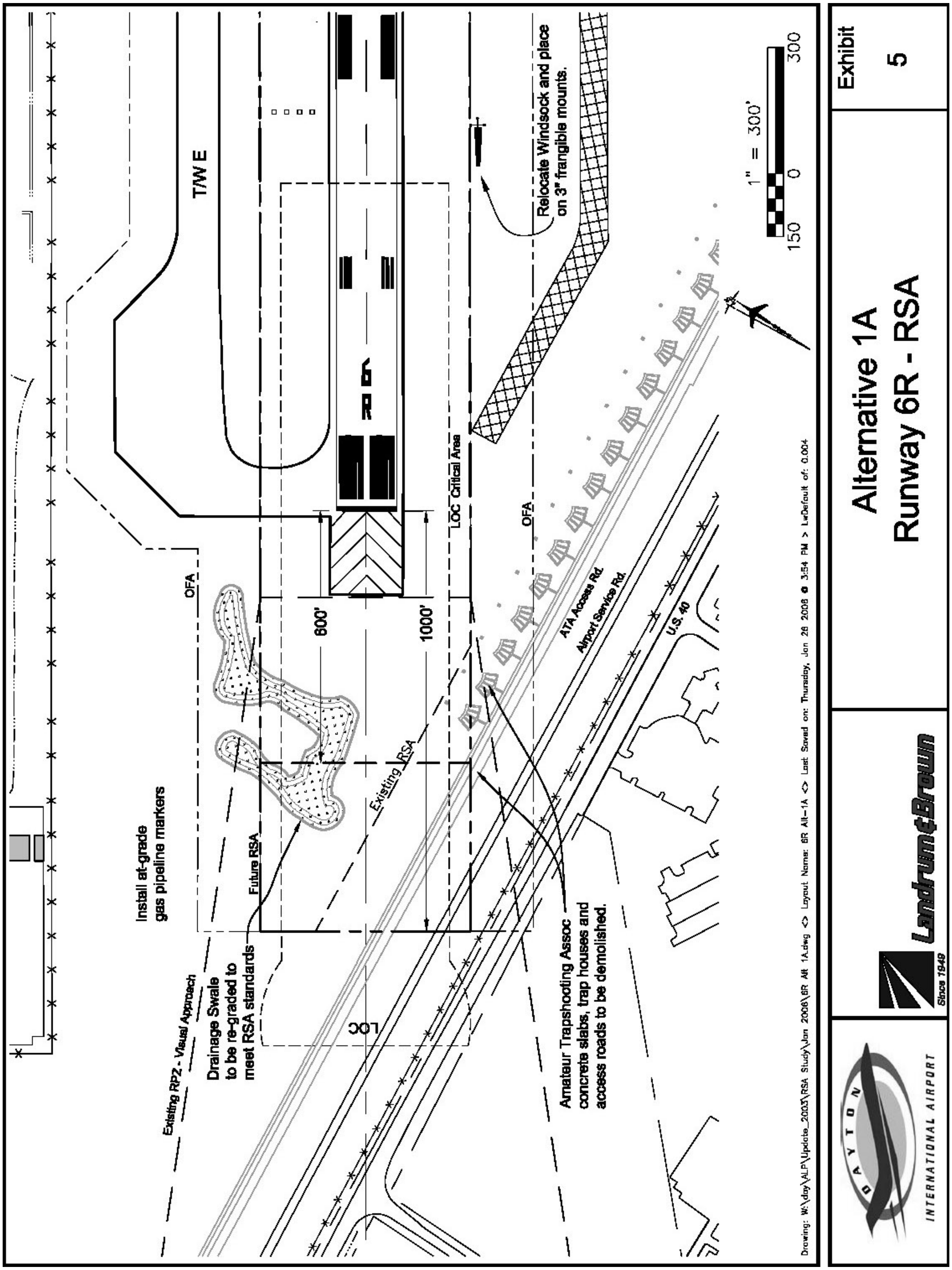
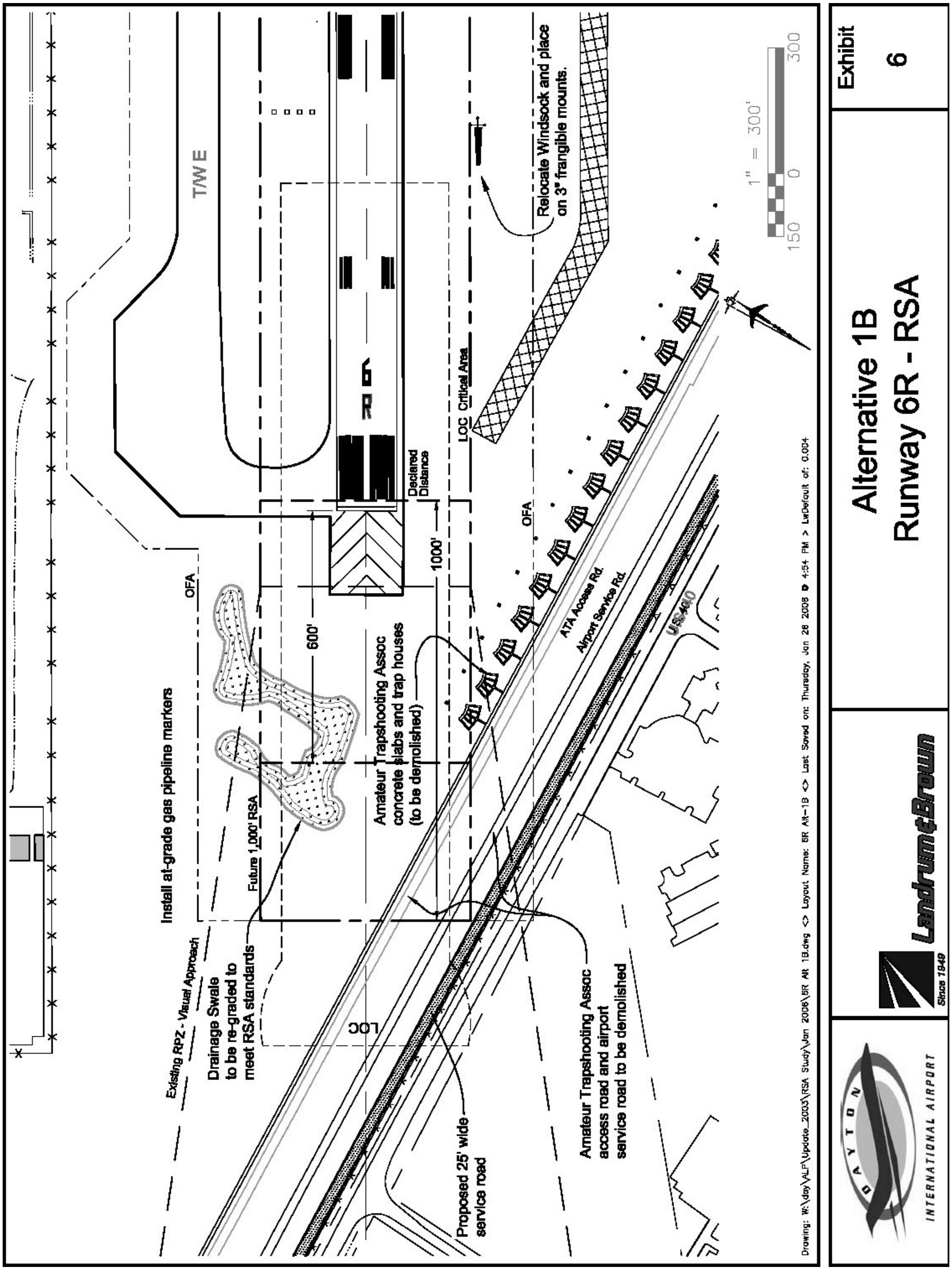
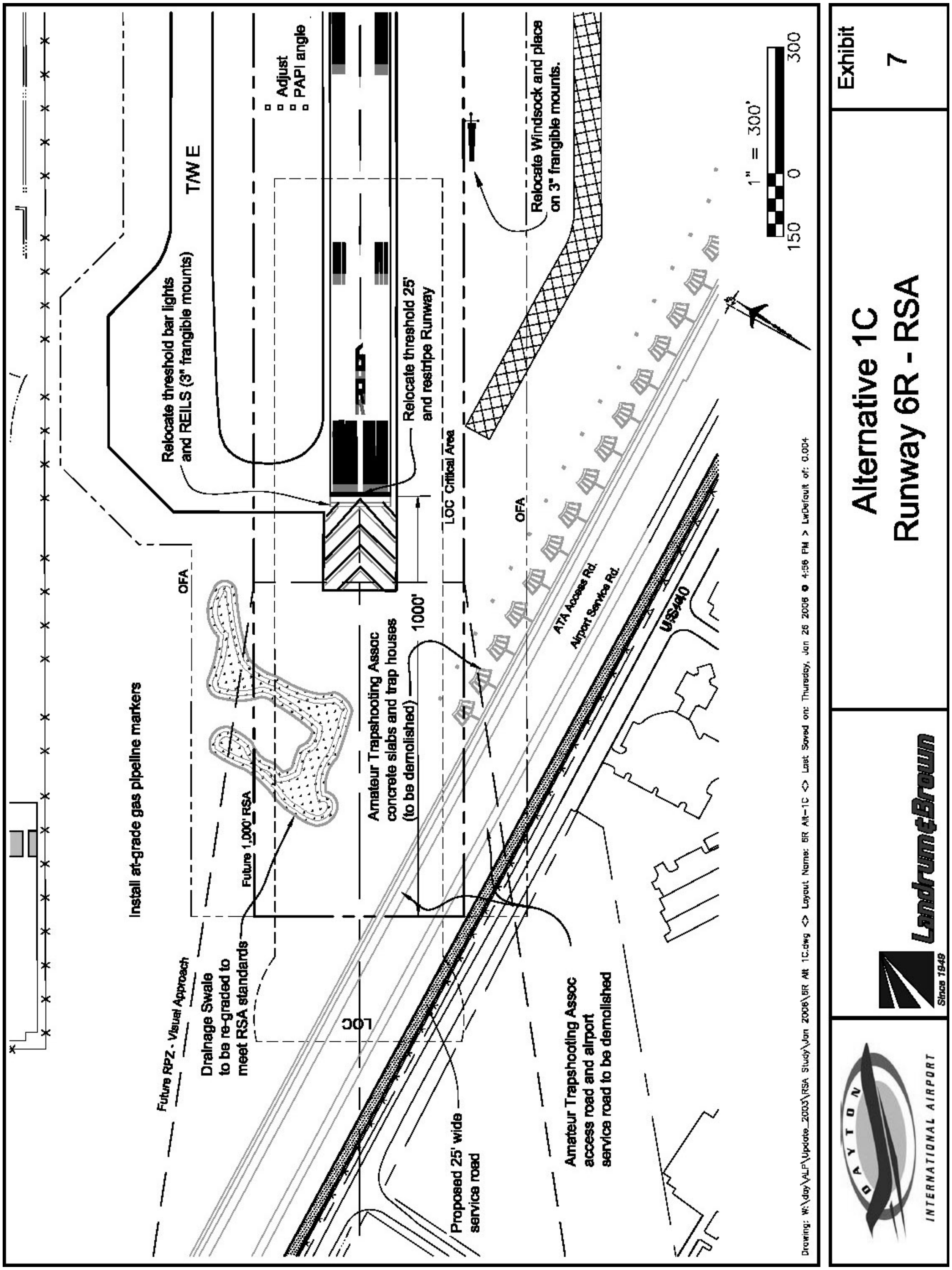
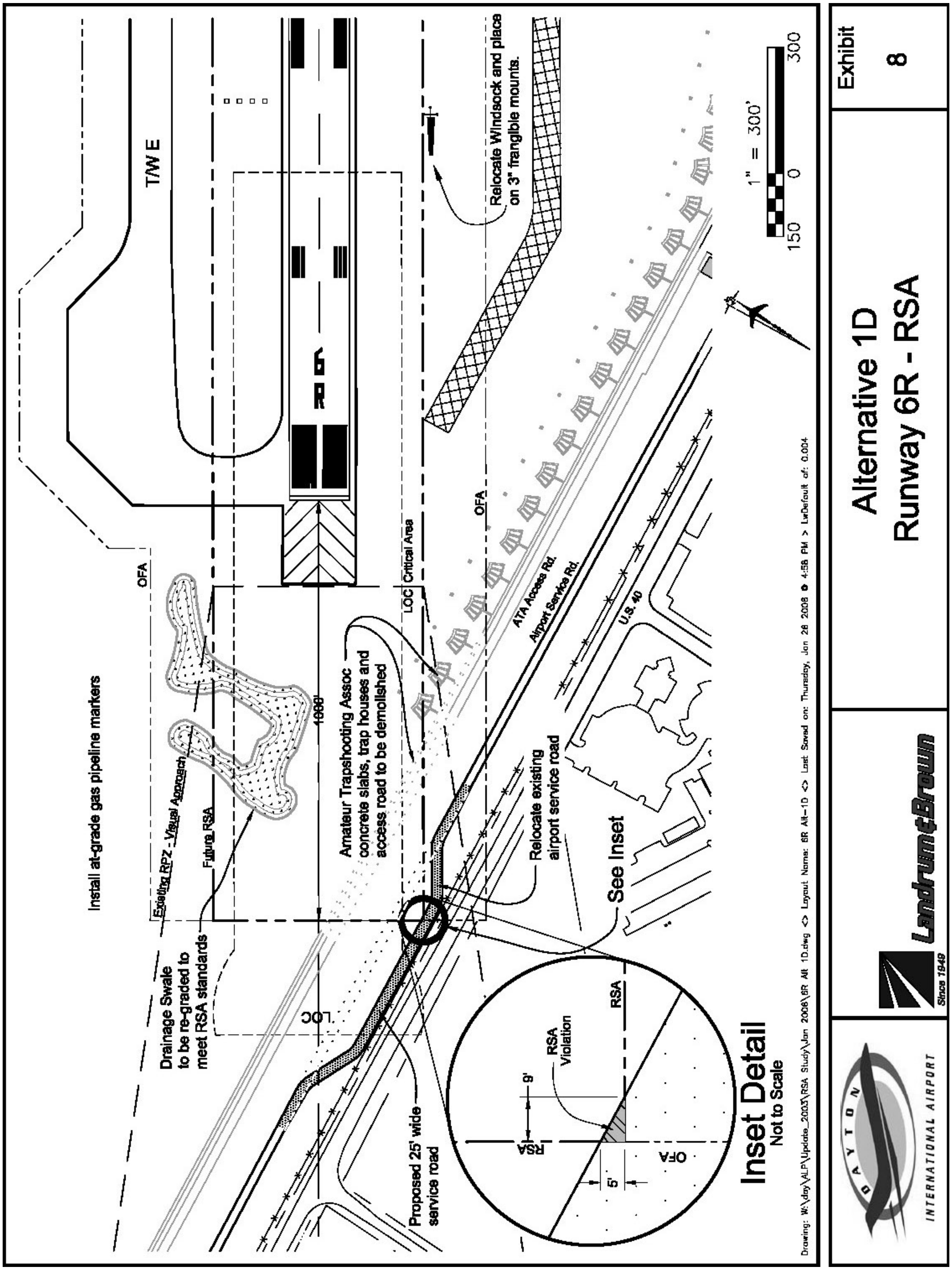


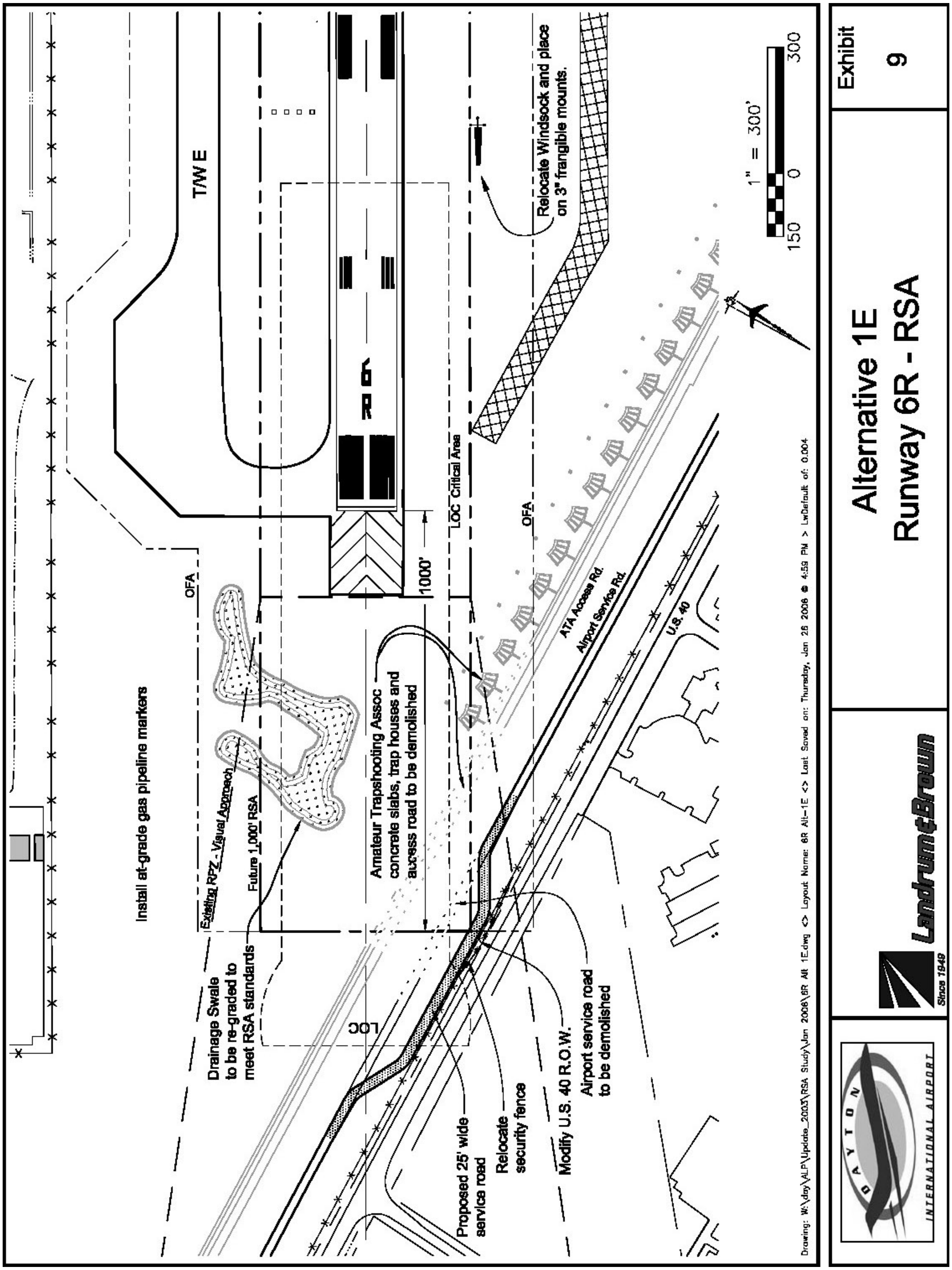
Exhibit
4
"Do Nothing" Alternative 2
Runway 24L - RSA
Existing RPZ
OFA
Future RSA
Airport Service Rd.
600'
715'
285'
OFA
Declared Distance
24
L
Relocated and place Windsock on
on 3" frangible mount.
0
300
600
GRAPHIC SCALE IN FEET
LandrumBrown
Since 1949
DAYTON
INTERNATIONAL AIRPORT

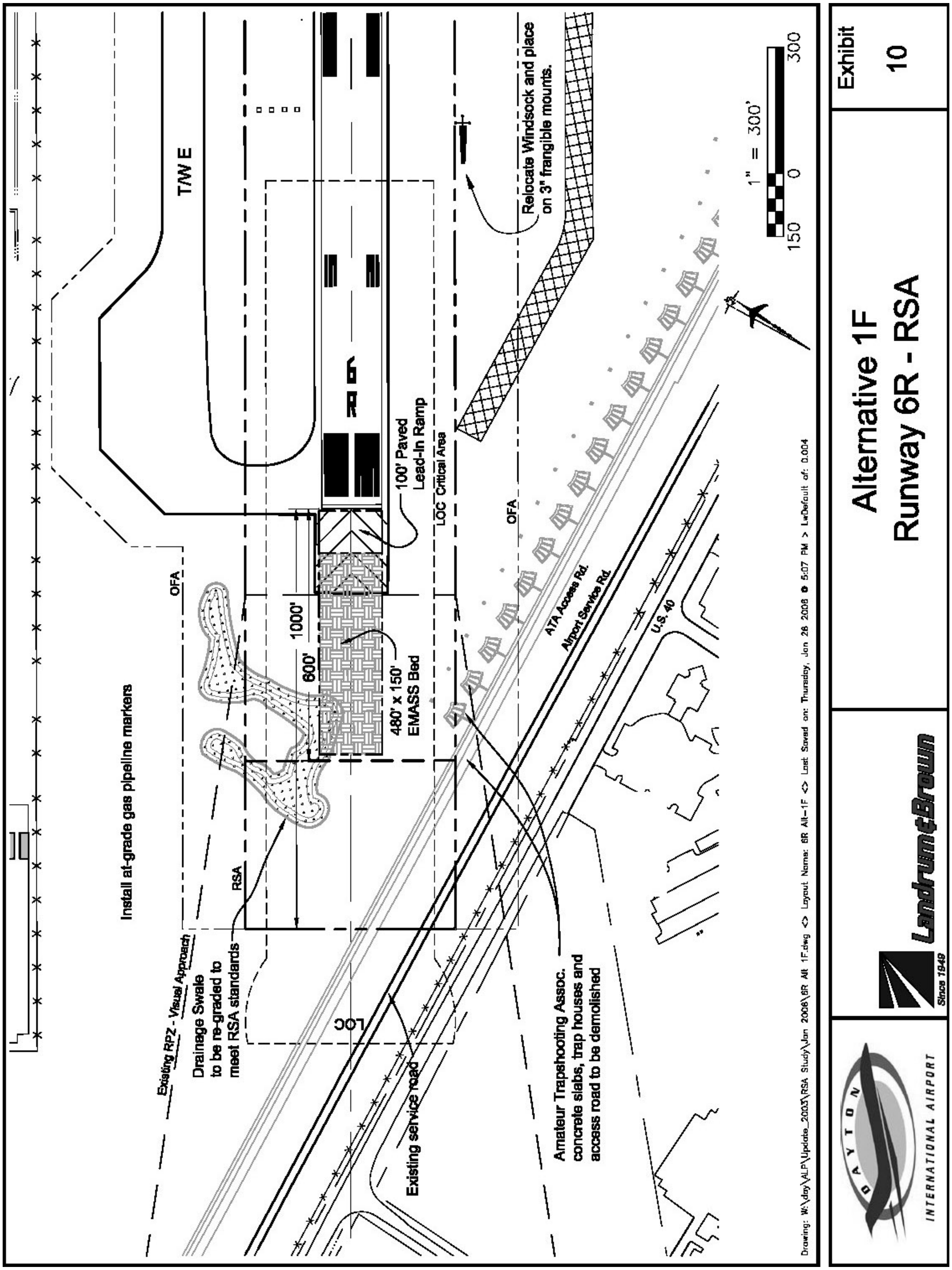

T/W E
Relocate Windsock and place on 3" frangible mounts.
1" = 300'
150
0
300
LOC Critical Area
OFA
600'
1000'
Existing RSA
Future RSA
ATA Access Rd.
Airport Service Rd.
U.S. 40
Install at-grade gas pipeline markers
Existing RP2 - Visual Approach
Drainage Swale to be re-graded to meet RSA standards
LOC
Amateur Trapshooting Assoc concrete slabs, trap houses and access roads to be demolished.
Exhibit
5
Alternative 1A
Runway 6R - RSA
Landrum&Brown
Since 1949
DAYTON INTERNATIONAL AIRPORT


T/W E
Relocate Windsock and place on 3" frangible mounts.
1" = 300'
150
0
300
LOC Critical Area
Declared Distance
OFA
1000'
600'
ATA Access Rd.
Airport Service Rd.
US 40
Amateur Trapshooting Assoc concrete slabs and trap houses (to be demolished)
Install at-grade gas pipeline markers
Future 1,000' RSA
Existing RPZ - Visual Approach
Drainage Swale to be re-graded to meet RSA standards
LOC
Amateur Trapshooting Assoc access road and airport service road to be demolished
Proposed 25' wide service road
Exhibit
6
Alternative 1B
Runway 6R - RSA
Landrum&Brown
Since 1949
DAYTON INTERNATIONAL AIRPORT


Install at-grade gas pipeline markers
Relocate threshold bar lights and REILS (3" frangible mounts)
T/W E
Adjust PAPI angle
Relocate threshold 25' and restripe Runway
LOC Critical Area
OFA
Relocate Windsock and place on 3" frangible mounts.
1" = 300'
150
0
300
Future RPZ - Visual Approach
Drainage Swale to be re-graded to meet RSA standards
Future 1,000' RSA
Amateur Trapshooting Assoc concrete slabs and trap houses (to be demolished)
1000'
ATA Access Rd.
Airport Service Rd.
US 40
LOC
Proposed 25' wide service road
Amateur Trapshooting Assoc access road and airport service road to be demolished
Exhibit
7
Alternative 1C
Runway 6R - RSA
LandrumBrown
Since 1949
DAYTON INTERNATIONAL AIRPORT


Install at-grade gas pipeline markers
T/W E
Relocate Windsock and place on 3" frangible mounts.
OFA
Existing RPZ - Visual Approach
Future RSA
Drainage Swale to be re-graded to meet RSA standards
1000'
Amateur Trapshooting Assoc concrete slabs, trap houses and access road to be demolished
LOC Critical Area
ATA Access Rd.
Airport Service Rd.
U.S. 40
Relocate existing airport service road
See Inset
LOC
Proposed 25' wide service road
Inset Detail
Not to Scale
RSA
RSA Violation
9'
5'
1" = 300'
150 0 300
Exhibit
8
Alternative 1D
Runway 6R - RSA
LandrumBrown
Since 1949
DAYTON INTERNATIONAL AIRPORT


Install at-grade gas pipeline markers
T/W E
OFA
Existing RPZ - Visual Approach
Future 1,000' RSA
Drainage Swale to be re-graded to meet RSA standards
LOC
Amateur Trapshooting Assoc concrete slabs, trap houses and access road to be demolished
1000'
LOC Critical Area
OFA
Relocate Windsock and place on 3" frangible mounts.
ATA Access Rd.
Airport Service Rd.
U.S. 40
Proposed 25' wide service road
Relocate security fence
Modify U.S. 40 R.O.W.
Airport service road to be demolished
1" = 300'
150 0 300
Alternative 1E
Runway 6R - RSA
Exhibit
9
LandrumBrown
Since 1949
DAYTON INTERNATIONAL AIRPORT


Install at-grade gas pipeline markers
T/W E
Relocate Windsock and place on 3" frangible mounts.
100' Paved Lead-In Ramp
LOC Critical Area
OFA
OFA
1000'
600'
480' x 150' EMASS Bed
RSA
Existing RPZ - Visual Approach
Drainage Swale to be re-graded to meet RSA standards
LOC
Existing service road
Amateur Trapshooting Assoc. concrete slabs, trap houses and access road to be demolished
ATA Access Rd.
Airport Service Rd.
U.S. 40
1" = 300'
150 0 300
Exhibit
10
Alternative 1F
Runway 6R - RSA
Landrum&Brown
Since 1949
DAYTON
INTERNATIONAL AIRPORT

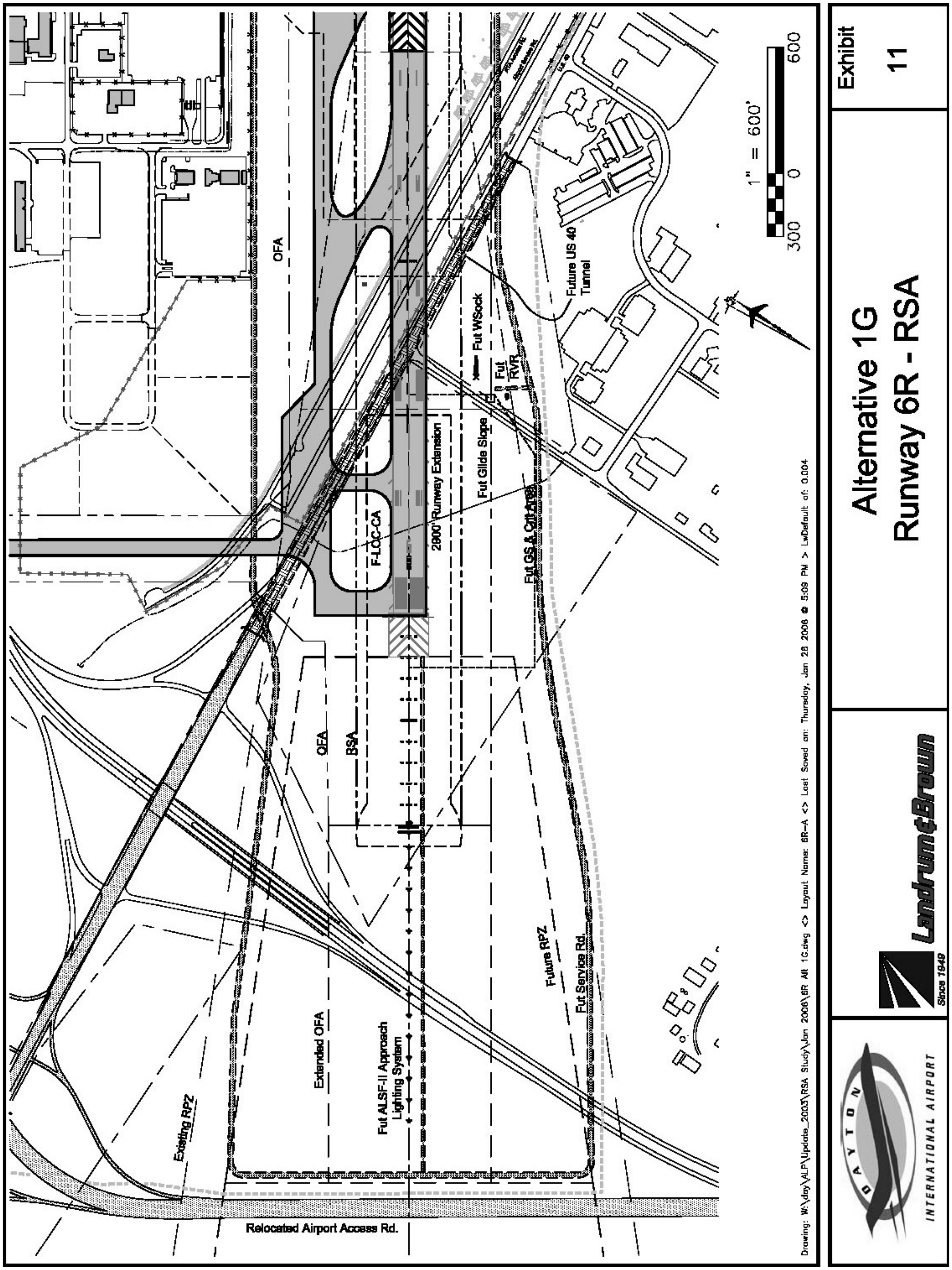
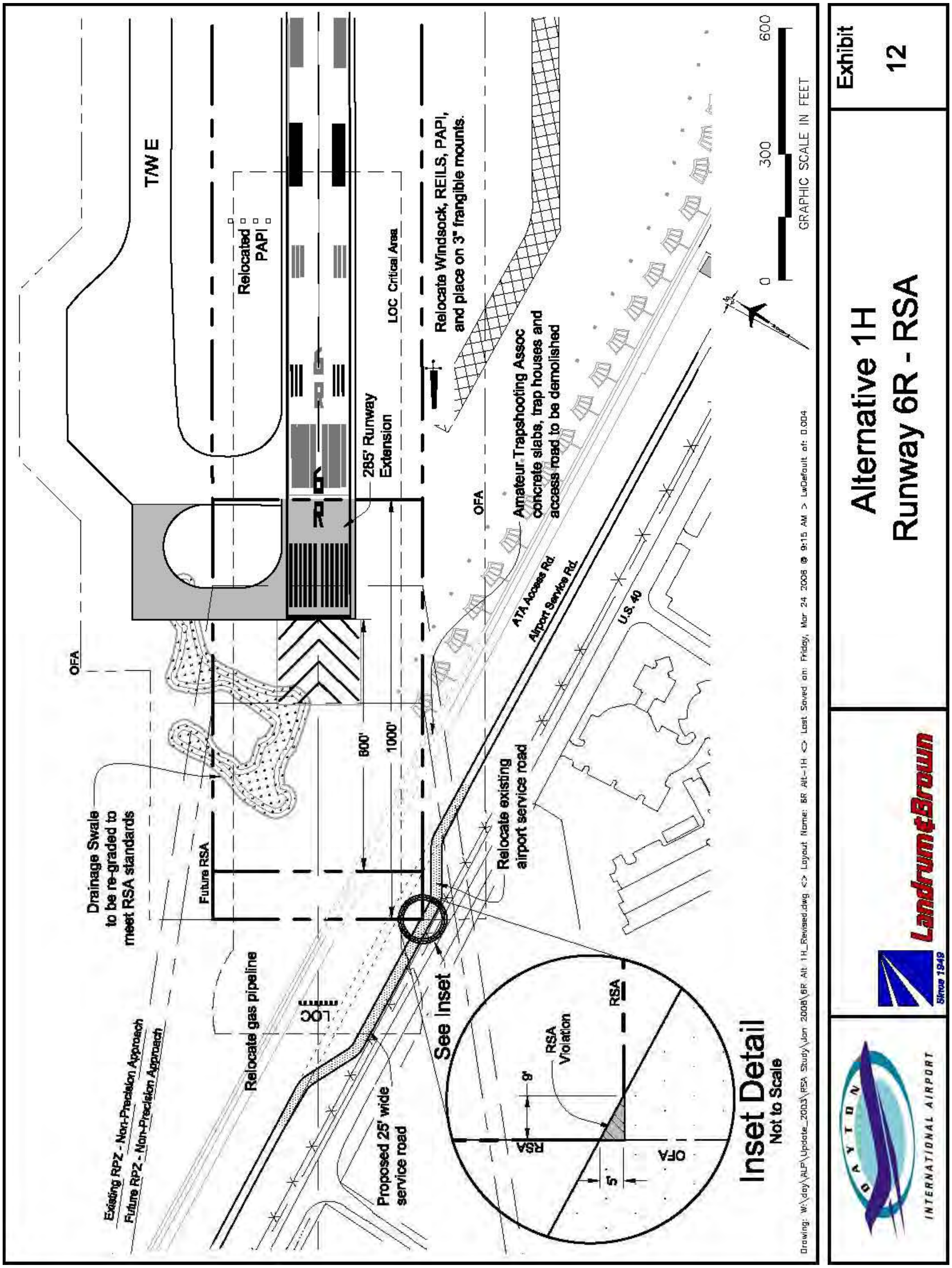


Exhibit
11
Alternative 1G
Runway 6R - RSA
1" = 600'
300
0
600
OFA
BSA
F-LOC-CA
2800' Runway Extension
Fut Glide Slope
Fut GS & Crit Area
Fut WSock
Fut RVR
Future US 40 Tunnel
Extended OFA
Fut ALSF-II Approach Lighting System
Future RPZ
Fut Service Rd.
Existing RPZ
Relocated Airport Access Rd.
LandrumBrown
Since 1949
DAYTON
INTERNATIONAL AIRPORT


T/W E
Relocated PAPI
LOC Critical Area
Relocate Windsock, REILS, PAPI, and place on 3" frangible mounts.
285' Runway Extension
OFA
Amateur Trapshooting Assoc concrete slabs, trap houses and access road to be demolished
ATA Access Rd.
Airport Service Rd.
U.S. 40
800'
1000'
Future RSA
Drainage Swale to be re-graded to meet RSA standards
Relocate existing airport service road
Relocate gas pipeline
LOC
Existing RPZ - Non-Precision Approach
Future RPZ - Non-Precision Approach
Proposed 25' wide service road
See Inset
Inset Detail
Not to Scale
RSA Violation
RSA
9'
5'
0
300
600
GRAPHIC SCALE IN FEET
Exhibit
12
Alternative 1H
Runway 6R - RSA
LandrumBrown
Since 1949
DAYTON INTERNATIONAL AIRPORT

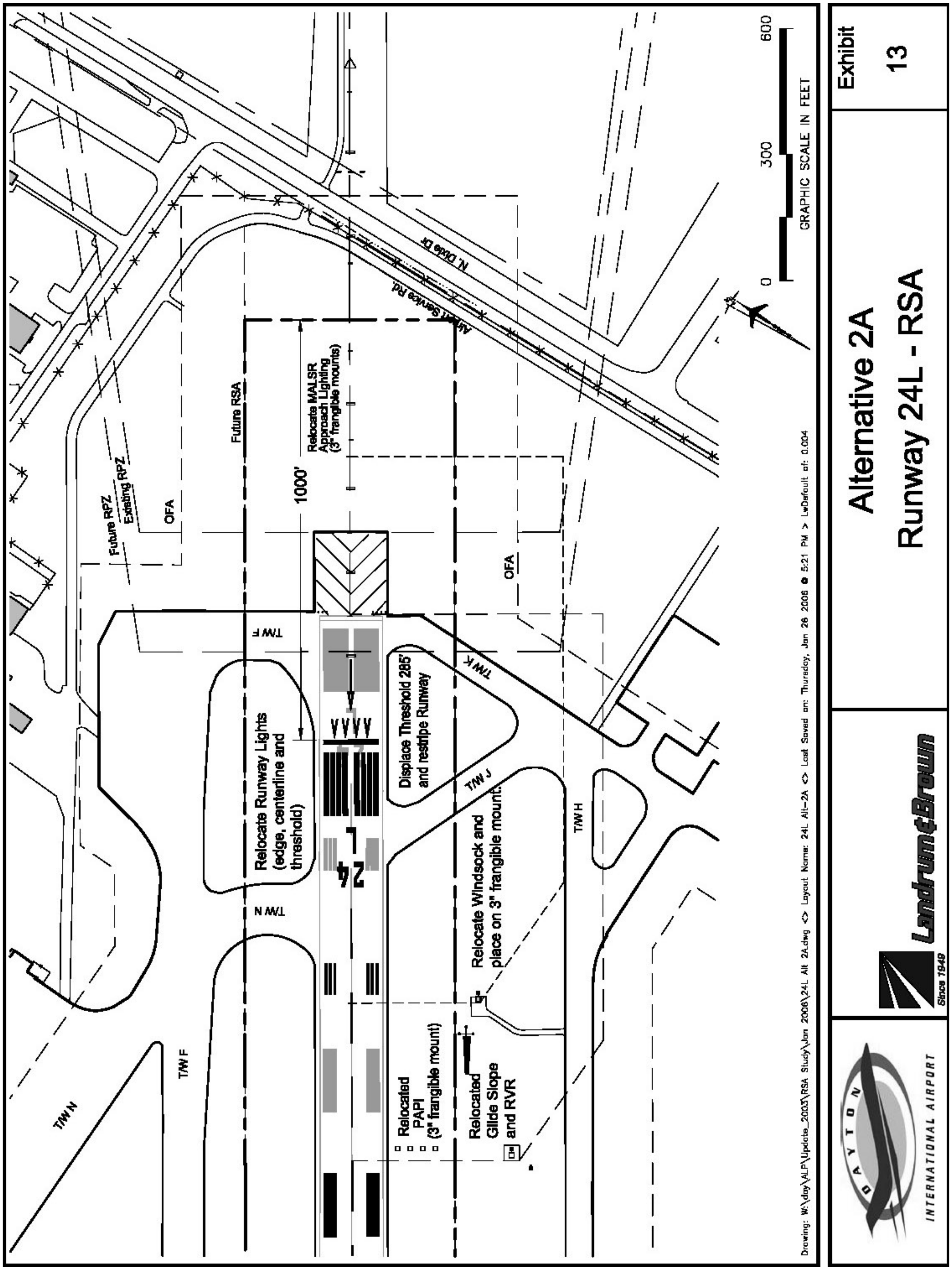
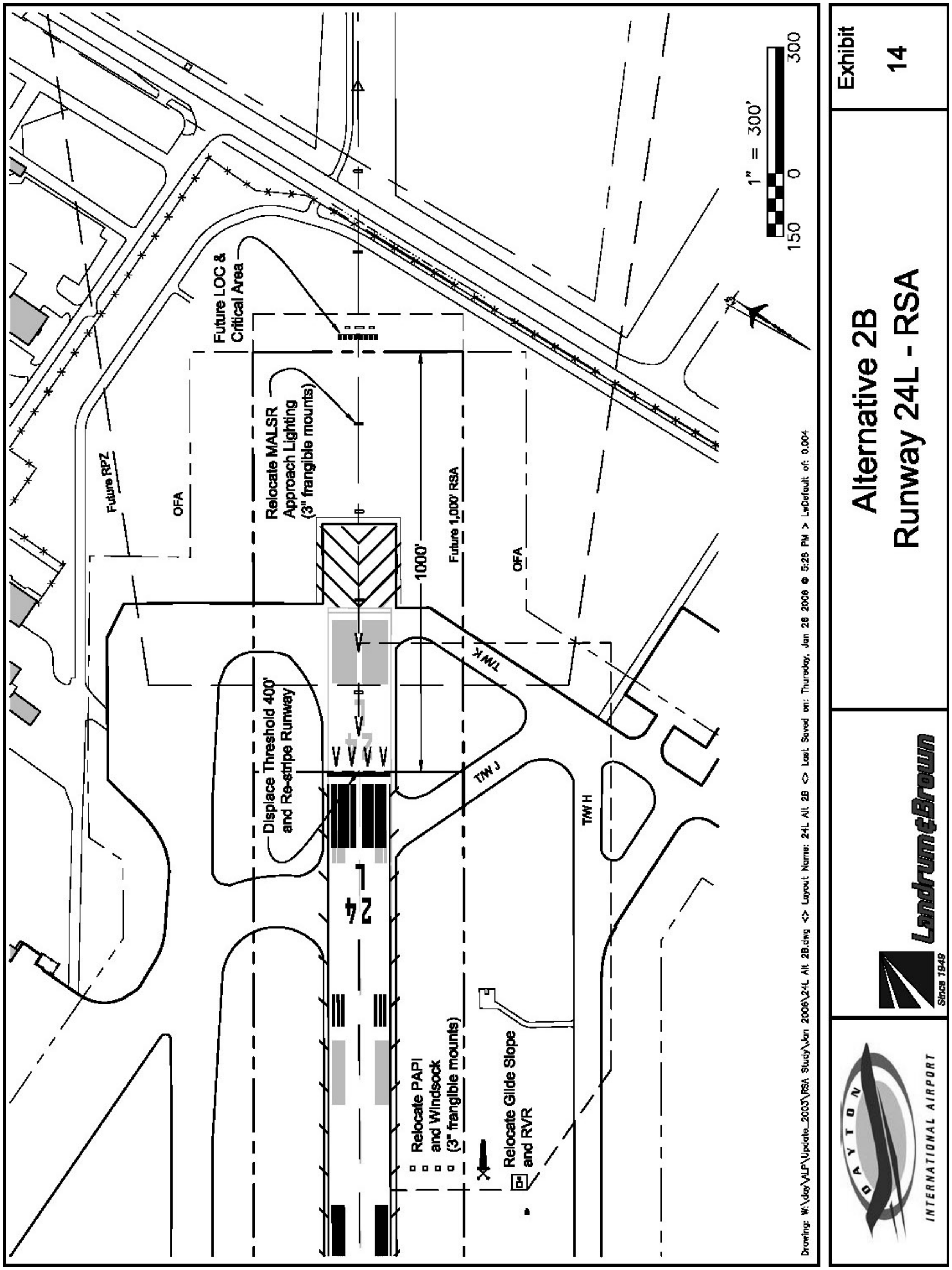


Exhibit
13
Alternative 2A
Runway 24L - RSA
Landrum&Brown
Since 1949
DAYTON INTERNATIONAL AIRPORT
GRAPHIC SCALE IN FEET
0
300
600
N. Dixie Dr.
Airport Service Rd.
Future RSA
Relocate MALSR Approach Lighting (3" frangible mounts)
1000'
Future RPZ
Existing RPZ
OFA
OFA
T/W F
T/W K
T/W J
T/W H
T/W N
T/W F
T/W N
Relocate Runway Lights (edge, centerline and threshold)
Displace Threshold 285' and restripe Runway
Relocate Windsock and place on 3" frangible mount
Relocated PAPI (3" frangible mount)
Relocated Glide Slope and RVR
24L


Future LOC &
Critical Area
Relocate MALSR
Approach Lighting
(3" frangible mounts)
Future RPZ
OFA
Future 1,000' RSA
1000'
OFA
Displace Threshold 400'
and Re-stripe Runway
T/W K
T/W J
T/W H
Relocate PAPI
and Windsock
(3" frangible mounts)
Relocate Glide Slope
and RVR
1" = 300'
150 0 300
Exhibit
14
Alternative 2B
Runway 24L - RSA
Landrum&Brown
Since 1948
DAYTON
INTERNATIONAL AIRPORT

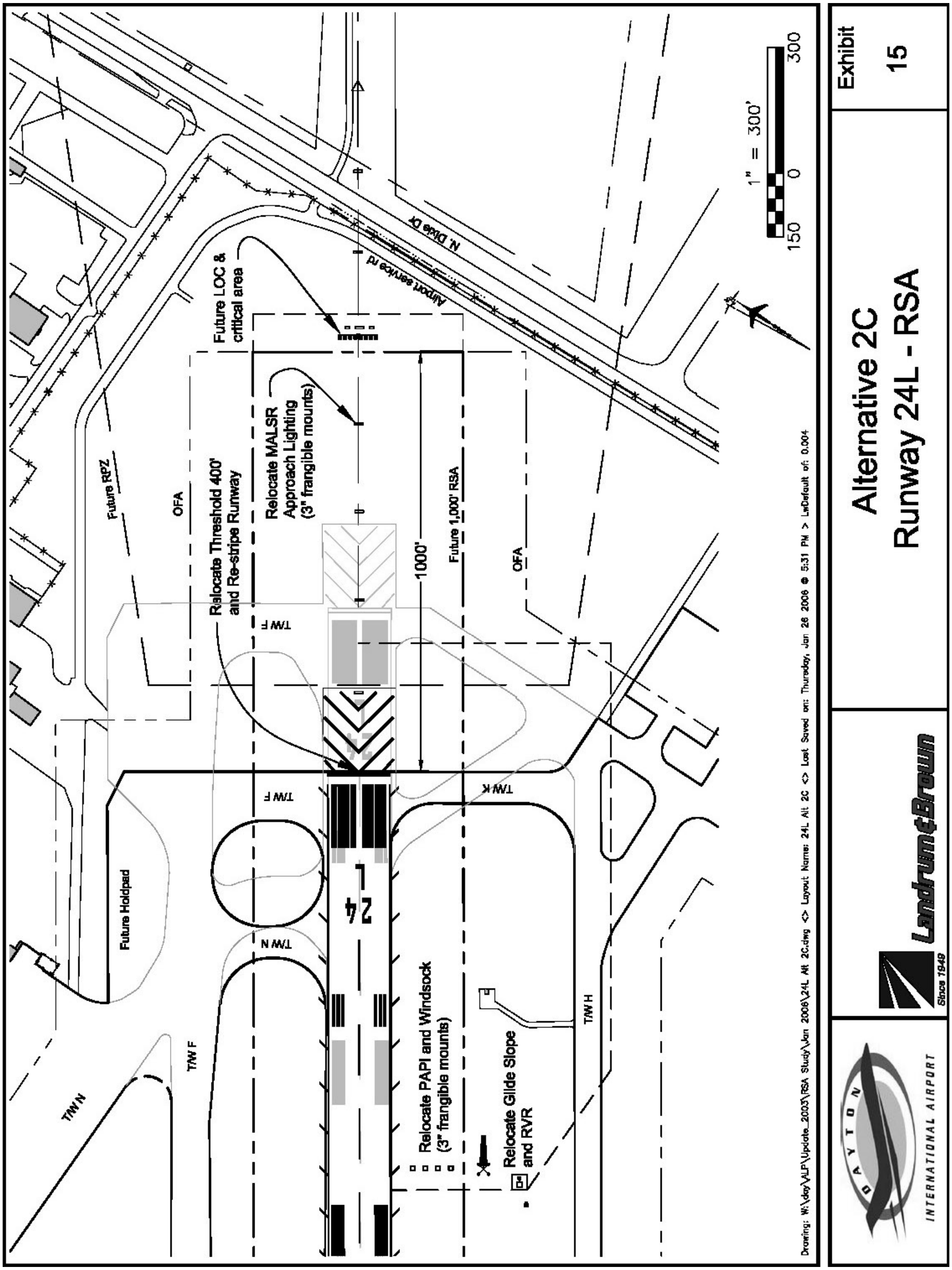
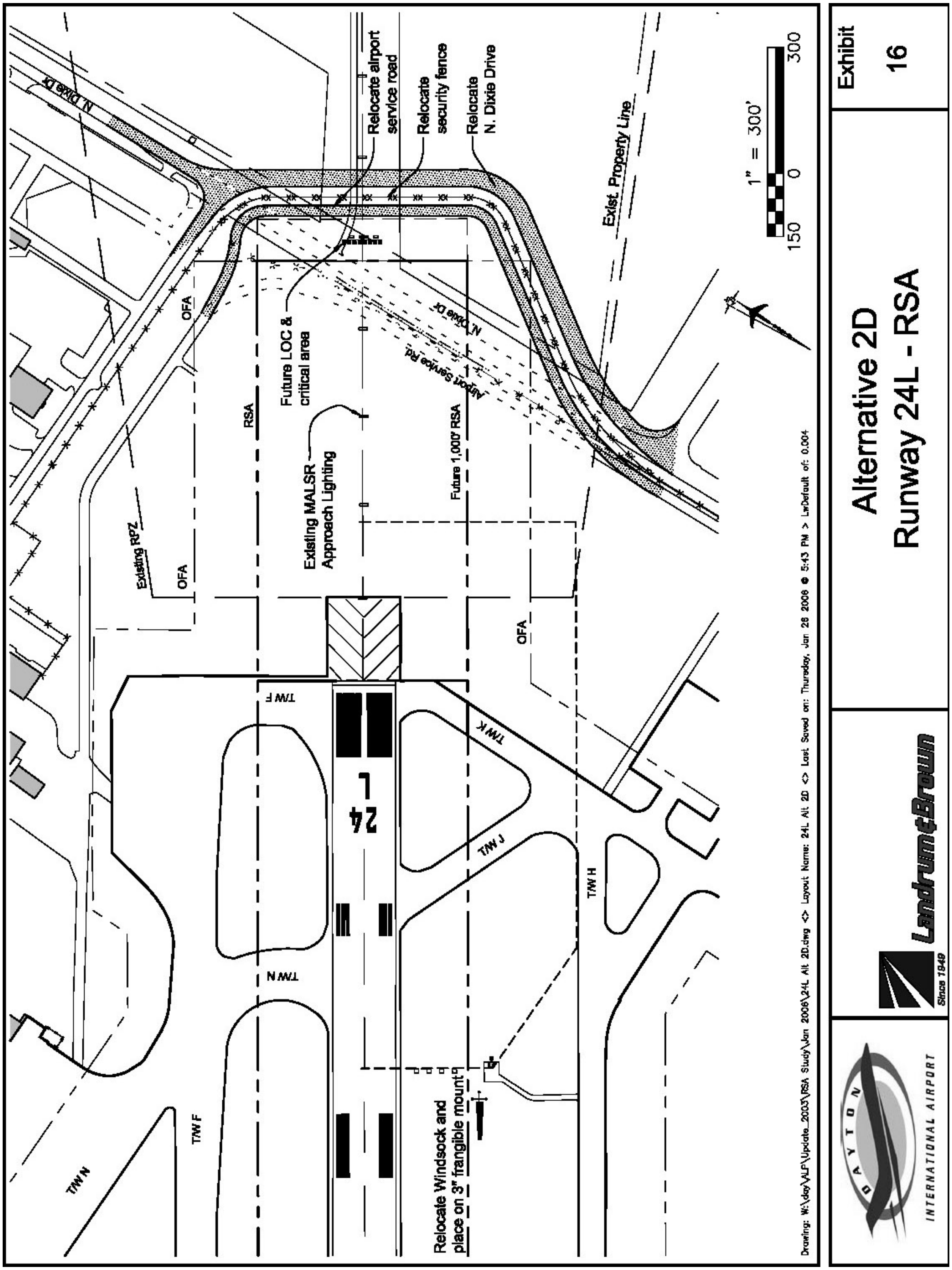


Exhibit
15
Alternative 2C
Runway 24L - RSA
1" = 300'
150 0 300
Future LOC & critical area
Relocate MALSR Approach Lighting (3" frangible mounts)
Relocate Threshold 400' and Re-stripe Runway
Future 1,000' RSA
1000'
Future RPZ
OFA
OFA
N. Dixie Dr
Airport service rd
Future Holdpad
T/W F
T/W N
T/W K
T/W H
Relocate PAPI and Windsock (3" frangible mounts)
Relocate Glide Slope and RVR
LandrumBrown
Since 1949
DAYTON
INTERNATIONAL AIRPORT


Relocate airport service road
Relocate security fence
Relocate N. Dixie Drive
Exist. Property Line
1" = 300'
150 0 300
Future LOC & critical area
Existing MALSR Approach Lighting
Future 1,000' RSA
RSA
OFA
Existing RPZ
N. Dixie Dr
Airport Service Rd
T/W F
T/W K
T/W J
T/W H
T/W N
24L
Relocate Windsock and place on 3" frangible mount
Exhibit
16
Alternative 2D
Runway 24L - RSA
Landrum & Brown
Since 1949
DAYTON INTERNATIONAL AIRPORT

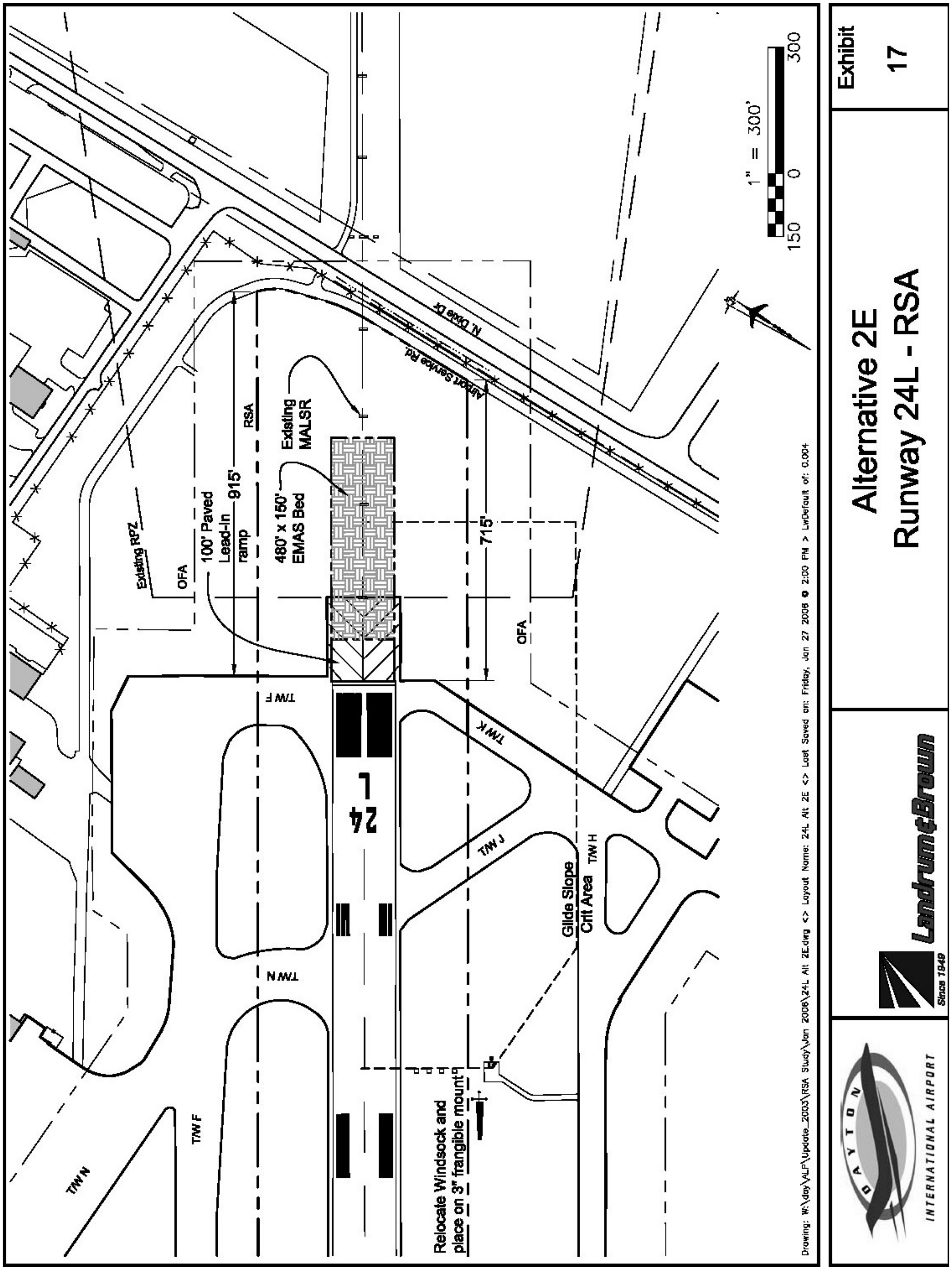


Exhibit
17
Alternative 2E
Runway 24L - RSA
Landrum&Brown
Since 1949
DAYTON INTERNATIONAL AIRPORT
1" = 300'
150
0
300
N. Dixie Dr
Airport Service Rd.
Existing MALSR
480' x 150' EMAS Bed
100' Paved Lead-in ramp
915'
715'
RSA
OFA
Existing RPZ
T/W F
T/W K
T/W J
T/W H
T/W N
24L
Glide Slope Crit Area
Relocate Windsock and place on 3" frangible mount

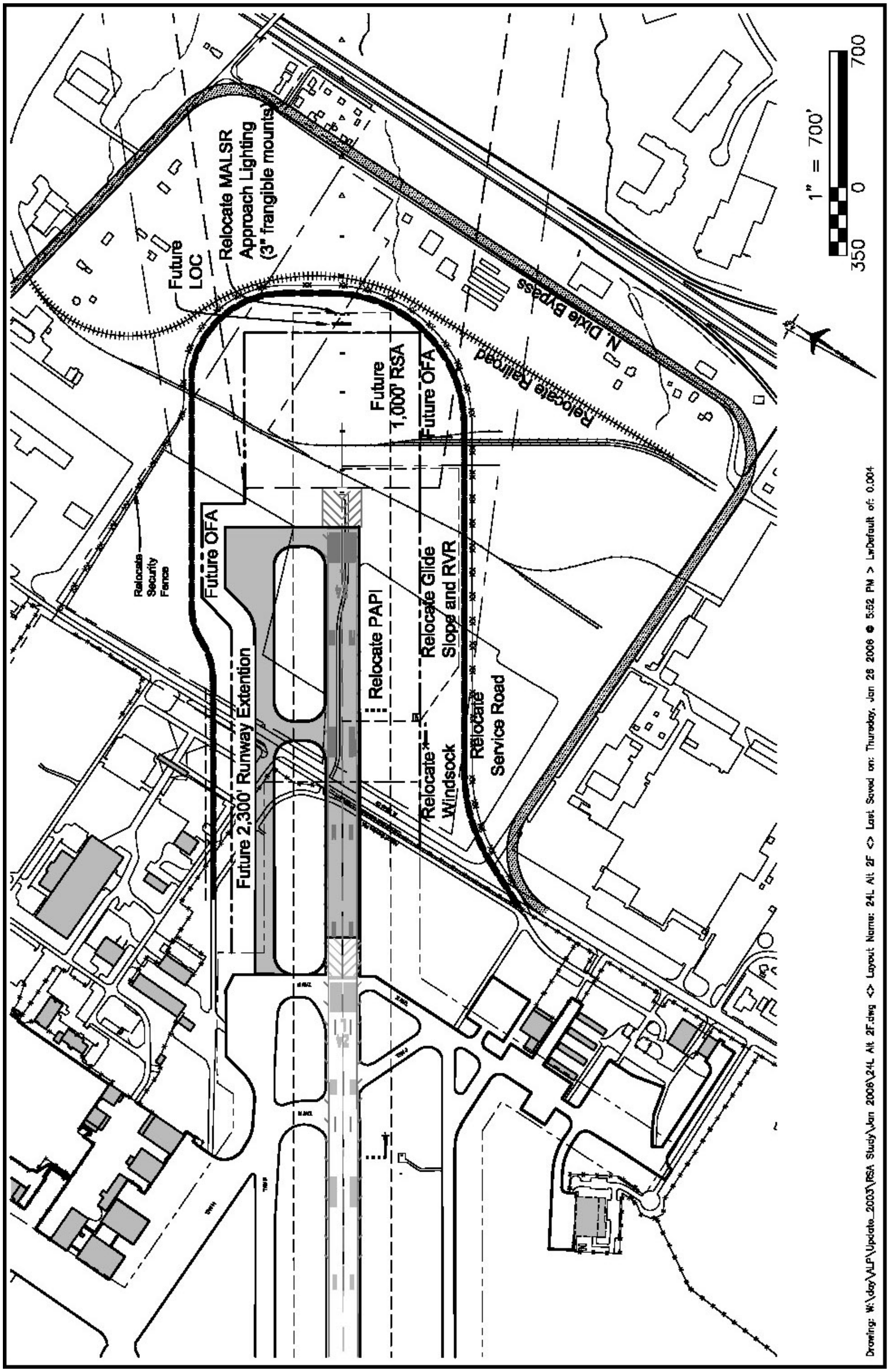


Exhibit 18

Alternative 2F
Runway 24L - RSA

LandrumBrown
Since 1948

Dayton International Airport

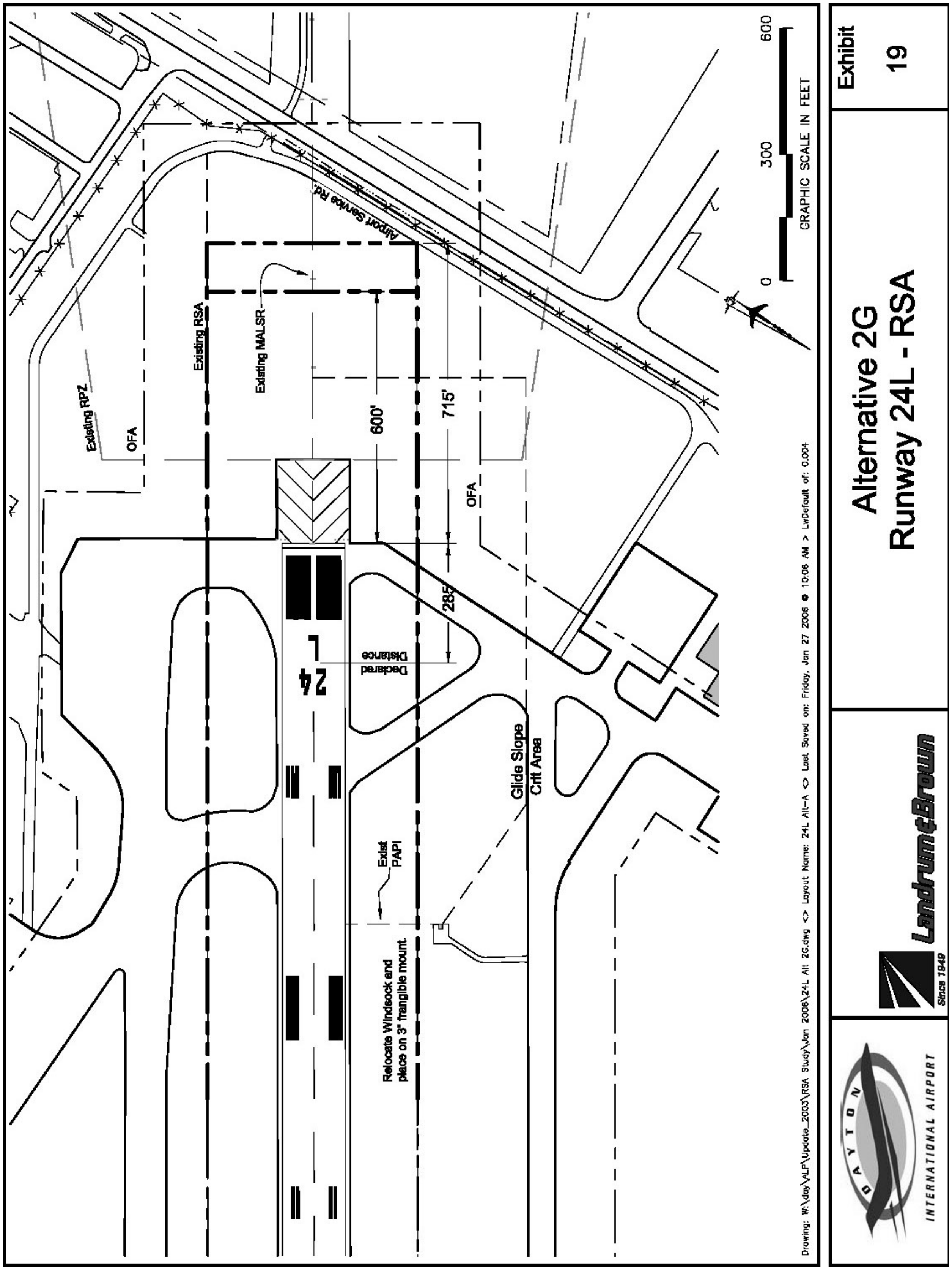


Exhibit
19
Alternative 2G
Runway 24L - RSA
Existing RPZ
OFA
Existing RSA
Existing MALSR
Airport Service Rd.
600'
715'
285'
Declared Distance
Glide Slope
Crit Area
Exist PAPI
Relocate Windsock and place on 3" frangible mount.
0
300
600
GRAPHIC SCALE IN FEET
LandrumBrown
Since 1949
DAYTON INTERNATIONAL AIRPORT

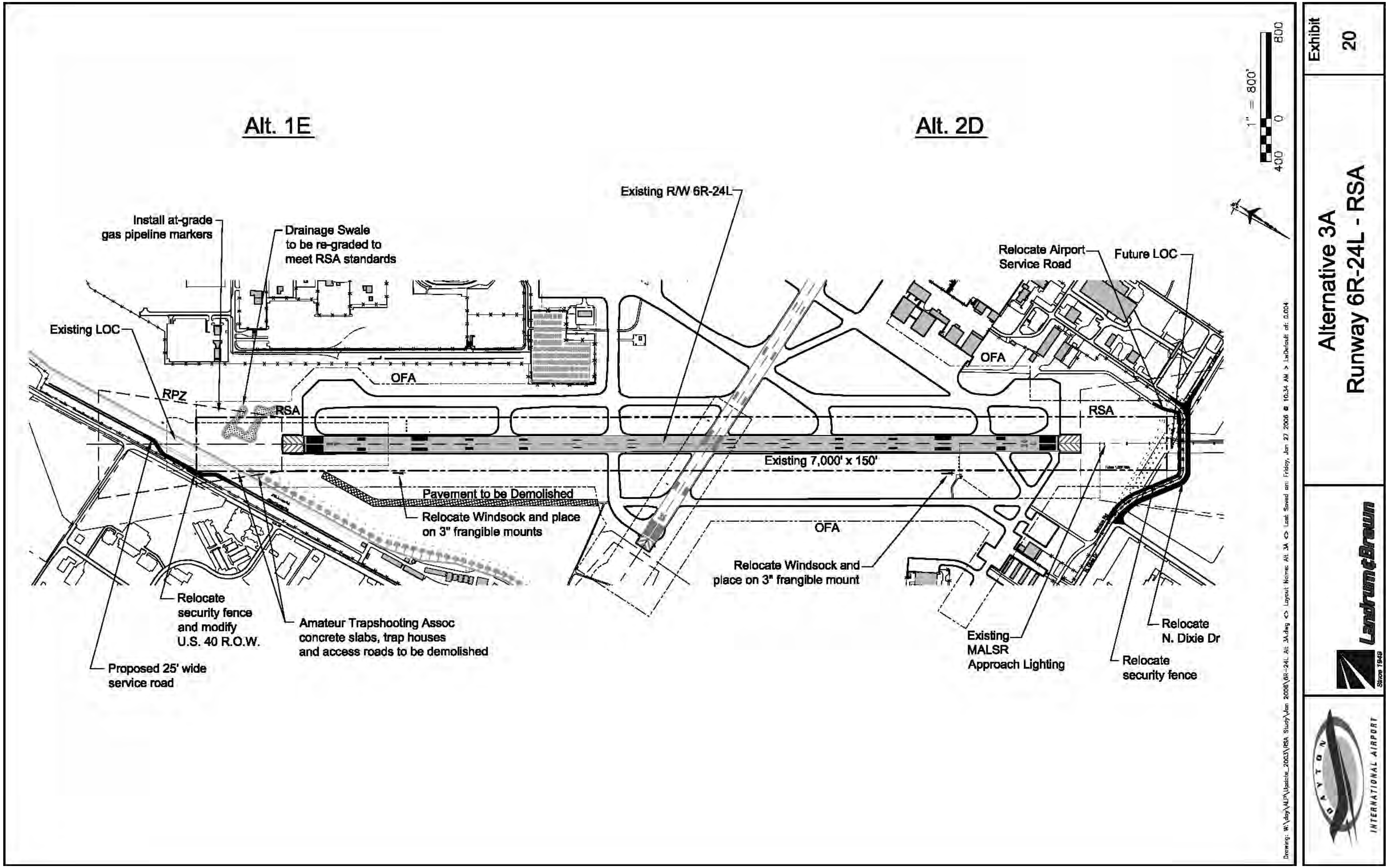
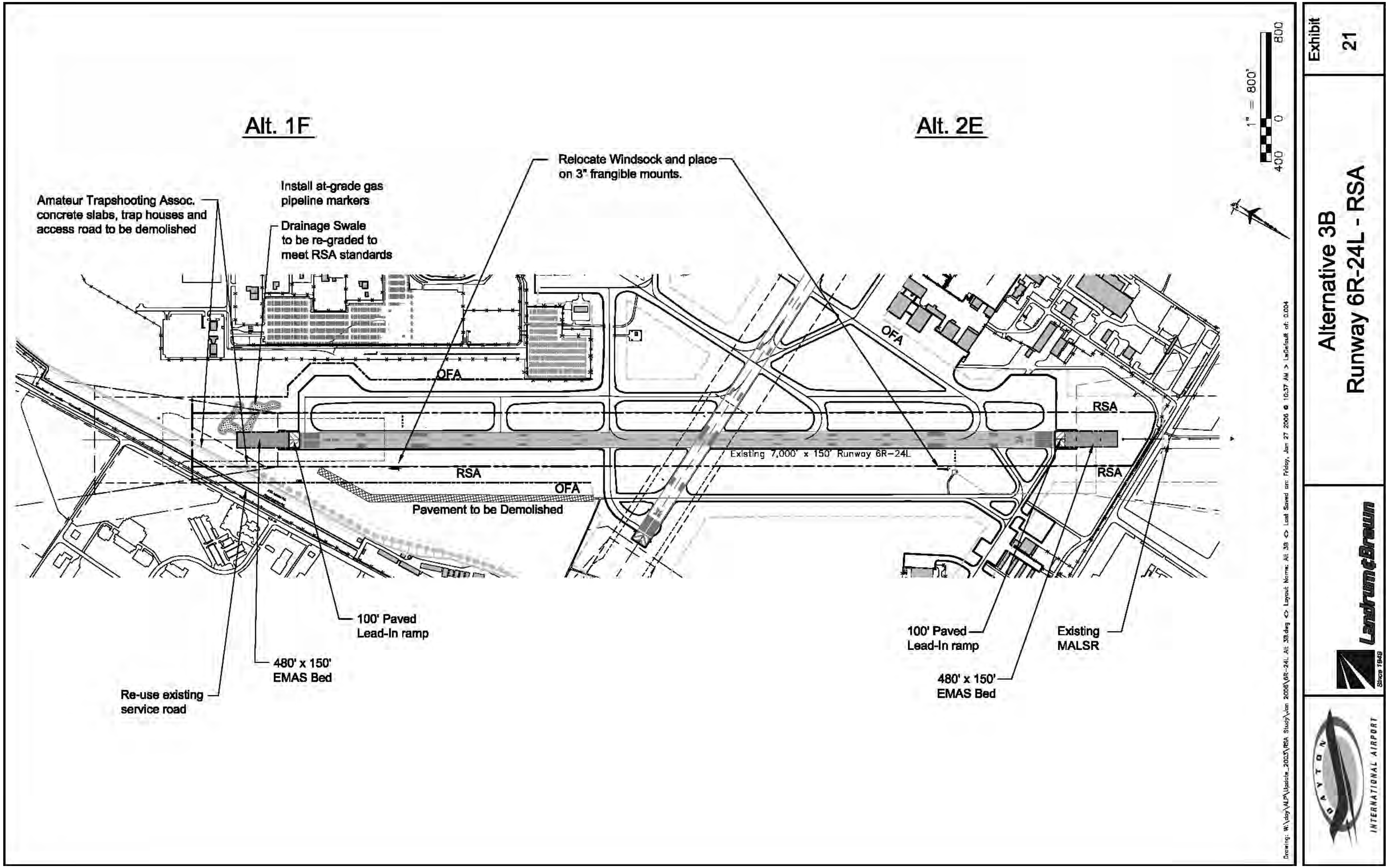
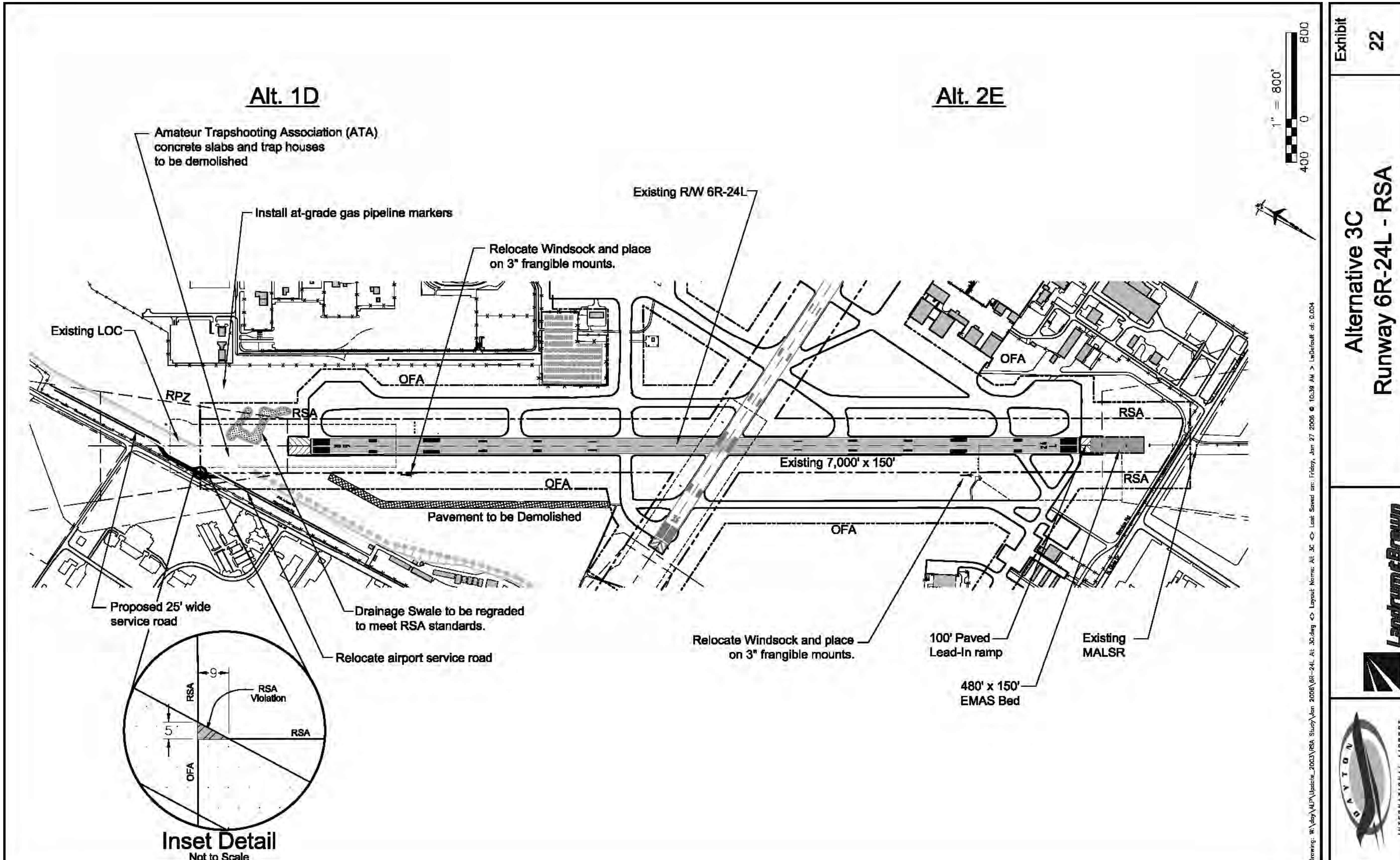
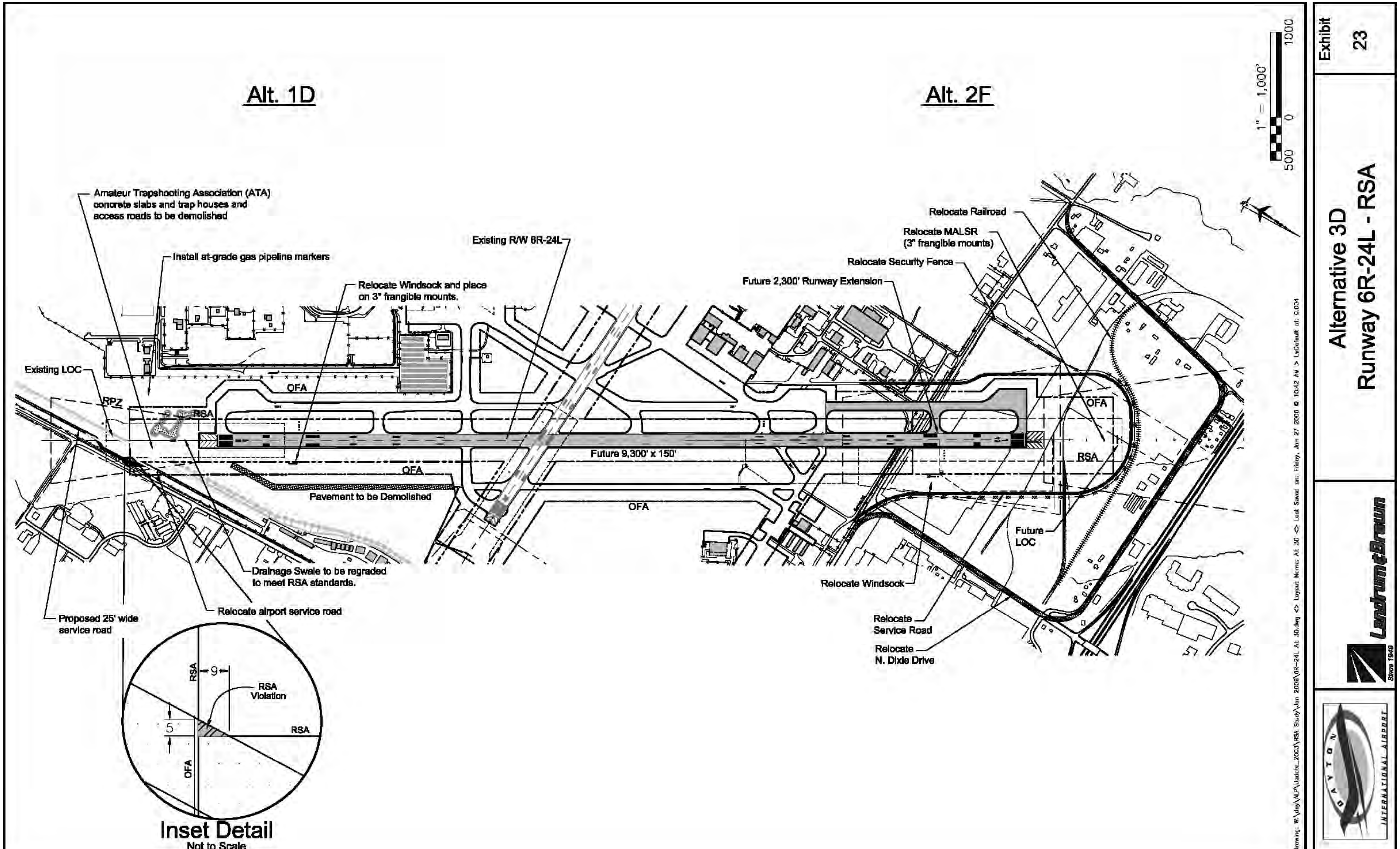


Exhibit
20
Alternative 3A
Runway 6R-24L - RSA
1" = 800'
400 0 800
Alt. 1E
Alt. 2D
Existing R/W 6R-24L
Install at-grade gas pipeline markers
Drainage Swale to be re-graded to meet RSA standards
Existing LOC
RPZ
RSA
OFA
Existing 7,000' x 150'
Pavement to be Demolished
Relocate Windsock and place on 3" frangible mounts
Relocate Windsock and place on 3" frangible mount
Relocate Airport Service Road
Future LOC
Relocate security fence and modify U.S. 40 R.O.W.
Amateur Trapshooting Assoc concrete slabs, trap houses and access roads to be demolished
Proposed 25' wide service road
Existing MALSR Approach Lighting
Relocate N. Dixie Dr
Relocate security fence
LandrumBrown
DAYTON INTERNATIONAL AIRPORT


Alt. 1F
Alt. 2E
Relocate Windsock and place on 3" frangible mounts.
Install at-grade gas pipeline markers
Amateur Trapshooting Assoc. concrete slabs, trap houses and access road to be demolished
Drainage Swale to be re-graded to meet RSA standards
OFA
RSA
Existing 7,000' x 150' Runway 6R-24L
Pavement to be Demolished
100' Paved Lead-In ramp
480' x 150' EMAS Bed
Re-use existing service road
Existing MALSR
1" = 800'
400 0 800
Exhibit 21
Alternative 3B
Runway 6R-24L - RSA
LandrumBrown
Since 1949
DAYTON INTERNATIONAL AIRPORT


Alt. 1D
Alt. 2E
Amateur Trapshooting Association (ATA) concrete slabs and trap houses to be demolished
Install at-grade gas pipeline markers
Relocate Windsock and place on 3" frangible mounts.
Existing R/W 6R-24L
Existing LOC
RPZ
RSA
OFA
Existing 7,000' x 150'
Pavement to be Demolished
Proposed 25' wide service road
Drainage Swale to be regraded to meet RSA standards.
Relocate airport service road
Relocate Windsock and place on 3" frangible mounts.
100' Paved Lead-In ramp
Existing MALSR
480' x 150' EMAS Bed
9
RSA Violation
5'
Inset Detail
Not to Scale
1" = 800'
400 0 800
Exhibit 22
Alternative 3C
Runway 6R-24L - RSA
Landrum&Brown
Since 1949
DAYTON INTERNATIONAL AIRPORT


Alt. 1D
Alt. 2F
1" = 1,000'
500 0 1000
Exhibit
23
Alternative 3D
Runway 6R-24L - RSA
Amateur Trapshooting Association (ATA) concrete slabs and trap houses and access roads to be demolished
Install at-grade gas pipeline markers
Existing R/W 6R-24L
Relocate Windsock and place on 3" frangible mounts.
Existing LOC
RPZ
RSA
OFA
Future 9,300' x 150'
Pavement to be Demolished
Drainage Swale to be regraded to meet RSA standards.
Proposed 25' wide service road
Relocate airport service road
Relocate Railroad
Relocate MALSR (3" frangible mounts)
Relocate Security Fence
Future 2,300' Runway Extension
Future LOC
Relocate Windsock
Relocate Service Road
Relocate N. Dixie Drive
RSA Violation
9
5
Inset Detail
Not to Scale
Landrum&Brown
Since 1949
DAYTON INTERNATIONAL AIRPORT

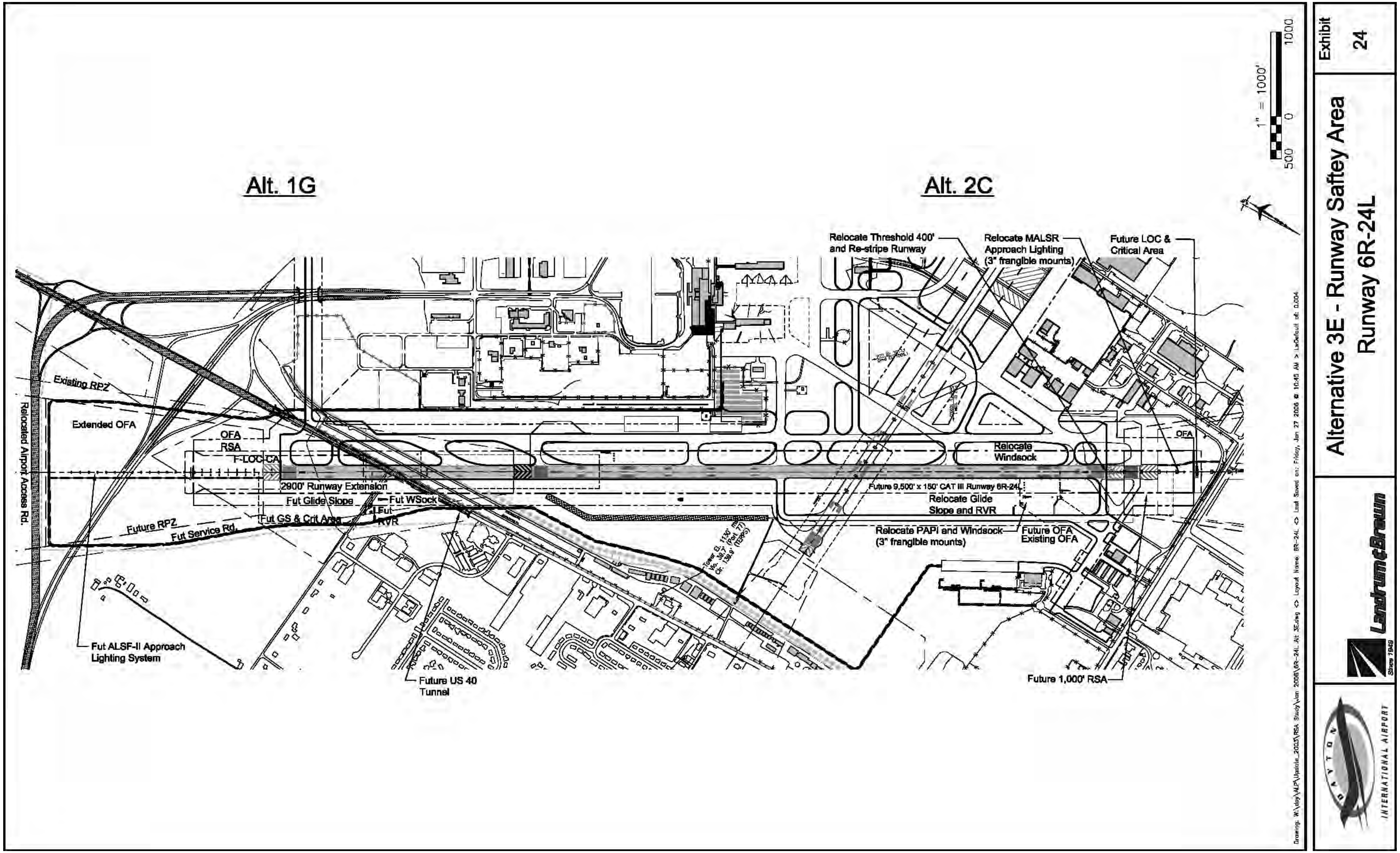


Exhibit
24
Alternative 3E - Runway Saftey Area
Runway 6R-24L
Alt. 1G
Alt. 2C
1" = 1000'
500 0 1000
Relocate Threshold 400' and Re-stripe Runway
Relocate MALSR Approach Lighting (3" frangible mounts)
Future LOC & Critical Area
Existing RPZ
Extended OFA
OFA
RSA
F-LOC CA
Relocated Airport Access Rd.
2900' Runway Extension
Fut Glide Slope
Fut WSock
Fut RVR
Fut GS & Crit Area
Future RPZ
Fut Service Rd.
Fut ALSF-II Approach Lighting System
Future US 40 Tunnel
Relocate Windsock
Future 9,500' x 150' CAT III Runway 6R-24L
Relocate Glide Slope and RVR
Relocate PAPI and Windsock
(3" frangible mounts)
Future OFA
Existing OFA
Future 1,000' RSA
LandrumBrown
DAYTON INTERNATIONAL AIRPORT

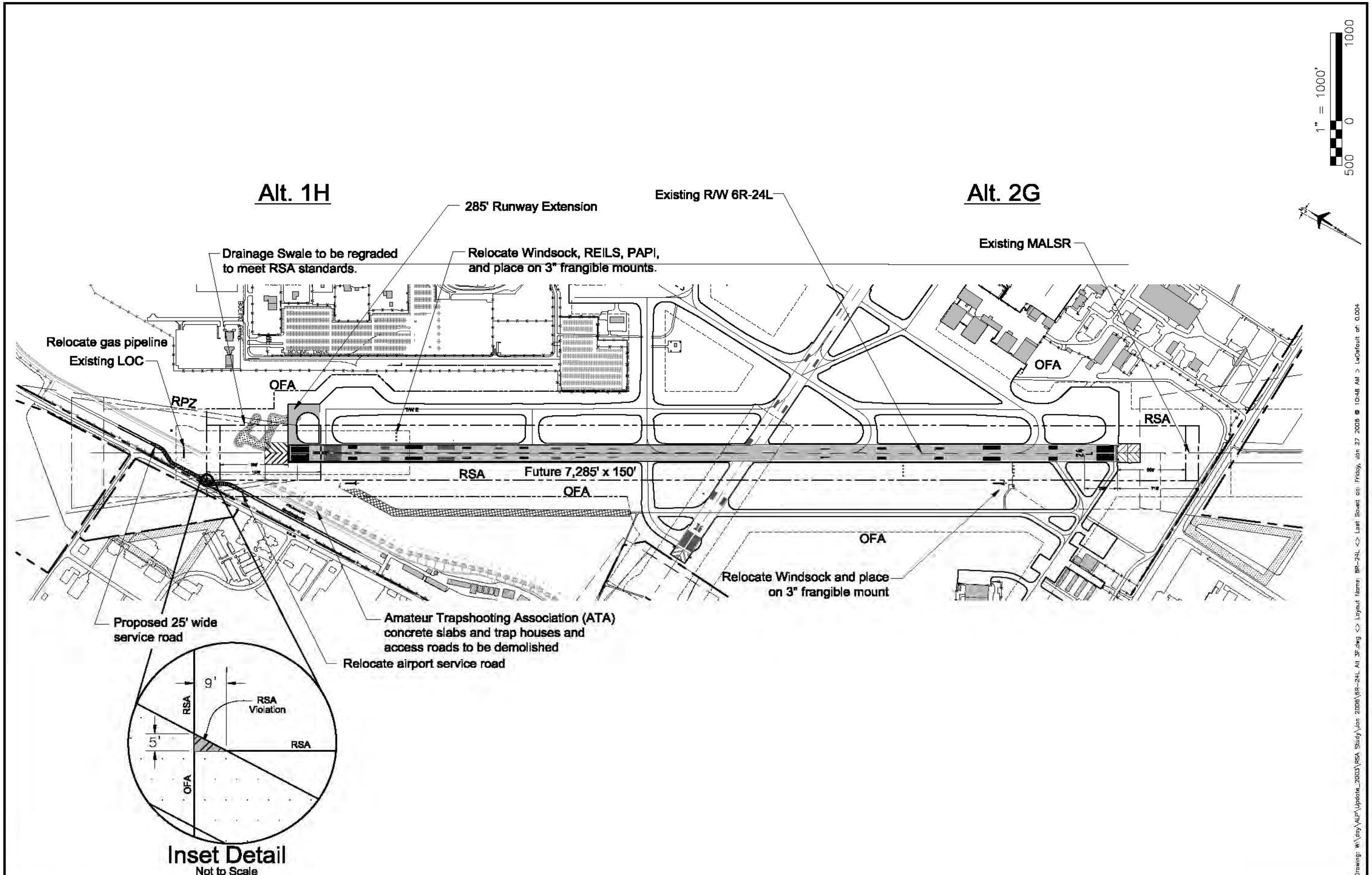


Exhibit 25

Alternative 3F - Runway Saftey Area
Runway 6R-24L

LandrumBrown

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APPENDIX D

RUNWAY SAFETY AREA ALTERNATIVES COST ESTIMATES

Runway 6R RSA "Do-Nothing" Alternative 1 – Cost Estimate

SPEC	ITEM	DESCRIPTION	QTY	UNIT	UNIT $	TOTAL
DEMOLITION						
ODOT	202.1	Remove Asphalt Pavement	6,000	SY	$ 10	$ 60,000
ODOT	202.2	Removal of Trap Structures	5	EA	$ 1,000	$ 5,000
ODOT	202.3	Removal of Concrete Sidewalk/Trap Lanes	710	SY	$ 12	$ 8,520
FAA	202.4	Removal of Runway Paint	7,335	SF	$ 2	$ 14,670
						$ 88,190
EXCAVATION						
ODOT	203.1	Excavation and Embankment	3,720	CY	$ 10	$ 37,200
ODOT	203.2	Special Embankment	100	CY	$ 20	$ 2,000
ODOT	207.1	Erosion Control	1	LS	$ 5,000	$ 5,000
						$ 44,200
LANDSCAPING AND IRRIGATION						
ODOT	651.1	Topsoil Stockpiled	1,540	CY	$ 4	$ 6,160
ODOT	652.1	Placing Stockpiled Topsoil	1,540	CY	$ 4	$ 6,160
ODOT	659.1	Seeding and Mulching, Class 7	18,500	SY	$ 1	$ 18,500
						$ 30,820
DRAINAGE						
COD	813.1	RCP, CL4, 18"	150	LF	$ 90	$ 13,500
COD	832.1	Catch Basin	3	EA	$ 3,750	$ 11,250
COD	833.1	Concrete Headwall	6	EA	$ 1,500	$ 9,000
COD	851.1	Catch Basin - Adjust to Grade	1	EA	$ 3,000	$ 3,000
						$ 36,750
MISCELLANEOUS						
	X-100.1	Mobilization	1	LS	$ 10,000	$ 10,000
	SP-1	Place REILS on Frangible Mounts	1	LS	$ 2,000	$ 2,000
	SP-2	Relocate Windsock Place with Frangible Mount	1	LS	$ 7,000	$ 7,000
						$ 19,000

Total Conceptual Estimate for Runway 6R RSA "Do-Nothing" Alt. 1: $ 218,960

Total Budget for 6R "Do-Nothing" Alt. 1		
Construction Estimate:		$ 218,960
Design Fees:	10.0%	$ 21,896
SDC Fees:	10.0%	$ 21,896
Contingence	15.0%	$ 32,844
		$ 295,596

Runway 24L RSA "Do-Nothing" Alternative 1 – Cost Estimate

SPEC	ITEM	DESCRIPTION	QTY	UNIT	UNIT $	TOTAL
MISCELLANEOUS						
	SP-1	Relocate Windsock with Frangible Mount	1	LS	$ 7,000	$ 7,000
						$ 7,000

Total Conceptual Estimate for Runway 24L RSA "Do-Nothing" Alt. 1: $ 7,000

Total Budget for Runway 24L "Do-Nothing" Alt. 1		
Construction Estimate:		$ 7,000
Design Fees:	10.0%	$ 700
SDC Fees:	10.0%	$ 700
Contingence	15.0%	$ 1,050
		$ 9,450

Runway 6R RSA "Do-Nothing" Alternative 2 – Cost Estimate

SPEC	ITEM	DESCRIPTION	QTY	UNIT	UNIT $	TOTAL
DEMOLITION						
FAA	202.4	Removal of Runway Paint	7,335	SF	$ 2	$ 14,670
						$ 14,670
RUNWAY MARKING AND LIGHTING						
FAA	X-100.1	Remove Runway Marking	46,763	SF	$ 2	$ 93,526
FAA	X-100.2	Relocate Runway Edge Lights	28	EA	$ 400	$ 11,200
FAA	X-100.4	Relocate Threshold Lights	8	EA	$ 500	$ 4,000
FAA	X-100.5	Relocate Distance Remaining Signs	7	EA	$ 600	$ 4,200
FAA	X-100.7	Runway Marking	46,264	SF	$ 2	$ 92,528
						$ 205,454
LANDSCAPING AND IRRIGATION						
ODOT	652.1	Placing Stockpiled Topsoil	100	CY	$ 5	$ 500
ODOT	659.1	Seeding and Mulching, Class 7	100	SY	$ 2	$ 200
						$ 700
MISCELLANEOUS						
	X-100.0	Mobilization	1	LS	$ 10,000	$ 10,000
	SP-1	Relocate Windsock and Frangible Mount	1	LS	$ 7,000	$ 7,000
	SP-2	Relocate PAPI and Frangible Mounts	1	LS	$ 8,000	$ 8,000
						$ 25,000

Total Conceptual Estimate for Runway 6R RSA "Do-Nothing" Alt. 2: $ 245,824

Total Budget for 6R "Do-Nothing" Alt. 2		
Construction Estimate:		$ 245,824
Design Fees:	10.0%	$ 24,582
SDC Fees:	10.0%	$ 24,582
Contingence	15.0%	$ 36,874
		$ 331,862

Runway 24L RSA "Do-Nothing" Alternative 2 – Cost Estimate

SPEC	ITEM	DESCRIPTION	QTY	UNIT	UNIT $	TOTAL
MISCELLANEOUS						
	SP-1	Relocate Windsock with Frangible Mount	1	LS	$ 7,000	$ 7,000
						$ 7,000

Total Conceptual Estimate for Runway 24L RSA "Do-Nothing" Alt. 2:	**$ 7,000**

Total Budget for Runway 24L "Do-Nothing" Alt. 2		
Construction Estimate:		$ 7,000
Design Fees:	10.0%	$ 700
SDC Fees:	10.0%	$ 700
Contingence	15.0%	$ 1,050
		$ 9,450

Runway 6R RSA Alternative 1A – Cost Estimate

SPEC	ITEM	DESCRIPTION	QTY	UNIT	UNIT $	TOTAL
DEMOLITION						
ODOT	202.1	Remove Asphalt Pavement	6,000	SY	$ 10	$ 60,000
ODOT	202.2	Removal of Trap Structures	5	EA	$ 1,000	$ 5,000
ODOT	202.3	Removal of Concrete Sidewalk/Trap Lanes	710	SY	$ 12	$ 8,520
FAA	202.4	Removal of Runway Paint	7,335	SF	$ 2	$ 14,670
						$ 88,190
EXCAVATION						
ODOT	203.1	Excavation and Embankment	3,720	CY	$ 10	$ 37,200
ODOT	203.2	Special Embankment	100	CY	$ 20	$ 2,000
ODOT	207.1	Erosion Control	1	LS	$ 5,000	$ 5,000
						$ 44,200
LANDSCAPING AND IRRIGATION						
ODOT	651.1	Topsoil Stockpiled	1,540	CY	$ 4	$ 6,160
ODOT	652.1	Placing Stockpiled Topsoil	1,540	CY	$ 4	$ 6,160
ODOT	659.1	Seeding and Mulching, Class 7	18,500	SY	$ 1	$ 18,500
						$ 30,820
DRAINAGE						
COD	813.1	RCP, CL4, 18"	150	LF	$ 90	$ 13,500
COD	832.1	Catch Basin	3	EA	$ 3,750	$ 11,250
COD	833.1	Concrete Headwall	6	EA	$ 1,500	$ 9,000
COD	851.1	Catch Basin - Adjust to Grade	1	EA	$ 3,000	$ 3,000
						$ 36,750
MISCELLANEOUS						
	X-100.1	Mobilization	1	LS	$ 10,000	$ 10,000
	SP-1	Relocate Windsock and Frangible Mount	1	LS	$ 7,000	$ 7,000
						$ 17,000

Total Conceptual Estimate for Runway 6R RSA Alt. 1A: $ 216,960

Total Budget for Alt. 1A		
Construction Estimate:		$ 216,960
Design Fees:	10.0%	$ 21,696
SDC Fees:	10.0%	$ 21,696
Contingence	15.0%	$ 32,544
		$ 292,896

Runway 6R RSA Alternative 1B – Cost Estimate

SPEC	ITEM	DESCRIPTION	QTY	UNIT	UNIT $	TOTAL
DEMOLITION						
ODOT	202.1	Remove Asphalt Pavement	6,000	SY	$ 10	$ 60,000
ODOT	202.2	Removal of Trap Structures	5	EA	$ 1,000	$ 5,000
ODOT	202.3	Removal of Concrete Sidewalk/Trap Lanes	710	SY	$ 12	$ 8,520
FAA	202.4	Removal of Runway Paint	7,335	SF	$ 2	$ 14,670
						$ 88,190
EXCAVATION						
ODOT	203.1	Excavation and Embankment	3,720	CY	$ 10	$ 37,200
ODOT	203.2	Special Embankment	100	CY	$ 20	$ 2,000
ODOT	207.1	Erosion Control	1	LS	$ 5,000	$ 5,000
						$ 44,200
PAVEMENT						
FAA	P-155.1	Lime Treated Subgrade, 6" (Slurry Method)	7,650	SY	$ 7	$ 53,550
ODOT	304.1	Aggregate Base, 6"	1,275	CY	$ 36	$ 45,900
ODOT	408.1	Prime Coat	1,900	GA	$ 2	$ 3,800
ODOT	448.1	Asphalt Concrete Surface Course, 1-1/2"	630	TN	$ 58	$ 36,540
ODOT	448.2	Asphalt Concrete Intermediate Course, 2-1/2"	1,050	TN	$ 56	$ 58,800
						$ 198,590
LANDSCAPING AND IRRIGATION						
ODOT	651.1	Topsoil Stockpiled	1,540	CY	$ 4	$ 6,160
ODOT	652.1	Placing Stockpiled Topsoil	1,540	CY	$ 4	$ 6,160
ODOT	659.1	Seeding and Mulching, Class 7	18,500	SY	$ 1	$ 18,500
						$ 30,820
DRAINAGE						
COD	813.1	RCP, CL4, 18"	150	LF	$ 90	$ 13,500
COD	832.1	Catch Basin	3	EA	$ 3,750	$ 11,250
COD	833.1	Concrete Headwall	6	EA	$ 1,500	$ 9,000
COD	851.1	Catch Basin - Adjust to Grade	1	EA	$ 3,000	$ 3,000
						$ 36,750
MISCELLANEOUS						
	X-100.1	Mobilization	1	LS	$ 10,000	$ 10,000
	SP-1	Relocate Windsock and Frangible Mount	1	LS	$ 7,000	$ 7,000
						$ 17,000

Total Conceptual Estimate for Runway 6R RSA Alt. 1B: $ 415,550

Total Budget for Alt. 1B		
Construction Estimate:		$ 415,550
Design Fees:	10.0%	$ 41,555
SDC Fees:	10.0%	$ 41,555
Contingence	15.0%	$ 62,333
		$ 560,993

Runway 6R RSA Alternative 1C – Cost Estimate

SPEC	ITEM	DESCRIPTION	QTY	UNIT	UNIT $	TOTAL
DEMOLITION						
ODOT	202.1	Remove Asphalt Pavement	6,000	SY	$ 10	$ 60,000
ODOT	202.2	Removal of Trap Structures	5	EA	$ 1,000	$ 5,000
ODOT	202.3	Removal of Concrete Sidewalk/Trap Lanes	710	SY	$ 12	$ 8,520
FAA	202.4	Removal of Runway Paint	7,335	SF	$ 2	$ 14,670
						$ 88,190
EXCAVATION						
ODOT	203.1	Excavation and Embankment	3,720	CY	$ 10	$ 37,200
ODOT	203.2	Special Excavation and Embankment	100	CY	$ 20	$ 2,000
ODOT	207.1	Erosion Control	1	LS	$ 5,000	$ 5,000
						$ 44,200
PAVEMENT						
FAA	P-155.1	Lime Treated Subgrade, 6" (Slurry Method)	7,650	SY	$ 7	$ 53,550
ODOT	304.1	Aggregate Base, 6"	1,275	CY	$ 36	$ 45,900
ODOT	408.1	Prime Coat	1,900	GA	$ 2	$ 3,800
ODOT	448.1	Asphalt Concrete Surface Course, 1-1/2"	630	TN	$ 58	$ 36,540
ODOT	448.2	Asphalt Concrete Intermediate Course, 2-1/2"	1,050	TN	$ 56	$ 58,800
						$ 198,590
TRAFFIC CONTROL & RUNWAY MARKING						
ODOT	620.1	Safe-Hit Flexible Guide Post, 48", Part No. SH548GP3	60	EA	$ 30	$ 1,800
ODOT	620.2	Safe-Hit Soil Anchor, Part No. SA-GP3	60	EA	$ 30	$ 1,800
ODOT	630.1	Traffic Signs	1	LS	$ 3,000	$ 3,000
ODOT	642.1	4" Solid White Line, Paint	5,740	LF	$ 1	$ 2,870
ODOT	642.2	4" Solid Double Yellow Line, Paint	2,870	LF	$ 1	$ 2,870
FAA	642.3	Runway Marking	8,835	SF	$ 4	$ 35,340
						$ 47,680
LANDSCAPING AND IRRIGATION						
ODOT	651.1	Topsoil Stockpiled	1,540	CY	$ 4	$ 6,160
ODOT	652.1	Placing Stockpiled Topsoil	1,540	CY	$ 4	$ 6,160
ODOT	659.1	Seeding and Mulching, Class 7	18,500	SY	$ 1	$ 18,500
						$ 30,820
DRAINAGE						
COD	813.1	RCP, CL4, 18"	150	LF	$ 90	$ 13,500
COD	832.1	Catch Basin	3	EA	$ 3,750	$ 11,250
COD	833.1	Concrete Headwall	6	EA	$ 1,500	$ 9,000
COD	851.1	Catch Basin - Adjust to Grade	1	EA	$ 3,000	$ 3,000
						$ 36,750
MISCELLANEOUS						
	X-100.1	Mobilization	1	LS	$ 10,000	$ 10,000
	SP-1	Relocate Windsock and Frangible Mount	1	LS	$ 7,000	$ 7,000
	SP-2	Readjust PAPI angle	1	LS	$ 2,000	$ 2,000
	SP-3	Relocate Threshold Bar Lights and REILS	1	LS	$ 30,000	$ 30,000
						$ 49,000

Total Conceptual Estimate for Runway 6R RSA Alt. 1C: $ 495,230

Total Budget for Alt. 1C		
Construction Estimate:		$ 495,230
Design Fees:	10.0%	$ 49,523
SDC Fees:	10.0%	$ 49,523
Contingence	15.0%	$ 74,285
		$ 668,561

Runway 6R RSA Alternative 1D – Cost Estimate

SPEC	ITEM	DESCRIPTION	QTY	UNIT	UNIT $	TOTAL
DEMOLITION						
ODOT	202.1	Remove Asphalt Pavement	6,000	SY	$ 10	$ 60,000
ODOT	202.2	Removal of Trap Structures	5	EA	$ 1,000	$ 5,000
ODOT	202.3	Removal of Concrete Sidewalk/Trap Lanes	710	SY	$ 12	$ 8,520
						$ 73,520
EXCAVATION						
ODOT	203.1	Excavation and Embankment11	1,240	CY	$ 10	$ 12,400
ODOT	203.2	Special Embankment	100	CY	$ 20	$ 2,000
ODOT	207.1	Erosion Control	1	LS	$ 5,000	$ 5,000
						$ 19,400
PAVEMENT						
FAA	P-155.1	Lime Treated Subgrade, 6" (Slurry Method)	1,170	SY	$ 7	$ 8,190
ODOT	304.1	Aggregate Base, 6"	390	CY	$ 36	$ 14,040
ODOT	408.1	Prime Coat	290	GA	$ 2	$ 580
ODOT	448.1	Asphalt Concrete Surface Course, 1-1/2"	100	TN	$ 58	$ 5,800
ODOT	448.2	Asphalt Concrete Intermediate Course, 2-1/2"	170	TN	$ 56	$ 9,520
						$ 38,130
TRAFFIC CONTROL						
ODOT	620.1	Safe-Hit Flexible Guide Post, 48", Part No. SH548GP3	10	EA	$ 30	$ 300
ODOT	620.2	Safe-Hit Soil Anchor, Part No. SA-GP3	10	EA	$ 30	$ 300
ODOT	630.1	Traffic Signs	1	LS	$ 3,000	$ 3,000
ODOT	642.1	4" Solid White Line, Paint	1,760	LF	$ 1	$ 880
ODOT	642.2	4" Solid Double Yellow Line, Paint	880	LF	$ 1	$ 880
						$ 5,360
LANDSCAPING AND IRRIGATION						
ODOT	652.1	Placing Stockpiled Topsoil	630	CY	$ 5	$ 3,150
ODOT	659.1	Seeding and Mulching, Class 7	5,670	SY	$ 1	$ 5,670
						$ 8,820
DRAINAGE						
COD	813.1	RCP, CL4, 18"	50	LF	$ 90	$ 4,500
COD	832.1	Catch Basin	1	EA	$ 3,750	$ 3,750
COD	833.1	Concrete Headwall	2	EA	$ 1,500	$ 3,000
COD	851.1	Catch Basin - Adjust to Grade	1	EA	$ 3,000	$ 3,000
						$ 14,250
MISCELLANEOUS						
	X-100.1	Mobilization	1	LS	$ 5,000	$ 5,000
	SP-1	Relocate Windsock and Frangible Mount	1	LS	$ 7,000	$ 7,000
						$ 12,000

Total Conceptual Estimate for Runway 6R RSA Alt. 1D: $ 171,480

Total Budget for Alt 1D		
Construction Estimate:		$ 171,480
Design Fees:	10.0%	$ 17,148
SDC Fees:	10.0%	$ 17,148
Contingence	15.0%	$ 25,722
		$ 231,498

Runway 6R RSA Alternative 1E – Cost Estimate

SPEC	ITEM	DESCRIPTION	QTY	UNIT	UNIT $	TOTAL
DEMOLITION						
ODOT	202.1	Remove Asphalt Pavement	6,000	SY	$ 10	$ 60,000
ODOT	202.2	Removal of Trap Structures	5	EA	$ 1,000	$ 5,000
ODOT	202.3	Removal of Concrete Sidewalk/Trap Lanes	710	SY	$ 12	$ 8,520
						$ 73,520
EXCAVATION						
ODOT	203.1	Excavation and Embankment	3,720	CY	$ 10	$ 37,200
ODOT	203.2	Special Embankment	100	CY	$ 20	$ 2,000
ODOT	207.1	Erosion Control	1	LS	$ 5,000	$ 5,000
						$ 44,200
PAVEMENT						
FAA	P-155.1	Lime Treated Subgrade, 6" (Slurry Method)	7,650	SY	$ 7	$ 53,550
ODOT	304.1	Aggregate Base, 6"	1,275	CY	$ 36	$ 45,900
ODOT	408.1	Prime Coat	1,900	GA	$ 2	$ 3,800
ODOT	448.1	Asphalt Concrete Surface Course, 1-1/2"	630	TN	$ 58	$ 36,540
ODOT	448.2	Asphalt Concrete Intermediate Course, 2-1/2"	1,050	TN	$ 56	$ 58,800
						$ 198,590
TRAFFIC CONTROL & RUNWAY MARKING						
ODOT	620.1	Safe-Hit Flexible Guide Post, 48", Part No. SH548GP3	60	EA	$ 30	$ 1,800
ODOT	620.2	Safe-Hit Soil Anchor, Part No. SA-GP3	60	EA	$ 30	$ 1,800
ODOT	630.1	Traffic Signs	1	LS	$ 3,000	$ 3,000
ODOT	642.1	4" Solid White Line, Paint	5,740	LF	$ 1	$ 2,870
ODOT	642.2	4" Solid Double Yellow Line, Paint	2,870	LF	$ 1	$ 2,870
						$ 12,340
LANDSCAPING AND IRRIGATION						
ODOT	651.1	Topsoil Stockpiled	1,540	CY	$ 4	$ 6,160
ODOT	652.1	Placing Stockpiled Topsoil	1,540	CY	$ 4	$ 6,160
ODOT	659.1	Seeding and Mulching, Class 7	18,500	SY	$ 1	$ 18,500
						$ 30,820
DRAINAGE						
COD	813.1	RCP, CL4, 18"	150	LF	$ 90	$ 13,500
COD	832.1	Catch Basin	3	EA	$ 3,750	$ 11,250
COD	833.1	Concrete Headwall	6	EA	$ 1,500	$ 9,000
COD	851.1	Catch Basin - Adjust to Grade	1	EA	$ 3,000	$ 3,000
						$ 36,750
MISCELLANEOUS						
	X-100.1	Mobilization	1	LS	$ 10,000	$ 10,000
	SP-1	Relocate Existing 8' Secuity Fence	270	LF	$ 12	$ 3,240
	SP-2	Relocate Windsock and Frangible Mount	1	LS	$ 7,000	$ 7,000
						$ 20,240
		Total Conceptual Estimate for Runway 6R RSA Alt. 1E:				**$ 416,460**

Total Budget for Alt. 1E		
Construction Estimate:		$ 416,460
Design Fees:	10.0%	$ 41,646
SDC Fees:	10.0%	$ 41,646
Contingence	15.0%	$ 62,469
		$ 562,221

Runway 6R RSA Alternative 1F – Cost Estimate

SPEC	ITEM	DESCRIPTION	QTY	UNIT	UNIT $	TOTAL
DEMOLITION						
ODOT	202.1	Remove Asphalt Pavement	6,000	SY	$ 10	$ 60,000
ODOT	202.2	Removal of Trap Structures	5	EA	$ 1,000	$ 5,000
ODOT	202.3	Removal of Concrete Sidewalk/Trap Lanes	710	SY	$ 12	$ 8,520
						$ 73,520
EXCAVATION						
ODOT	203.1	Excavation	100	CY	$ 10	$ 1,000
ODOT	203.2	Special Embankment	100	CY	$ 20	$ 2,000
ODOT	207.1	Erosion Control	1	LS	$ 5,000	$ 5,000
						$ 8,000
LANDSCAPING AND IRRIGATION						
ODOT	651.1	Topsoil Stockpiled	80	CY	$ 4	$ 320
ODOT	652.1	Placing Stockpiled Topsoil	80	CY	$ 5	$ 400
ODOT	659.1	Seeding and Mulching, Class 7	6,710	SY	$ 1	$ 6,710
						$ 7,430
MISCELLANEOUS						
	X-100.1	Mobilization	1	LS	$ 5,000	$ 5,000
	SP-1	Provide 480' EMAS	1	LS	$ 3,800,000	$ 3,800,000
	SP-2	Relocate Windsock and Frangible Mount	1	LS	$ 7,000	$ 7,000
						$ 3,812,000

Total Conceptual Estimate for Runway 6R RSA Alt. 1F: $ 3,900,950

Total Budget for 6R RSA Alt. 1F		
Construction Estimate:		$ 3,900,950
Design Fees:	10.0%	$ 390,095
SDC Fees:	10.0%	$ 390,095
Contingence	15.0%	$ 585,143
		$ 5,266,283

Runway 6R RSA Alternative 1G – Cost Estimate

SPEC	ITEM	DESCRIPTION	QTY	UNIT	UNIT $	TOTAL
DEMOLITION						
ODOT	202.1	Remove Asphalt Pavement	92,000	SY	$ 10	$ 920,000
FAA	P-151	Clearing and Grubbing	100	AC	$ 4,000	$ 400,000
FAA	P-162	Remove Fencing	15,000	LF	$ 10	$ 150,000
FAA	P-620	Remove Runway Painting	8,000	SF	$ 2	$ 16,000
						$ 1,486,000
EXCAVATION						
FAA	P-152	Excavation and Embankment	860,000	CY	$ 6	$ 5,160,000
ODOT	203.2	Special Embankment	1,000	CY	$ 20	$ 20,000
FAA	P-156	Erosion Control	1	LS	$ 100,000	$ 100,000
						$ 5,280,000
PAVEMENT						
FAA	P-155	Lime Treated Subgrade, 12" (Slurry Method)	452,000	SY	$ 9	$ 4,068,000
FAA	P-209	Aggregate Base	70,000	CY	$ 36	$ 2,520,000
FAA	P-602	Prime Coat	90,000	GA	$ 2	$ 180,000
FAA	P-603	Tack Coat	30,000	GA	$ 2	$ 60,000
FAA	P-401	Runway Grooving	42,000	SY	$ 10	$ 420,000
FAA	P-401	Asphalt Concrete Surface Course, 2"	22,000	TN	$ 50	$ 1,100,000
FAA	P-401	Asphalt Concrete Intermediate Course, 3"	32,000	TN	$ 48	$ 1,536,000
						$ 9,884,000
TRAFFIC CONTROL						
ODOT	614.1	Maintaining Traffic	1	LS	$ 500,000	$ 500,000
ODOT	620.1	Safe-Hit Flexible Guide Post, 48" w/anchor,	1,600	EA	$ 60	$ 96,000
ODOT	630.1	Traffic Signs	1	LS	$ 250,000	$ 250,000
						$ 846,000
RUNWAY AND TAXIWAY LIGHTING AND MARKING						
FAA	P-620	Solid White Paint	60,000	SF	$ 4	$ 240,000
FAA	P-620	Solid Yellow Paint	3,200	SF	$ 4	$ 12,800
FAA	L-862	Runway Edge Lighting	40	EA	$ 1,250	$ 50,000
FAA	L-851	Runway Touchdown Zone Lighting	140	EA	$ 2,250	$ 315,000
FAA	L-861	Taxiway Edge Lighting	140	EA	$ 750	$ 105,000
FAA	L-108	Lighting Cable	20,000	LF	$ 2	$ 40,000
FAA	L-110	Lighting Conduit	20,000	LF	$ 8	$ 160,000
FAA		Airfield Signage	24	EA	$ 7,500	$ 180,000
FAA		ALSF-II Approach Lighting System	1	LS	$ 4,500,000	$ 4,500,000
						$ 5,602,800
LANDSCAPING AND IRRIGATION						
ODOT	651.1	Topsoil Stockpiled	30,000	CY	$ 8	$ 240,000
ODOT	652.1	Placing Stockpiled Topsoil	20,000	CY	$ 10	$ 200,000
FAA	F-162	Security Fencing 8'	27,000	LF	$ 20	$ 540,000
ODOT	659.1	Seeding and Mulching, Class 7	90,000	SY	$ 2	$ 180,000
						$ 1,160,000
DRAINAGE						
COD	813.1	RCP, CL4, 24"	7,500	LF	$ 100	$ 750,000
COD	832.1	Catch Basin	15	EA	$ 3,750	$ 56,250
COD	833.1	Concrete Headwall	20	EA	$ 1,500	$ 30,000
COD	851.1	Catch Basin - Adjust to Grade	5	EA	$ 2,500	$ 12,500
						$ 848,750
MISCELLANEOUS						
FAA	X-100.1	Mobilization	1	LS	$ 300,000	$ 300,000
ODOT		Land Acquisition	200	AC	$ 30,000	$ 6,000,000
FAA	SP-1	Provide Frangible Mounts for Wind Sock, PAPI & REILS	1	LS	$ 7,000	$ 7,000
FAA	SP-2	Relocate PAPIs	1	LS	$ 45,000	$ 45,000
						$ 6,352,000
RUNWAY TUNNEL and BRIDGE						
FAA	P-610	Structural Concrete	75,000	CY	$ 400	$ 30,000,000
FAA	P-619	Reinforcing Steel	5,000	TON	$ 2,000	$ 10,000,000
ODOT		Sump Pumps	4	EA	$ 30,000	$ 120,000
ODOT		Steel Pipe 12"	5,000	LF	$ 100	$ 500,000
ODOT		Utility Ducts	5,200	LF	$ 1,200	$ 6,240,000
ODOT		Utility Vaults	4	EA	$ 250,000	$ 1,000,000
ODOT		Intake and Exhaust Fans	10	EA	$ 250,000	$ 2,500,000
ODOT		Lighting	1	LS	$ 250,000	$ 250,000
ODOT		Structural Piles	7,000	EA	$ 2,000	$ 14,000,000
						$ 64,610,000

Total Conceptual Estimate for Runway 6R RSA Alt. 1G: $ 96,069,550

Total Budget for Runway 6R RSA Alt. 1G		
Construction Estimate:		$ 96,069,550
Design Fees:	7.5%	$ 7,205,216
SDC Fees:	7.5%	$ 7,205,216
Contingence	15.0%	$ 14,410,433
		$ 124,890,415

Runway 6R RSA Alternative 1H – Cost Estimate

SPEC	ITEM	DESCRIPTION	QTY	UNIT	UNIT $	TOTAL
DEMOLITION						
FAA	P-150	Remove Asphalt Pavement	3,333	SY	$ 10	$ 33,330
FAA	P-620	Removal of Runway Paint	46,650	SF	$ 2	$ 93,300
						$ 126,630
EXCAVATION						
FAA	P-152	Excavation and Embankment	1,500	CY	$ 10	$ 15,000
FAA	P-156	Erosion Control	1	LS	$ 10,000	$ 10,000
						$ 25,000
PAVEMENT						
FAA	P-155	Lime Treated Subgrade, 6" (Slurry Method)	10,040	SY	$ 7	$ 70,280
FAA	P-209	Aggregate Base, 6"	2,680	CY	$ 36	$ 96,480
FAA	P-501	Portland Cement Concrete, 16"	10,040	SY	$ 55	$ 552,200
FAA	P-603	Tack Coat	1,000	GA	$ 2	$ 2,000
FAA	P-401	Asphalt Concrete Base, 5"	2,750	TN	$ 45	$ 123,750
FAA	P-401	Asphalt Concrete Surface Course, 1-1/2"	500	TN	$ 50	$ 25,000
FAA	P-401	Asphalt Concrete Intermediate Course, 2-1/2"	840	TN	$ 45	$ 37,800
						$ 907,510
TRAFFIC CONTROL & RUNWAY MARKING						
ODOT	630.1	Traffic Signs	1	LS	$ 3,000	$ 3,000
FAA	P-620	Runway and Taxiway Marking	46,650	SF	$ 2	$ 93,300
						$ 96,300
LANDSCAPING AND IRRIGATION						
FAA	T-905	Topsoil Stockpiled	500	CY	$ 4	$ 2,000
FAA	T-905	Placing Stockpiled Topsoil	500	CY	$ 4	$ 2,000
FAA	T-901	Seeding and Mulching, Class 7	6,000	SY	$ 1	$ 6,000
						$ 10,000
DRAINAGE						
FAA	D-701	RCP, CL4, 18"	150	LF	$ 90	$ 13,500
FAA	D-705	6" Perforated Underdrain Pipe	1,540	LF	$ 20	$ 30,800
FAA	D-751	Catch Basin	1	EA	$ 3,750	$ 3,750
FAA	D-751	Concrete Headwall	2	EA	$ 1,500	$ 3,000
FAA	D-751	Catch Basin - Adjust to Grade	1	EA	$ 3,000	$ 3,000
						$ 54,050
MISCELLANEOUS						
FAA	X-100	Mobilization	1	LS	$ 50,000	$ 50,000
FAA	L-125	Runway Edge Lights with Bases	2	EA	$ 1,250	$ 2,500
FAA	L-125	Taxiway Edge Lights with Bases	26	EA	$ 1,250	$ 32,500
FAA	L-125	Relocate Existing Lights with Bases	8	EA	$ 800	$ 6,400
FAA	L-110	2" PVC Conduit	1,540	LF	$ 6	$ 9,240
FAA	L-108	L-824 Cable with Counterpoise	1,720	LF	$ 4	$ 6,880
FAA	SP-1	Relocate Windsock, PAPI & REILS with Frangible Mounts	1	LS	$ 10,000	$ 10,000
FAA	SP-2	Readjust PAPI angle	1	LS	$ 2,000	$ 2,000
						$ 119,520

Total Conceptual Estimate for Runway 6R RSA Alternative 1H: $ 1,339,010

Total Budbet for Runway 6R RSA Alt. 1H		
Construction Estimate:		$ 1,339,010
Design Fees:	10.0%	$ 133,901
SDC Fees:	10.0%	$ 133,901
Contingence	15.0%	$ 200,852
		$ 1,807,664

Runway 24L RSA Alternative 2A – Cost Estimate

SPEC	ITEM	DESCRIPTION	QTY	UNIT	UNIT $	TOTAL
RUNWAY MARKING AND LIGHTING						
FAA	X-100.1	Remove Runway Marking	46,763	SF	$ 2	$ 93,526
FAA	X-100.2	Relocate Runway Edge Lights	28	EA	$ 400	$ 11,200
FAA	X-100.4	Relocate Threshold Lights	8	EA	$ 500	$ 4,000
FAA	X-100.5	Relocate Distance Remaining Signs	7	EA	$ 600	$ 4,200
FAA	X-100-6	Relocate MALSR	1	LS	$ 235,000	$ 235,000
FAA	X-100.7	Runway Marking	46,264	SF	$ 2	$ 92,528
						$ 440,454
LANDSCAPING AND IRRIGATION						
ODOT	652.1	Placing Stockpiled Topsoil	100	CY	$ 5	$ 500
ODOT	659.1	Seeding and Mulching, Class 7	100	SY	$ 2	$ 200
						$ 700
MISCELLANEOUS						
	X-100.0	Mobilization	1	LS	$ 10,000	$ 10,000
	SP-1	Relocate Windsock with Frangible Mount	1	LS	$ 7,000	$ 7,000
	SP-2	Relocate PAPI, Glide Slope and RVR	1	LS	$ 45,000	$ 45,000
						$ 62,000

Total Conceptual Estimate for Runway 24L RSA Alt. 2A **$ 503,154**

Total Budget Runway 24L RSA Alt. 2A		
Construction Estimate:		$ 503,154
Design Fees:	10.0%	$ 50,315
SDC Fees:	10.0%	$ 50,315
Contingence	15.0%	$ 75,473
		$ 679,258

Runway 24L RSA Alternative 2B – Cost Estimate

SPEC	ITEM	DESCRIPTION	QTY	UNIT	UNIT $	TOTAL
RUNWAY MARKING AND LIGHTING						
FAA	X-100.1	Remove Runway Marking	47,453	SF	$ 2	$ 94,906
FAA	X-100.2	Relocate Runway Edge Lights	28	EA	$ 400	$ 11,200
FAA	X-100.4	Relocate Threshold Lights	8	EA	$ 500	$ 4,000
FAA	X-100.5	Relocate Distance Remaining Signs	7	EA	$ 600	$ 4,200
FAA	X-100.6	Relocate MALSR	1	LS	$ 470,000	$ 470,000
FAA	X-100.7	New Runway Marking	46,940	SF	$ 4	$ 187,760
						$ 772,066
MISCELLANEOUS						
	X-100.0	Mobilization	1	LS	$ 10,000	$ 10,000
	SP-1	Relocate Windsock with Frangible Mount	1	LS	$ 7,000	$ 7,000
	SP-2	Relocate Wind Sock, PAPI, Glide Slope and RVR	1	LS	$ 45,000	$ 45,000
						$ 62,000

Total Conceptual Estimate for Runway 24L RSA Alt. 2B: $ 834,066

Total Budget for 24L RSA Alt. 2B		
Construction Estimate:		$ 834,066
Design Fees:	10.0%	$ 83,407
SDC Fees:	10.0%	$ 83,407
Contingence	15.0%	$ 125,110
		$ 1,125,989

Runway 24L RSA Alternative 2C – Cost Estimate

SPEC	ITEM	DESCRIPTION	QTY	UNIT	UNIT $	TOTAL
DEMOLITION						
ODOT	202.1	Remove Asphalt Pavement	54,100	SY	$ 10	$ 541,000
						$ 541,000
EXCAVATION						
ODOT	203.1	Excavation and Embankment	10,340	CY	$ 10	$ 103,400
ODOT	207.1	Erosion Control	1	LS	$ 5,000	$ 5,000
						$ 108,400
PAVEMENT						
FAA	P-155.1	Lime Treated Subgrade, 6" (Slurry Method)	38,590	SY	$ 7	$ 270,130
ODOT	304.1	Aggregate Base, 12"	12,860	CY	$ 36	$ 462,960
ODOT	408.1	Prime Coat	9,650	GA	$ 2	$ 19,300
ODOT	448.1	Asphalt Concrete Surface Course, 3"	6,340	TN	$ 58	$ 367,720
ODOT	448.2	Asphalt Concrete Intermediate Course, 5"	10,560	TN	$ 56	$ 591,360
						$ 1,711,470
RUNWAY MARKING AND LIGHTING						
FAA	X-100.1	Remove Runway Marking	47,453	SF	$ 2	$ 94,906
FAA	X-100.2	Relocate Runway Edge Lights	28	EA	$ 400	$ 11,200
FAA	X-100.3	Relocate Taxiway Lights	60	EA	$ 400	$ 24,000
FAA	X-100.4	Relocate Threshold Lights	8	EA	$ 500	$ 4,000
FAA	X-100.5	Relocate Distance Remaining Signs	7	EA	$ 600	$ 4,200
FAA	X-100.6	Relocate MALSR	1	LS	$ 235,000	$ 235,000
FAA	X-100.7	Runway Marking	47,416	SF	$ 2	$ 94,832
						$ 468,138
LANDSCAPING AND IRRIGATION						
ODOT	652.1	Placing Stockpiled Topsoil	1,400	CY	$ 5	$ 7,000
ODOT	659.1	Seeding and Mulching, Class 7	15,500	SY	$ 2	$ 31,000
						$ 38,000
MISCELLANEOUS						
	X-100.0	Mobilization	1	LS	$ 50,000	$ 50,000
	SP-1	Relocate Windsock with Frangible Mount	1	LS	$ 7,000	$ 7,000
	SP-2	Relocate PAPI, Glide Slope and RVR	1	LS	$ 45,000	$ 45,000
						$ 102,000

Total Conceptual Estimate for Runway 24L RSA Alt. 2C: $ 2,969,008

Total Budget for Runway 24L RSA Alt. 2C		
Construction Estimate:		$ 2,969,008
Design Fees:	10.0%	$ 296,901
SDC Fees:	10.0%	$ 296,901
Contingence	15.0%	$ 445,351
		$ 4,008,161

Runway 24L RSA Alternative 2D – Cost Estimate

SPEC	ITEM	DESCRIPTION	QTY	UNIT	UNIT $	TOTAL
DEMOLITION						
ODOT	202.1	Remove Asphalt Pavement	7,420	SY	$ 10	$ 74,200
ODOT	202.2	Removal of Security Fence	1,050	LF	$ 8	$ 8,400
ODOT	202.3	Removal of Concrete Curb and Gutter	3,000	LF	$ 6	$ 18,000
						$ 100,600
EXCAVATION						
ODOT	203.1	Excavation and Embankment	18,425	CY	$ 10	$ 184,250
ODOT	207.1	Erosion Control	1	LS	$ 10,000	$ 10,000
						$ 194,250
PAVEMENT						
FAA	P-155.1	Lime Treated Subgrade, 6" (Slurry Method)	9,570	SY	$ 7	$ 66,990
ODOT	304.1	Aggregate Base, 6"	1,600	CY	$ 36	$ 57,600
ODOT	408.1	Prime Coat	2,400	GA	$ 2	$ 4,800
ODOT	448.1	Asphalt Concrete Surface Course, 1-1/2"	800	TN	$ 58	$ 46,400
ODOT	448.2	Asphalt Concrete Intermediate Course, 2-1/2"	1,300	TN	$ 56	$ 72,800
						$ 248,590
LANDSCAPING AND IRRIGATION						
ODOT	651.1	Topsoil Stockpiled	2,780	CY	$ 4	$ 11,120
ODOT	652.1	Placing Stockpiled Topsoil	2,780	CY	$ 5	$ 13,900
ODOT	652.2	Installing 8' Chain Link Security Fence	1,400	LF	$ 20	$ 28,000
ODOT	659.1	Seeding and Mulching, Class 7	16,990	SY	$ 2	$ 33,980
						$ 87,000
DRAINAGE						
COD	813.1	RCP, CL4, 18"	150	LF	$ 90	$ 13,500
COD	832.1	Catch Basin	1	EA	$ 3,750	$ 3,750
COD	833.1	Concrete Headwall	2	EA	$ 1,500	$ 3,000
						$ 20,250
MISCELLANEOUS						
	X-100.0	Mobilization	1	LS	$ 40,000	$ 40,000
	SP-1	Relocate Windsock with Frangible Mount	1	LS	$ 7,000	$ 7,000
	SP-2	Land Acquisition	6	AC	$ 43,560	$ 261,360
						$ 308,360

Total Conceptual Estimate for Runway 24L RSA Alt. 2D: $ 959,050

Total Budget for Runway 24L RSA Alt. 2D		
Construction Estimate:		$ 959,050
Design Fees:	10.0%	$ 95,905
SDC Fees:	10.0%	$ 95,905
Contingence	15.0%	$ 143,858
		$ 1,294,718

Runway 24L RSA Alternative 2E – Cost Estimate

SPEC	ITEM	DESCRIPTION	QTY	UNIT	UNIT $	TOTAL
PAVEMENT						
ODOT	448.1	Asphalt Concrete Surface Course, 3"	280	TN	$ 58	$ 16,240
ODOT	448.2	Asphalt Concrete Intermediate Course, 5"	460	TN	$ 56	$ 25,760
						$ 42,000
MISCELLANEOUS						
	X-100.1	Mobilization	1	LS	$ 5,000	$ 5,000
	SP-1	Provide 480' EMAS	1	LS	$ 3,800,000	$ 3,800,000
	SP-2	Relocate Windsock with Frangible Mount	1	LS	$ 7,000	$ 7,000
						$ 3,812,000

Total Conceptual Estimate for Runway 24L RSA Alt. 2E: $ 3,837,760

Total Budget for Runway 24L RSA Alt. 2E		
Construction Estimate:		$ 3,837,760
Design Fees:	10.0%	$ 383,776
SDC Fees:	10.0%	$ 383,776
Contingence	15.0%	$ 575,664
		$ 5,180,976

Runway 24L RSA Alternative 2F – Cost Estimate

SPEC	ITEM	DESCRIPTION	QTY	UNIT	UNIT $	TOTAL
DEMOLITION						
ODOT	202.1	Remove Asphalt Pavement	7,000	SY	$ 10	$ 70,000
FAA	P-151	Clearing and Grubbing	20	AC	$ 4,000	$ 80,000
FAA	P-162	Remove Fencing	15,000	LF	$ 10	$ 150,000
FAA	P-620	Remove Runway Painting	8,000	SF	$ 2	$ 16,000
						$ 316,000
EXCAVATION						
FAA	P-152	Excavation and Embankment	100,000	CY	$ 6	$ 600,000
ODOT	203.2	Special Embankment	1,000	CY	$ 20	$ 20,000
FAA	P-156	Erosion Control	1	LS	$ 75,000	$ 75,000
						$ 695,000
PAVEMENT						
FAA	P-155	Lime Treated Subgrade, 12" (Slurry Method)	90,000	SY	$ 9	$ 810,000
FAA	P-209	Aggregate Base	10,000	CY	$ 36	$ 360,000
FAA	P-602	Prime Coat	32,000	GA	$ 2	$ 64,000
FAA	P-603	Tack Coat	16,000	GA	$ 2	$ 32,000
FAA	P-401	Runway Grooving	40,000	SY	$ 10	$ 400,000
FAA	P-401	Asphalt Concrete Surface Course, 2"	12,000	TN	$ 50	$ 600,000
FAA	P-401	Asphalt Concrete Intermediate Course, 3"	18,000	TN	$ 48	$ 864,000
						$ 3,130,000
TRAFFIC CONTROL						
ODOT	614.1	Maintaining Traffic	1	LS	$ 100,000	$ 100,000
ODOT	620.1	Safe-Hit Flexible Guide Post, 48" w/anchor,	1,600	EA	$ 60	$ 96,000
ODOT	630.1	Traffic Signs	1	LS	$ 250,000	$ 250,000
						$ 446,000
RUNWAY AND TAXIWAY LIGHTING AND MARKING						
FAA	P-620	Solid White Paint	50,000	SF	$ 4	$ 200,000
FAA	P-620	Solid Yellow Paint	3,000	SF	$ 4	$ 12,000
FAA	L-862	Runway Edge Lighting	30	EA	$ 1,250	$ 37,500
FAA	L-851	Runway Touchdown Zone Lighting	140	EA	$ 2,250	$ 315,000
FAA	L-861	Taxiway Edge Lighting	120	EA	$ 750	$ 90,000
FAA	L-108	Lighting Cable	12,000	LF	$ 2	$ 24,000
FAA	L-110	Lighting Conduit	12,000	LF	$ 8	$ 96,000
FAA		Airfield Signage	10	EA	$ 7,500	$ 75,000
FAA		Relocate MALSR Approach Lighting	1	LS	$ 235,000	$ 235,000
						$ 1,084,500
LANDSCAPING AND IRRIGATION						
ODOT	651.1	Topsoil Stockpiled	6,000	CY	$ 8	$ 48,000
ODOT	652.1	Placing Stockpiled Topsoil	6,000	CY	$ 10	$ 60,000
FAA	F-162	Security Fencing 8'	7,000	LF	$ 20	$ 140,000
ODOT	659.1	Seeding and Mulching, Class 7	3,000	SY	$ 2	$ 6,000
						$ 254,000
DRAINAGE						
COD	813.1	RCP, CL4, 24"	2,500	LF	$ 100	$ 250,000
COD	832.1	Catch Basin	8	EA	$ 3,750	$ 30,000
COD	833.1	Concrete Headwall	10	EA	$ 1,500	$ 15,000
COD	851.1	Catch Basin - Adjust to Grade	3	EA	$ 2,500	$ 7,500
						$ 302,500
MISCELLANEOUS						
FAA	X-100.1	Mobilization	1	LS	$ 100,000	$ 100,000
ODOT		Land Acquisition	90	AC	$ 30,000	$ 2,700,000
FAA		Purchase of Structures	18	EA	$ 100,000	$ 1,800,000
FAA	SP-1	Provide Frangible Mounts for Windsock, PAPI, & REILS	1	LS	$ 7,000	$ 7,000
FAA	SP-2	Relocate PAPIs, Windsock & REILS	1	LS	$ 45,000	$ 45,000
						$ 4,652,000

Total Conceptual Estimate for Runway 24L RSA Alt. 2F: $ 10,880,000

Total Budget for Runway 24L RSA Alt. 2F		
Construction Estimate:		$ 10,880,000
Design Fees:	7.5%	$ 816,000
SDC Fees:	7.5%	$ 816,000
Contingence	15.0%	$ 1,632,000
		$ 14,144,000

Runway 24L RSA Alternative 2G – Cost Estimate

SPEC	ITEM	DESCRIPTION	QTY	UNIT	UNIT $	TOTAL
MISCELLANEOUS						
	SP-1	Relocate Windsock with Frangible Mount	1	LS	$ 7,000	$ 7,000
						$ 7,000

Total Conceptual Estimate for Runway 24L RSA Alt. 2G **$ 7,000**

Total Budget for Runway 24L RSA Alt. 2G		
Construction Estimate:		$ 7,000
Design Fees:	10.0%	$ 700
SDC Fees:	10.0%	$ 700
Contingence	15.0%	$ 1,050
		$ 9,450

APPENDIX E

RUNWAY LENGTH REQUIREMENTS ANALYSIS

RUNWAY LENGTH REQUIREMENTS ANALYSIS

DAYTON INTERNATIONAL AIRPORT MASTER PLAN UPDATE

Prepared By:
Landrum & Brown, Inc.

Draft
February 9, 2005

TABLE OF CONTENTS

I. EXECUTIVE SUMMARY

In accordance with FAA Advisory Circular 150/5325-4A and the aircraft manufacturers' characteristics manuals, an analysis was conducted to determine the runway length requirements for passenger air carrier, commuter, and cargo aircraft operating at Dayton International Airport (DAY). Based on 100 percent maximum takeoff weights (MTOW) of the existing and future aircraft fleet mix through year 2020, the following runway lengths are justified at DAY.

Justified Runway Lengths

Runway	Justified Runway Length (ft.)
6R-24L	13,900
6L/24R	13,900
18-36	11,120

These runway lengths are based on individual aircraft performance charts, and take into consideration the elevation and average temperature of the airport, runway conditions, and the operating weight and engine type of the aircraft. This initial runway length analysis did not take into consideration local conditions, such as, environmental, noise, topographical (except for runway gradient), physical, land use, political, and economic factors. However, these factors were taken into consideration for determination of the proposed runway lengths as depicted on the draft Future Airport Layout Plan (ALP) dated January 19, 2005.

The following are the results of the runway length requirements for the three existing runways at DAY:

- ***Runway 6R/24L*** – In accordance with Advisory Circular 150/5325-4A, parallel runways should have a length based on the airplanes that will use the runways and should also be approximately equal in length. Based on these criteria, the Runway 6R/24L takeoff length of 13,900 feet is justified since the theoretical 13,900-foot length of Runway 6L/24R is justified. This length would accommodate all of the existing and future aircraft fleet mix at 100 percent MTOW.

  Although justifiable at 13,900 feet, the draft Future ALP proposes a length of 9,500 feet for Runway 6R/24L due to various local factors as previously noted. The proposed runway length of 9,500 feet can accommodate the air carrier fleet with a 95 percent or greater MTOW, with the exception of the B-757-200, B-757-300, B-737-900, and DC-9-32 aircraft. The flight range distance for each aircraft is also adequate to serve the current commercial markets at DAY. The proposed 9,500-foot Runway 6R/24L is based on the premise that both parallel 6-24 runways are in operation.

  During peak arrival periods, the proposed 9,500-foot long Runway 6R/24L will be capable of accommodating all of the cargo aircraft for landing under wet conditions.

- ***Runway 18-36*** – In accordance with Advisory Circular 150/5325-4A, a crosswind runway should have a length of at least 80 percent of the primary runway length. Based on these criteria, Runway 18-36 is justified at a takeoff length of 11,120 feet, which is 80 percent of the justified 13,900-foot Runway 6L/24R length. It is anticipated that the air carrier and commuter aircraft will mainly use Runway 18-36, with use by cargo aircraft when wind and weather dictate. Based on recent radar data, the actual usage of Runway 18-36 is approximately 10.6 percent annually.

  The draft Future ALP proposed a length of 9,500 feet for Runway 18-36. This runway length is less than the justified length of 11,120 feet in accordance with FAA Advisory Circular due to various local factors as previously noted. The proposed runway length of 9,500 feet can accommodate the air carrier fleet with a 95 percent or greater MTOW, with the exception of the B-757-200, B-757-300, B-737-900, and DC-9-32 aircraft. In addition, the flight range distance for each aircraft is adequate to serve the current commercial markets at DAY.

- ***Runway 6L/24R*** – Due to the anticipated heavy use by cargo aircraft, the Runway 6L/24R takeoff length is justified at 13,900 feet to adequately serve all of the anticipated cargo aircraft at 100 percent MTOW. Also, all of the air carrier and commuter aircraft fleet would be able to use a 13,900-foot long runway at 100 percent MTOW. The draft Future ALP proposes a length of 12,600 feet for Runway 6L/24R. This runway length is less than the justified length of 13,900 feet in accordance with the FAA Advisory Circular due to various local factors as previously noted. The 24R threshold has been moved 1,478 feet to the west-southwest in order to provide a full 1,000-foot safety area, and construction of a parallel taxiway and service road on the west side of Runway 18-36. The 6L threshold has been extended 3,178 feet to the west-southwest such that US 40 could stay in its existing alignment.

  The proposed runway length of 12,600 feet can accommodate the cargo aircraft fleet at 100 percent MTOW, with the exception of the A300-B4, B-727-200, DC-10-30, and DC-8-62 aircraft. The worst case is the DC-8-62 aircraft with a 97.3 percent MTOW. Although, all of the cargo aircraft can takeoff with 100 percent payload weight, their flight range distances and markets that are reachable non-stop are limited.

Based on this runway length requirements analysis, it has been demonstrated that the runway lengths as depicted on the January 19, 2005 Future ALP are justified based on the existing and future aircraft fleet mix, and anticipated runway usage. As mentioned, the proposed runway lengths are less than what is justified per the FAA Advisory Circular planning standards due to local considerations such as land use, noise, and cost-benefits. These issues have been addressed in the Master Plan Study and other planning efforts. The proposed runway lengths will provide adequate aircraft takeoff and landing performance based on current markets being served from DAY. However, as future markets are added and travel distances increase, it may be necessary to increase one or more of the runway lengths to assure maximum efficiency and utilization of the airport runway system.

II. INTRODUCTION

In accordance with FAA Advisory Circular 150/5325-4A and the aircraft manufacturers characteristics manuals, an analysis was conducted to determine the theoretical runway length requirements for passenger air carrier, commuter, and cargo aircraft operating at Dayton International Airport (DAY). The runway length requirements were calculated using charts published in the aircraft manufacturers' characteristics manuals and the International Civil Aviation Organization (ICAO) Aerodrome Design Manual. Requirements were calculated by taking into consideration the elevation and average temperature of the airport, the performance characteristics of the individual aircraft, runway conditions, and the operating weight and engine type of the aircraft, which is dependent on the amount of fuel needed to reach the destination, and the amount of payload (passengers, baggage, and cargo).

FAA Advisory Circular 150/5325-4A, dated 1/29/90, "Runway Length Requirements for Airport Design", notes the following: "*Parallel Runways* should have a length based on the airplanes that will use the runways. Parallel runways should be approximately equal in length. A *Crosswind Runway* should have a length of at least 80 percent of the primary runway length." These criteria will be taken into consideration for the runway length analysis.

Also to be considered for this analysis is the Draft Advisory Circular 150/5325-4B, "Runway Length Requirements for Airport Design," currently out for review and comment. This draft AC makes the following recommendations: "When the MTOW of listed airplanes is over 60,000 pounds, the recommended runway length is determined according to *individual airplanes*. The design objective for the main primary runway is to determine a recommended runway length that serves all airplanes without operational weight restrictions. The design objective for the length of crosswind runways for scheduled transport service is to equal 100 percent of the primary runway."

In accordance with FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems (NPIAS)*, the following is noted regarding airport dimensional standards. "Airport dimensional standards (such as runway length and width, separation standards, surface gradients, etc.) should be selected which are appropriate for the critical aircraft that will make substantial use of the airport in the planning period. Substantial use means either 500 or more annual itinerant operations, or scheduled commercial service. The critical aircraft may be a single aircraft or a composite of the most demanding characteristics of several aircraft." This planning standard will be taken into consideration when determining the runway length requirements.

Dayton International Airport has a three-runway airfield system that consists of two parallel 6-24 runways, and a single 18-36 runway. Runway 6L/24R serves as the primary runway and has a length of 10,900 feet with Category II/III approach capability on Runway 6L, and Category I approach capability on Runway 24R. Runway 6R/24L serves as the secondary parallel runway and has a length of 7,000 feet with Category I approach capability on Runway 24L, and a Non-Precision (non-directional beacon) approach capability on Runway 6R. Runway 18-36 serves as the cross-wind runway and has a length of 8,500 feet with Category I approach capability on Runway 18, and Visual approach capability on Runway 36. Runway 18-36 provides operations beyond that of a typical crosswind runway and is used approximately 10.6 percent of the time.

III. FORECAST AIRCRAFT OPERATIONS AND AIRCRAFT FLEET MIX

Based on the FAA approved February 20, 2004 Forecasts of Aviation Activity at DAY, total annual operations are to increase from approximately 125,217 in 2002 to 158,600 in 2020. This represents an average annual increase of 1.4 percent over the forecast period. **Table 1** summarizes the total annual aircraft operations forecast for Dayton International Airport.

Air carrier passenger operations are projected to grow 1.5 percent per year, beginning in 2004. The regional passenger operations are projected to grow 1.7 percent per year, beginning in 2004. In addition, the cargo operations are anticipated to grow 3.3 percent per year.

UPS has recently acquired (December 2004) the Menlo Worldwide Forwarding freight hub at DAY that currently has 34 daily flights. The following information was taken from the UPS pressroom web site:

> The acquisition *(Menlo)* reinforces UPS's strategy of providing broad supply chain solutions to enable global commerce. As a result of the acquisition, UPS will expand its global capabilities and add guaranteed heavy airfreight services around the world, enabling customers to reach the global marketplace faster. This also means UPS will introduce new time-definite products such as overnight, two-day and deferred heavy airfreight to North America. *www.pressroompups.com (10/5/04).*
>
> "Menlo Worldwide Forwarding's capabilities complement UPS's ability to manage customers' shipments of any size, anywhere and in virtually any time frame," said Bob Stoffel, UPS senior vice president, Supply Chain Group. Menlo Worldwide Forwarding services soon will be sold under the UPS brand, he added. *www.pressroomups.com (1/24/05).*

In addition, the following are excerpts from an article in the October 21, 2004, Dayton Daily News:

> "If you look at their *(UPS)* commitment to going into a heavy weight, global, time-definite product, our hub *(DAY)* has those capabilities," Trimarco said. The Menlo executive said he expects to sign on with the new owner. He also said that he expects Dayton hub employment to remain stable under UPS provided the economy continues to grow.

Based on these comments, it has been assumed that UPS will continue to operate and grow the DAY cargo hub as anticipated in the February 20, 2004 Forecast of Aviation Activity.

Based on this forecast, **Table 2** summarizes the anticipated passenger air carrier and commuter aircraft fleet-mix at DAY. The air carrier fleet mix is projected to remain a narrow-body fleet. Based on the proposed 2020 air carrier fleet mix, the Boeing 717-200 will represent approximately 57 percent of the fleet, the Airbus 320-200 will represent approximately 28 percent, and the Boeing 737-800/900 will represent approximately 15 percent of the air carrier fleet mix. Based on a total of 14,200 annual air carrier operations in year 2020, each of these aircraft type will exceed the 500 annual operations requirement.

The air carrier aircraft fleet-mix and engine types used in this analysis is presented in **Table 3**, and are grouped by aircraft weight classes for informational purposes only. ***Heavy*** – Aircraft capable of takeoff weights of more than 255,000 pounds, including the B757, whether or not they are operating at this weight during a particular phase of flight. ***Large*** – Aircraft of more than 41,000 pounds, maximum certificated takeoff weight, up to 255,000 pounds. ***Small*** – Aircraft of 41,000 pounds or less maximum certificated takeoff weight.

Today, the commuter aircraft fleet is dominated with 50-seat regional jets, and small turboprop aircraft. Over the forecast horizon, the regional carriers are expected to phase out virtually all of the turboprop aircraft in favor of regional jets ranging in size from 32 to 90 seats. The Canadair Regional Jet CRF-200/700 and the Embraer Regional Jet ERJ 135/140/145 will dominate the commuter aircraft fleet mix at approximately 86 percent of the fleet. Based on a total of 68,200 annual commuter operations in year 2020, each of these aircraft type will exceed the 500 annual operations requirement.

With the recent acquisition of Menlo Worldwide Forwarding by UPS (December 2004), it was assumed that all cargo aircraft types that have served the airport over the past five years, along with the current UPS aircraft fleet would be used in this analysis. **Table 4** summarizes the anticipated cargo aircraft fleet mix.

IV. TAKEOFF RUNWAY LENGTH REQUIREMENTS

When aircraft operate during periods of high temperatures, the relative increased density altitude decreases an aircraft's operational performance. Loss in performance requires longer takeoff distances and faster ground speeds during landings, which results in longer runway length requirements. This section discusses the takeoff runway length requirements for the aircraft currently or projected to be in operation at Dayton International Airport throughout the planning horizon. Runway length requirements are identified for air carrier, commuter, and cargo aircraft.

Air Carrier Aircraft Requirements

Takeoff runway length requirements were determined from the "standard day" charts (59 degrees Fahrenheit) and a mean daily high temperature of 85 degrees Fahrenheit was used to determine the ultimate runway length requirements for air carrier and commuter aircraft. Based on an airport elevation of 1009 msl, the density altitude at 85^{o}F is approximately 3,000 feet. Density altitude is defined as pressure altitude corrected for nonstandard temperature. **Exhibit A-1** in

Appendix A illustrates the calculation for density altitude. The density altitude is the altitude at which the density of the International Standard Atmosphere (ISA) is the same as the density of the air being evaluated. The temperature at ISA is 15 degrees Celsius (59^{o}F).

Exhibit 1 shows the takeoff runway length requirements for air carrier aircraft at 100 percent Maximum Takeoff Weight (MTOW) for each of the existing runways at DAY. The required lengths for each runway are slightly different due to the variation in their centerline slope. The "standard day" runway length has been increased 10 feet for every foot of difference in centerline elevation between the high and low points. The following table summaries the necessary runway length at 100 percent MTOW for some of the existing and future air carrier aircraft type that are anticipated to be in operation through the year 2020.

100 percent MTOW Runway Length

AIRCRAFT TYPE	RUNWAY LENGTH (FT.)
B-717-200	7,600
A320-200	9,600
MD-80-83	10,600
B-757-300	12,000
B-737-900	12,800

Commuter Aircraft Requirements

Runway length requirements for commuter regional jets and turboprop aircraft were taken from the *Jane's All The World Aircraft* manuals based on maximum takeoff weight and standard day temperature (15 degrees Celsius). These runway length requirements were then adjusted for airport elevation, temperature, and runway slope as specified in the ICAO Aerodrome Runway Design Manual.

Exhibit 2 shows the standard day (Jane's) and adjusted (ICAO) runway lengths. For this analysis, the adjusted ICAO runway lengths were used to determine the optimum commuter aircraft takeoff runway length requirements because there is insufficient detailed data from the aircraft manufacturers. As shown, the commuter aircraft require between 5,000 feet and 9,350 feet of runway length at 100 percent MTOW. The majority of the commuter aircraft fleet will be comprised of regional jets that require the longer runway length.

Cargo Aircraft Requirements

Takeoff runway length requirements were determined from the "standard day" charts (59 degrees Fahrenheit) and a mean morning high temperature of 65 degrees Fahrenheit was used to determine the ultimate runway length requirements for cargo aircraft. The lower temperature was used for the cargo aircraft to reflect the typical morning hours in which these aircraft depart. Based on an airport elevation of 1009 msl, the density altitude at 65^{o}F is approximately

1,900 feet. Density altitude is defined as pressure altitude corrected for nonstandard temperature. **Exhibit A-2** in **Appendix A** illustrates the calculation for density altitude.

Cargo aircraft takeoff length requirements were calculated in the same manner as the air carrier aircraft and are presented in **Exhibit 3**. Likewise, it is desirable to accommodate 100 percent of the cargo aircraft payload for maximum revenue potential. As shown, the cargo aircraft will require a runway length ranging from 8,000 feet for the B-757-200 and 13,900 feet for the B-727-200 aircraft.

V. LANDING RUNWAY LENGTH REQUIREMENTS

Landing runway length requirements were also determined for the air carrier, commuter, and cargo aircraft at Dayton International Airport. **Exhibits 4, 5 and 6** depict the runway lengths necessary with maximum aircraft landing weight for wet and dry pavement conditions. All of the air carrier aircraft should be able to land on a 7,000-foot long runway, while all of the commuter aircraft should be able to land on a 6,400-foot long runway under wet conditions. In addition, all of the cargo aircraft should be able to land on an 8,900-foot long runway under wet conditions. The landing runway lengths are not the critical metric for determining the optimum runway length requirements, because it requires less runway length to conduct aircraft landings. This information is provided for airport planning purposes and potential runway usage during peak arrival periods.

VI. SUMMARY

Runway takeoff and landing length requirements were identified for air carrier, commuter, and cargo aircraft at Dayton International Airport in accordance with FAA Advisory Circular 150/5325-4A and the aircraft manufacturers' characteristics manuals. Based on 100 percent maximum takeoff and landing weights, the table below shows the runway lengths that are justified for use by the three aircraft groups.

Runway Length Requirements

AIRCRAFT TYPE	TAKEOFF LENGTH AT MTOW (FT.)	LANDING LENGTH (FT.)(WET)
Air Carrier	12,800	7,000
Commuter	9,350	6,400
Cargo	13,900	8,900

These runway lengths are based on individual aircraft performance charts, and take into consideration the elevation and average temperature of the airport, runway conditions, and the operating weight and engine type of the aircraft. This initial runway length analysis did not take into consideration local conditions, such as, environmental, noise, topographical (except for runway gradient), physical, land use, political, and economic factors. However, these factors were taken into consideration for determination of the proposed runway lengths as depicted on the draft Future Airport Layout Plan (ALP) dated January 19, 2005.

The following are the results of the runway length requirements for the three existing runways at DAY:

- ***Runway 6R/24L*** – In accordance with Advisory Circular 150/5325-4A, parallel runways should have a length based on the airplanes that will use the runways and should also be approximately equal in length. Based on these criteria, the Runway 6R/24L takeoff length of 13,900 feet is justified since the theoretical 13,900-foot length of Runway 6L/24R is justified. This length would accommodate all of the existing and future aircraft fleet mix at 100 percent MTOW.

  Although justifiable at 13,900 feet, the draft Future ALP proposes a length of 9,500 feet for Runway 6R/24L due to various local factors as previously noted. The proposed runway length of 9,500 feet can accommodate the air carrier fleet with a 95 percent or greater MTOW, with the exception of the B-757-200, B-757-300, B-737-900, and DC-9-32 aircraft. **Table 7** shows the percent MTOW and maximum stage length (nautical miles) for each of the air carrier aircraft based on a 9,500-foot long runway. The flight range distance for each aircraft is also adequate to serve the current commercial markets at DAY as shown in Table 6. The proposed 9,500-foot Runway 6R/24L is based on the premise that both parallel 6-24 runways are in operation. However, if the airlines wish to add new markets with longer stage lengths, the 9,500-foot runway length may not be adequate for all aircraft types to serve these new markets with payloads that are economically viable for the airlines.

  An additional analysis was conducted to determine the performance of the cargo aircraft on a 9,500-foot long runway. **Table 8** shows the percent MTOW and maximum stage length for each of the cargo aircraft. The flight range distance for each aircraft is less than those for the proposed 12,600-foot long Runway 6L/24R. The MTOW for all of the cargo aircraft are between 90 percent and 100 percent based on the 9,500-foot long runway.

  The cargo aircraft could also use Runway 6R/24L primarily during peak arrival periods and will require a minimum landing length of 8,900 feet. The proposed 9,500-foot long Runway 6R/24L will be capable of accommodating all of the cargo aircraft for landing under wet conditions.

- ***Runway 18-36*** – In accordance with Advisory Circular 150/5325-4A, a crosswind runway should have a length of at least 80 percent of the primary parallel runway length. Based on these criteria, Runway 18-36 is justified at a takeoff length between 11,120 feet, which is 80 percent of the justified 13,900-foot Runway 6L/24R length. It is anticipated that the air carrier and commuter aircraft will mainly use Runway 18-36, with use by cargo aircraft when wind and weather dictate. Based on recent radar data, the actual usage of Runway 18-36 is approximately 10.6 percent annually.

  The draft Future ALP proposed a length of 9,500 feet for Runway 18-36. This runway length is less than the justified length of 11,120 feet in accordance with the FAA Advisory Circular due to various local factors as previously noted. The proposed runway length of 9,500 feet can accommodate the air carrier fleet with a 95 percent or greater MTOW, with the exception of the

B-757-200, B-757-300, B-737-900, and DC-9-32 aircraft. Table 7 shows the percent MTOW and maximum stage length (nautical miles) for each of the air carrier aircraft based on a 9,500-foot long runway. The flight range distance for each aircraft is adequate to serve the current commercial markets at DAY as shown in Table 6. However, as previously noted, if the airlines wish to add new markets with longer stage lengths, the 9,500-foot runway length may not be adequate for all aircraft types to serve the new markets with payloads that are economically viable for the airlines.

- ***Runway 6L/24R*** – Due to the anticipated heavy use by cargo aircraft, the Runway 6L/24R takeoff length is justified at 13,900 feet to adequately serve all of the anticipated cargo aircraft at 100 percent MTOW. Also, all of the air carrier and commuter aircraft fleet would be able to use a 13,900-foot long runway at 100 percent MTOW. The draft Future Airport Layout Plan (ALP) dated January 18, 2005 proposes a length of 12,600 feet for Runway 6L/24R. This runway length is less than the justified length of 13,900 feet in accordance with the FAA Advisory Circular due to various local factors as previously noted. The 24R threshold has been moved 1,478 feet to the west-southwest in order to provide a full 1,000-foot safety area, and construction of a parallel taxiway and service road on the west side of Runway 18-36. The 6L threshold has been extended 3,178 feet to the west-southwest such that US 40 could stay in its existing alignment.

  The proposed runway length of 12,600 feet can accommodate the cargo aircraft fleet at 100 percent MTOW, with the exception of the A300-B4, B-727-200, DC-10-30, and DC-8-62 aircraft. **Table 5** shows the percent MTOW and maximum stage length (nautical miles) for each of the cargo aircraft based on a 12,600-foot long runway. The worst case is the DC-8-62 aircraft with a 97.3 percent MTOW. Although, all of the cargo aircraft can takeoff with 100 percent payload weight, their flight range distances and markets that are reachable non-stop are limited. **Table 6** shows the current markets that are being served by UPS today (previous Menlo Worldwide Forwarding markets).

Based on this runway length requirements analysis, it has been demonstrated that the runway lengths as depicted on the January 19, 2005 draft Future ALP are justified based on the existing and future aircraft fleet mix, and anticipated runway usage at DAY. As mentioned, the proposed runway lengths are less than what is justified per the FAA Advisory Circular planning standards due to local considerations such as land use, noise, and cost-benefits. These issues have been addressed in the Master Plan Study and other planning efforts. The proposed runway lengths will provide adequate aircraft takeoff and landing performance based on current markets being served from DAY. However, as future markets are added and travel distances increase, it may be necessary to increase one or more of the runway lengths to assure Dayton International Airport's ability to competitively serve the existing and future cargo and passenger markets.

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TABLE 1
AIRCRAFT OPERATIONS FORECAST

		Passenger					Annual
	Year	Air Carrier	Regional	Cargo	Other	Total	Change
Actual	1998	24,148	31,398	42,540	53,393	151,479 \1	
	1999	24,239	30,330	38,987	58,448	152,004 \1	0.3%
	2000	25,540	33,466	35,118	51,277	145,401 \2	-4.3%
	2001	21,795	40,114	22,706	47,994	132,609 \2	-8.8%
	2002	15,079	44,940	16,066	49,132	125,217 \2	-5.6%
Estimate	2003	11,000	51,500	14,700	47,100	124,300	-0.7%
Forecast	2004	12,200	54,400	14,800	47,300	128,700	3.5%
	2005	12,400	58,400	15,300	47,500	133,600	3.8%
	2006	12,600	59,600	15,800	47,700	135,700	1.6%
	2007	12,700	60,800	16,400	47,900	137,800	1.5%
	2008	12,900	62,000	17,000	48,100	140,000	1.6%
	2009	13,000	62,900	17,600	48,300	141,800	1.3%
	2010	13,100	63,500	18,200	48,500	143,300	1.1%
	2011	13,200	63,800	18,800	48,700	144,500	0.8%
	2012	13,400	64,200	19,500	48,900	146,000	1.0%
	2013	13,500	64,600	20,200	49,100	147,400	1.0%
	2014	13,600	65,000	20,900	49,300	148,800	0.9%
	2015	13,700	65,400	21,600	49,500	150,200	0.9%
	2016	13,800	65,900	22,400	49,700	151,800	1.1%
	2017	13,900	66,400	23,200	49,900	153,400	1.1%
	2018	14,000	67,000	24,000	50,100	155,100	1.1%
	2019	14,100	67,600	24,800	50,300	156,800	1.1%
	2020	14,200	68,200	25,700	50,500	158,600	1.1%
Average Annual Growth Rates							
	1998-2003	-14.6%	10.4%	-19.1%	-2.5%	-3.9%	
	2003-2010	2.5%	3.0%	3.1%	0.4%	2.1%	
	2010-2020	0.8%	0.7%	3.5%	0.4%	1.0%	
	2003-2020	1.5%	1.7%	3.3%	0.4%	1.4%	

Notes:

Other Operations includes military, non-commercial air taxi, and general aviation.

\1 Total from FAA TAF

\2 Total from Airport records

TABLE 2
FUTURE ANNUAL PASSENGER AIRCRAFT FLEET MIX

Air Carrier Aircraft	Seats	2003	2005	2010	2015	2020
757	180	17.1%	5.9%	5.6%	0.0%	0.0%
739	177	0.0%	0.0%	0.0%	5.3%	5.1%
738	162	0.0%	0.0%	0.0%	10.7%	10.3%
320	144	0.5%	0.0%	0.0%	26.6%	27.8%
M80	142	23.3%	35.6%	39.8%	0.0%	0.0%
733	134	10.4%	5.9%	5.6%	0.0%	0.0%
M80	129	3.3%	11.9%	5.6%	0.0%	0.0%
319	126	0.2%	0.0%	0.0%	0.0%	0.0%
717	117	15.8%	28.9%	32.4%	46.7%	56.8%
735	116	6.3%	11.9%	11.1%	10.7%	0.0%
D9S	106	13.3%	0.0%	0.0%	0.0%	0.0%
100	87	9.4%	0.0%	0.0%	0.0%	0.0%
DC9	78	0.5%	0.0%	0.0%	0.0%	0.0%
Total		100.0%	100.0%	100.0%	100.0%	100.0%
Total Operations		11,152	12,400	13,100	13,700	14,200

Regional Aircraft	Seats	2003	2005	2010	2015	2020
142/146 (NB)	85	1.0%	1.2%	2.3%	2.2%	2.1%
ARJ	82	0.2%	0.0%	0.0%	0.0%	0.0%
CR7	70	1.9%	2.3%	3.4%	4.5%	5.4%
CRJ/ERJ/ER4	50	40.6%	69.5%	69.4%	75.8%	80.9%
DH3 (TP)	50	0.6%	0.0%	0.0%	0.0%	0.0%
ATR (TP)	46	0.0%	0.0%	0.0%	0.0%	0.0%
ERD (RJ)	44	2.2%	1.1%	2.3%	3.0%	3.2%
DH8 (TP)	37	1.5%	2.5%	0.0%	0.0%	0.0%
ER3 (RJ)	37	4.0%	4.5%	4.6%	4.5%	4.1%
SF3 (TP)	34	12.3%	8.5%	8.0%	2.2%	0.0%
FRJ (RJ)	32	5.2%	4.7%	4.6%	4.5%	2.1%
EM2/SF3	30	0.0%	0.0%	0.0%	0.0%	0.0%
D38/J41	29	25.8%	3.8%	3.5%	3.3%	2.1%
BEH/BE1/J31	19	4.6%	2.0%	1.8%	0.0%	0.0%
Total		100.0%	100.0%	100.0%	100.0%	100.0%
Total Operations		52,234	58,500	63,500	65,400	68,200

TABLE 3
AIR CARRIER AIRCRAFT FLEET MIX CHARACTERISTICS

AIRCRAFT TYPE	MODEL	ENGINE TYPE	MTOW (POUNDS)
Heavy Aircraft			
Boeing 757	200	RB211-535E-4B	255,000
Boeing 757	200	PW2037	255,000
Boeing 757	300	RB211-535E-4B	270,000
Boeing 757	300	PW2043	270,000
Large Aircraft			
Boeing 737	300	CFM56-3B2	139,500
Boeing 737	500	CFM56-3B1	133,500
Boeing 737	800	CFM56-7B-24	174,200
Boeing 737	900	CFM56-7B-24	174,200
Airbus 320	100	CFM56-5A1	149,911
Airbus 320	200	CFM56-5A1	169,754
Airbus 319	112	CFM56-5B6	141,096
MD-80	83	PW-JT8D-219	160,000
MD-80	87	PW-JT8D-217C	140,000
DC-9	32	PW-JT8D-9	108,000
DC-9	51	PW-JT8D-17	121,000
Avro Regional Jet	70/85/100	ASE-LF507-1F	101,500
Fokker	100	RR-Tay 650	98,000
British Aerospace 146	100	ASE-ALF502R-5	84,000
British Aerospace 146	200	ASE-ALF502R-5	93,000
Boeing 717	200	RR-BR715	51,710
Embraer Regional Jet	145	AE3007-A1	42,328
Embraer Regional Jet	140	AE3007-A1/3	46,517
Embraer Regional Jet	135	AE3007-A1/3	44,092
Canadair Regional Jet	900	GE-CF34-8C5	80,500
Canadair Regional Jet	700	GE-CF34-8C1	72,500
Canadair Regional Jet	200	GE-CF34-3B1	51,000
De Havilland DHC8	300	PW123	43,000
Small Aircraft			
Saab	340	GE-CT7-5A2	28,000
British Aerospace Jetstream	41	ASE-TPE331-14GR	24,000
Beechcraft	1900D	PWC PT6A-67D	17,120
Fairchild Dornier 328	310	PWC-PW306B	34,524

MTOW=Maximum Takeoff Weight
Source: October 2003 Official Airline Guide

TABLE 4
CARGO AIRCRAFT FLEET MIX CHARACTERISTICS

AIRCRAFT TYPE	MODEL	ENGINE TYPE	MTOW (POUNDS)
Airbus 300	B4/203	CF6-50C2	363,756
Boeing 727	100C	JT8D-7	169,000
Boeing 727	200F	JT8D-15	209,500
Boeing 747	200C	JT9D-7Q	833,000
MD-11	11F	PW4460	602,500
DC-10	10CF	CF6-6D	440,000
DC-10	30CF	CF6-50C	555,000
Boeing 767	300	CF6-80A	350,000
Boeing 757	200	RB211-535E-4B	255,000
DC8-	62	JT3D-3B	350,000
DC8	73	CFM56-2	355,000
DC-9	41	JT8D-15	114,000

MTOW=Maximum Takeoff Weight
Source: 2001-2002 Cargo Landings from FAA Form 5100-108

TABLE 5
CARGO AIRCRAFT TAKEOFF REQUIREMENTS (12,600' RUNWAY)

Cargo Aircraft	Engine Type	Takeoff Weights (lbs.) Fuel	Payload	OEW	Total	OEW Plus Payload (lbs.)	Max. Structural Payload (lbs.)	Loss in Payload (lbs.)	MTOW	Percent of Total Payload	Percent of MTOW
A300-B4/203	CF6-50C2	88,631	78,252	195,117	362,000	273,369	78,252	0	363,756	100.0%	99.5%
B-727-100C	JT8D-7	45,500	35,800	87,696	169,000	123,500	35,800	0	169,000	100.0%	100.0%
B-727-200F	JT8D-15	60,600	43,300	100,700	204,600	144,000	43,300	0	209,500	100.0%	97.7%
B-747-200C	JT9D-7Q	243,000	244,670	345,330	833,000	590,000	244,670	0	833,000	100.0%	100.0%
MD-11F	PW4460	151,200	202,733	248,567	602,500	451,300	202,733	0	602,500	100.0%	100.0%
DC-10-10CF	CF6-6D	105,000	119,556	215,444	440,000	335,000	119,556	0	440,000	100.0%	100.0%
DC-10-30CF	CF6-50C	160,000	152,964	238,036	551,000	391,000	152,964	0	555,000	100.0%	99.3%
B-767-300	CF6-80A	72,000	88,248	189,752	350,000	278,000	88,248	0	350,000	100.0%	100.0%
B-757-200	RB211-535E-4B	67,000	47,060	136,940	255,000	188,000	47,060	0	255,000	100.0%	100.0%
DC-8-62F	JT3D-3B	110,600	91,440	138,560	340,600	230,000	91,440	0	350,000	100.0%	97.3%
DC-8-73F	CFM56-2	94,000	111,800	149,200	355,000	261,000	111,800	0	355,000	100.0%	100.0%
DC-9-41	JT8D-15	21,000	31,665	61,335	114,000	93,000	31,665	0	114,000	100.0%	100.0%
									Average	100.0%	99.5%

1. Runway lengths calculated based on specific aircraft manufacturers manuals for standard day temperature (15 degrees C) at 1009 elevation and adjusted for density altitude.
2. Mean daily high temperature of 65 degrees F and a pressure altitude of 1,009 feet yields a density altitude of approximately 1,900 feet.

TABLE 6
TAKEOFF DESTINATION AND DISTANCE

PASSENGER AIRCRAFT MARKETS		CARGO AIRCRAFT MARKETS	
City	Distance (nautical miles)	City	Distance (nautical miles)
Dallas	747	Toronto	306
St. Louis	294	St. Louis	294
Chicago	209	New Orleans	664
Cleveland	141	Boston	615
New York	480	Kansas City	487
Houston	807	Montreal	566
Cincinnati	56	Rochester	352
Atlanta	376	Baltimore	352
Orlando	703	Nashville	255
Detroit	144	Charlotte	322
Minneapolis	498	Sacramento	1,713
Washington	339	Atlanta	376
Charlotte	322	Chicago	209
Pittsburgh	186	Monterrey, MX	1,163
Philadelphia	413	Dallas	747
Milwaukee	247	Denver	940
Ft. Lauderdale	593	Los Angeles	1,668
		Brussels, Belgium	3,566
		El Paso	1,176
		Austin	879
		Brownsville	1,069
		Wichita	632
		Ft. Lauderdale	593
		Portland, OR	1,837
		Salt Lake City	1,345

TABLE 7
AIR CARRIER AIRCRAFT TAKEOFF REQUIREMENTS (9,500' RUNWAY)

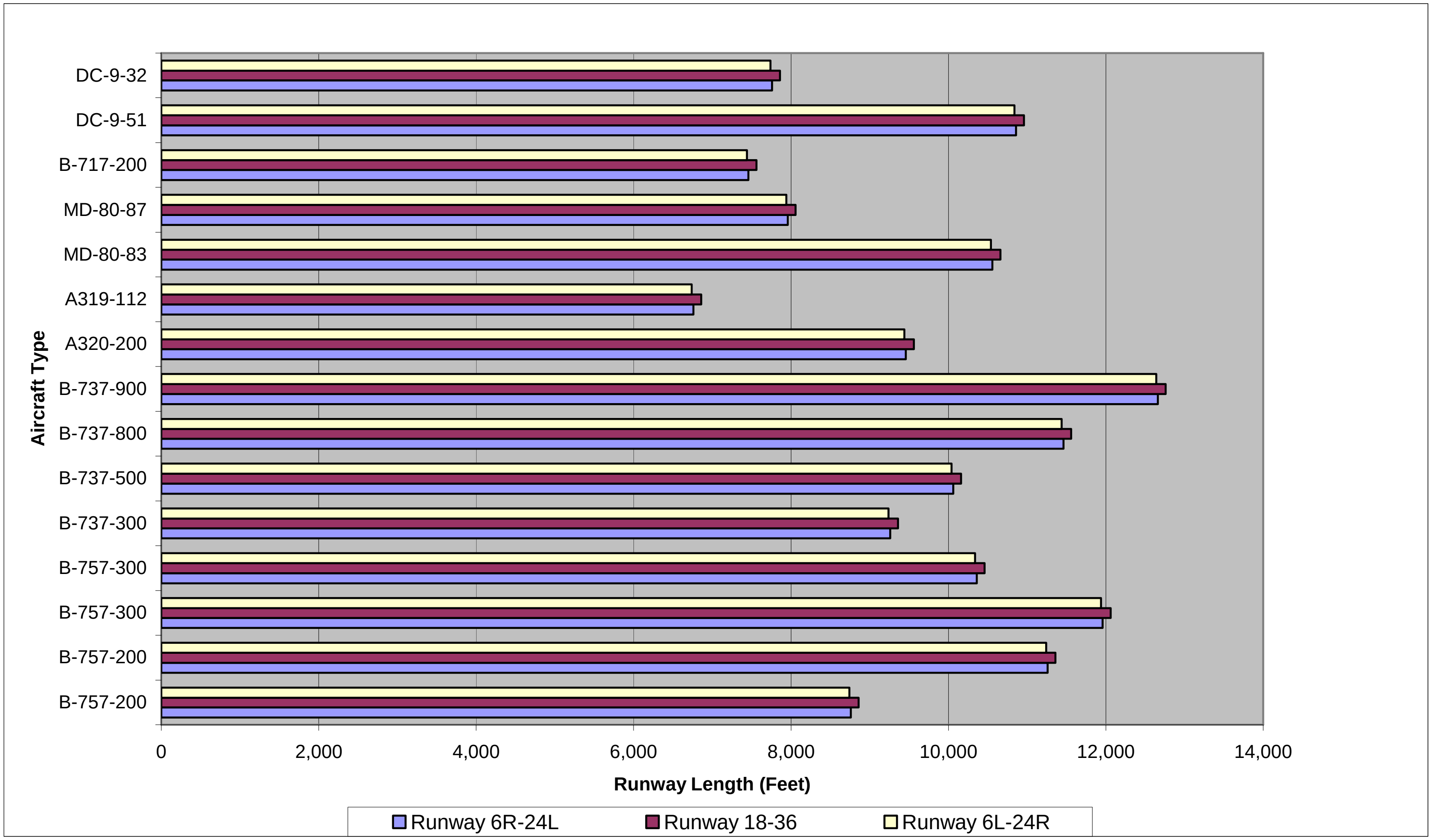
Air Carrier Aircraft	Engine Type	Takeoff Weights (lbs.) Fuel	Payload	OEW	Total	OEW Plus Payload (lbs.)	Max. Structural Payload (lbs.)	Loss in Payload (lbs.)	MTOW	Percent of Total Payload	Percent of MTOW
B-757-200	RB211-535E-4B	37,000	47,060	136,940	225,000	188,000	47,060	0	255,000	100.0%	88.2%
B-757-200	PW2037	58,000	53,125	130,875	246,000	188,000	53,125	0	255,000	100.0%	96.5%
B-757-300	PW2043	57,000	68,200	141,800	267,000	210,000	68,200	0	270,000	100.0%	98.9%
B-757-300	RB211-535E-4B	42,500	67,650	142,350	252,500	210,000	67,650	0	270,000	100.0%	93.5%
B-737-300	CFM56-3B2	26,500	33,960	72,540	133,000	106,500	33,960	0	139,500	100.0%	95.3%
B-737-500	CFM56-3B-1	26,500	33,470	69,030	129,000	102,500	33,470	0	133,500	100.0%	96.6%
B-737-800	CFM56-7B-24	26,700	47,000	91,300	165,000	138,300	47,000	0	174,200	100.0%	94.7%
B-737-900	CFM56-7B-24	27,000	35,420	94,580	157,000	130,000	45,720	10,300	174,200	77.5%	90.1%
A320-200	CFM56-5A1	36,374	44,028	89,350	169,754	133,380	44,028	0	169,754	100.0%	100.0%
A319-112	CFM56-5B6	15,434	37,116	86,476	141,096	125,662	37,116	0	141,096	100.0%	100.0%
MD-80-83	PW-JT8D-219	32,187	42,127	79,686	154,000	121,813	42,127	0	160,000	100.0%	96.3%
MD-80-87	PW-JT8D-217C	28,000	38,726	73,274	140,000	112,000	38,726	0	140,000	100.0%	100.0%
B-717-200	RR-BR715	18,000	26,170	69,830	114,000	96,000	26,170	0	114,000	100.0%	100.0%
DC-9-51	PW-JT8D-17	19,000	33,825	64,675	117,500	98,500	33,825	0	121,000	100.0%	97.1%
DC-9-32	PW-JT8D-9	24,645	11,000	56,855	92,500	67,855	30,145	19,145	108,000	36.5%	85.6%
									Average	94.3%	95.5%

1. Runway lengths calculated based on specific aircraft manufacturers manuals for standard day temperature (15 degrees C) at 1009 elevation and adjusted for density altitude.
2. Mean daily high temperature of 85 degrees F and a pressure altitude of 1,009 feet yields a density altitude of approximately 3,000 feet.

TABLE 8
CARGO AIRCRAFT TAKEOFF REQUIREMENTS (9,500' RUNWAY)

Cargo Aircraft	Engine Type	Takeoff Weights (lbs.) Fuel	Payload	OEW	Total	OEW Plus Payload (lbs.)	Max. Structural Payload (lbs.)	Loss in Payload (lbs.)	MTOW	Percent of Total Payload	Percent of MTOW
A300-B4/203	CF6-50C2	75,631	78,252	195,117	349,000	273,369	78,252	0	363,756	100.0%	95.9%
B-727-100C	JT8D-7	45,500	35,800	87,696	169,000	123,500	35,800	0	169,000	100.0%	100.0%
B-727-200F	JT8D-15	47,000	43,300	100,700	191,000	144,000	43,300	0	209,500	100.0%	91.2%
B-747-200C	JT9D-7Q	185,000	244,670	345,330	775,000	590,000	244,670	0	833,000	100.0%	93.0%
MD-11F	PW4460	108,700	202,733	248,567	560,000	451,300	202,733	0	602,500	100.0%	92.9%
DC-10-10CF	CF6-6D	88,500	119,556	215,444	423,500	335,000	119,556	0	440,000	100.0%	96.3%
DC-10-30CF	CF6-50C	115,400	152,964	238,036	506,400	391,000	152,964	0	555,000	100.0%	91.2%
B-767-300	CF6-80A	68,000	88,248	189,752	346,000	278,000	88,248	0	350,000	100.0%	98.9%
B-757-200	RB211-535E-4B	67,000	47,060	136,940	255,000	188,000	47,060	0	255,000	100.0%	100.0%
DC-8-62F	JT3D-3B	85,000	91,440	138,560	315,000	230,000	91,440	0	350,000	100.0%	90.0%
DC-8-73F	CFM56-2	69,000	111,800	149,200	330,000	261,000	111,800	0	355,000	100.0%	93.0%
DC-9-41	JT8D-15	21,000	31,665	61,335	114,000	93,000	31,665	0	114,000	100.0%	100.0%
									Average	100.0%	95.2%

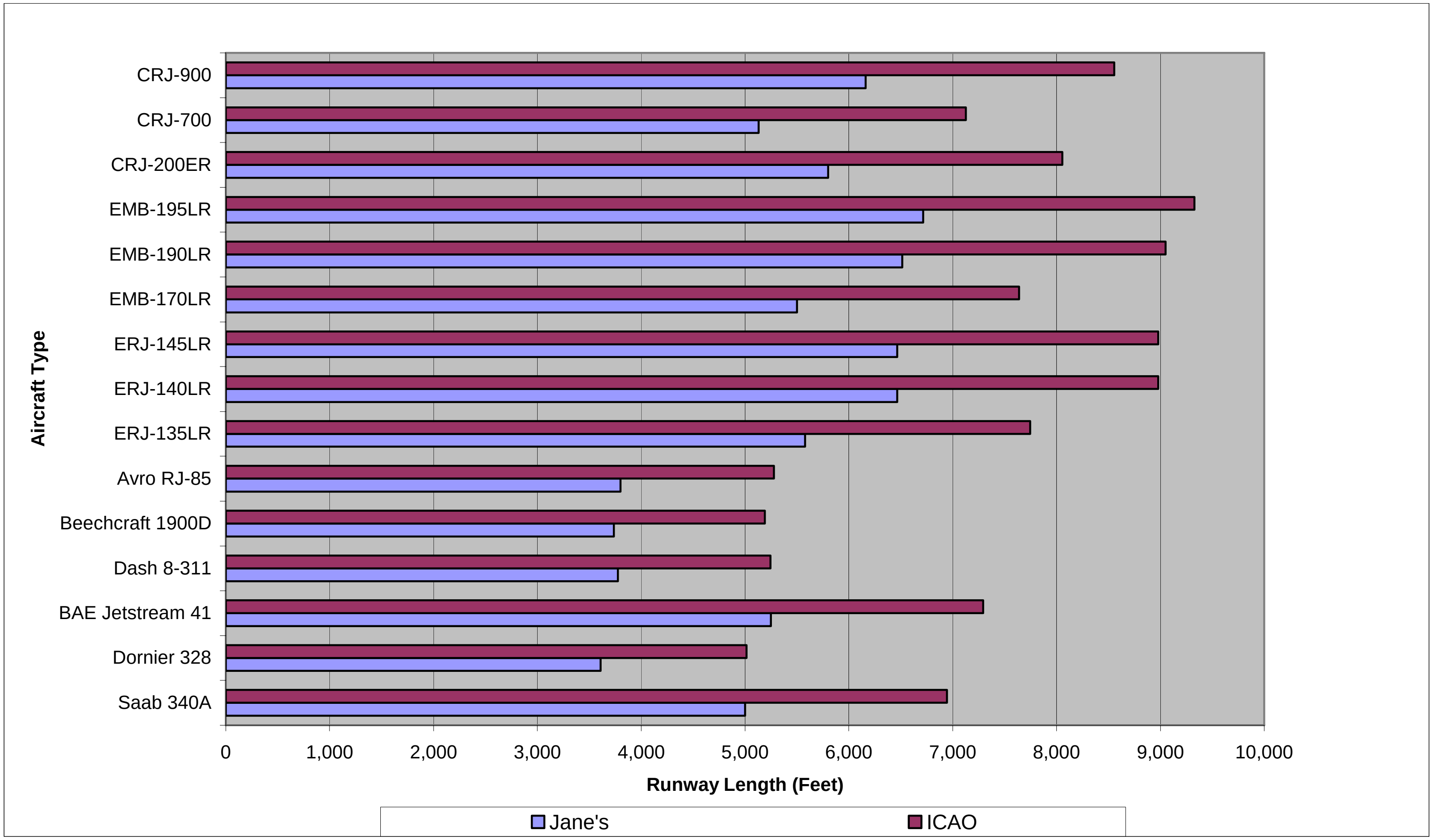
1. Runway lengths calculated based on specific aircraft manufacturers manuals for standard day temperature (15 degrees C) at 1009 elevation and adjusted for density altitude.
2. Mean daily high temperature of 65 degrees F and a pressure altitude of 1,009 feet yields a density altitude of approximately 1,900 feet.



Notes:
1. Mean daily high temperature of 85 degrees F and a pressure altitude of 1,009 feet yields a density altitude of approximately 3,000 feet.
2. Runway lengths calculated based on specific aircraft manufacturers manuals for standard day temperature (15 degrees C) and adjusted for density altitude.

Source: Aircraft Characteristic Manuals
H:\DAY\Runway Length\[Rwy 6R Length Analysis_12-04.xls]9,500' RW 01/27/05

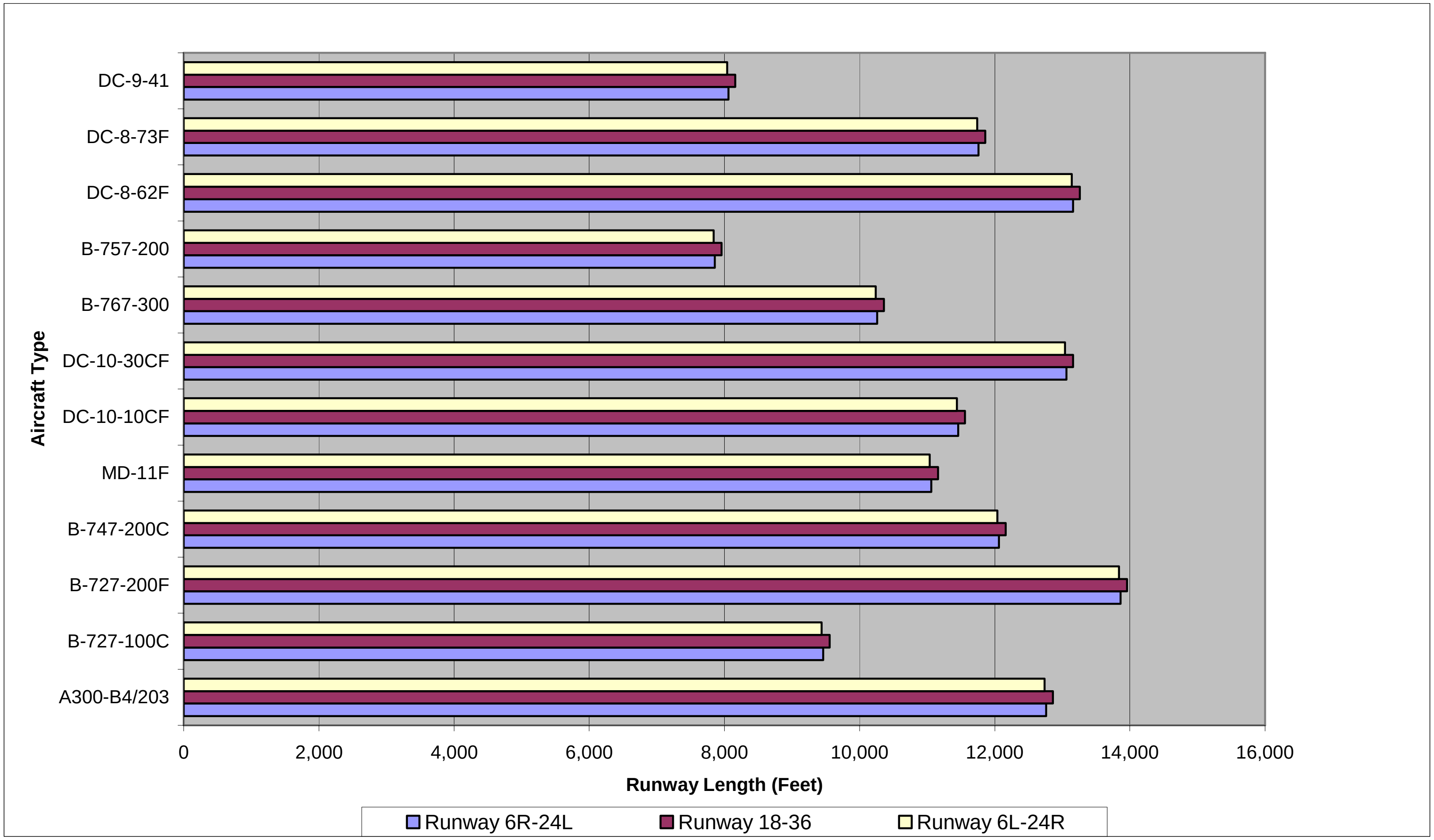
Dayton International Airport	**Runway Takeoff Length Requirements Air Carrier Aircraft - 100% MTOW**	**Exhibit 1**



Notes: 1. Mean daily high temperature of 85 degrees F and a pressure altitude of 1,009 feet yields a density altitude of approximately 3,000 feet.
2. Runway lengths calculated based on specific aircraft manufacturers manuals for standard day temperature (15 degrees C) and adjusted for density altitude.

Source: Aircraft Characteristic Manuals
H:\DAY\Runway Length\[Rwy 6R Length Analysis_12-04.xls]9,500' RW 01/27/05

Dayton International Airport	Runway Takeoff Length Requirements Commuter Aircraft - 100% MTOW	Exhibit 2



Notes: 1. Mean daily high temperature of 65 degrees F and a pressure altitude of 1,009 feet yields a density altitude of approximately 1,900 feet.
2. Runway lengths calculated based on specific aircraft manufacturers manuals for standard day temperature (15 degrees C) and adjusted for density altitude.

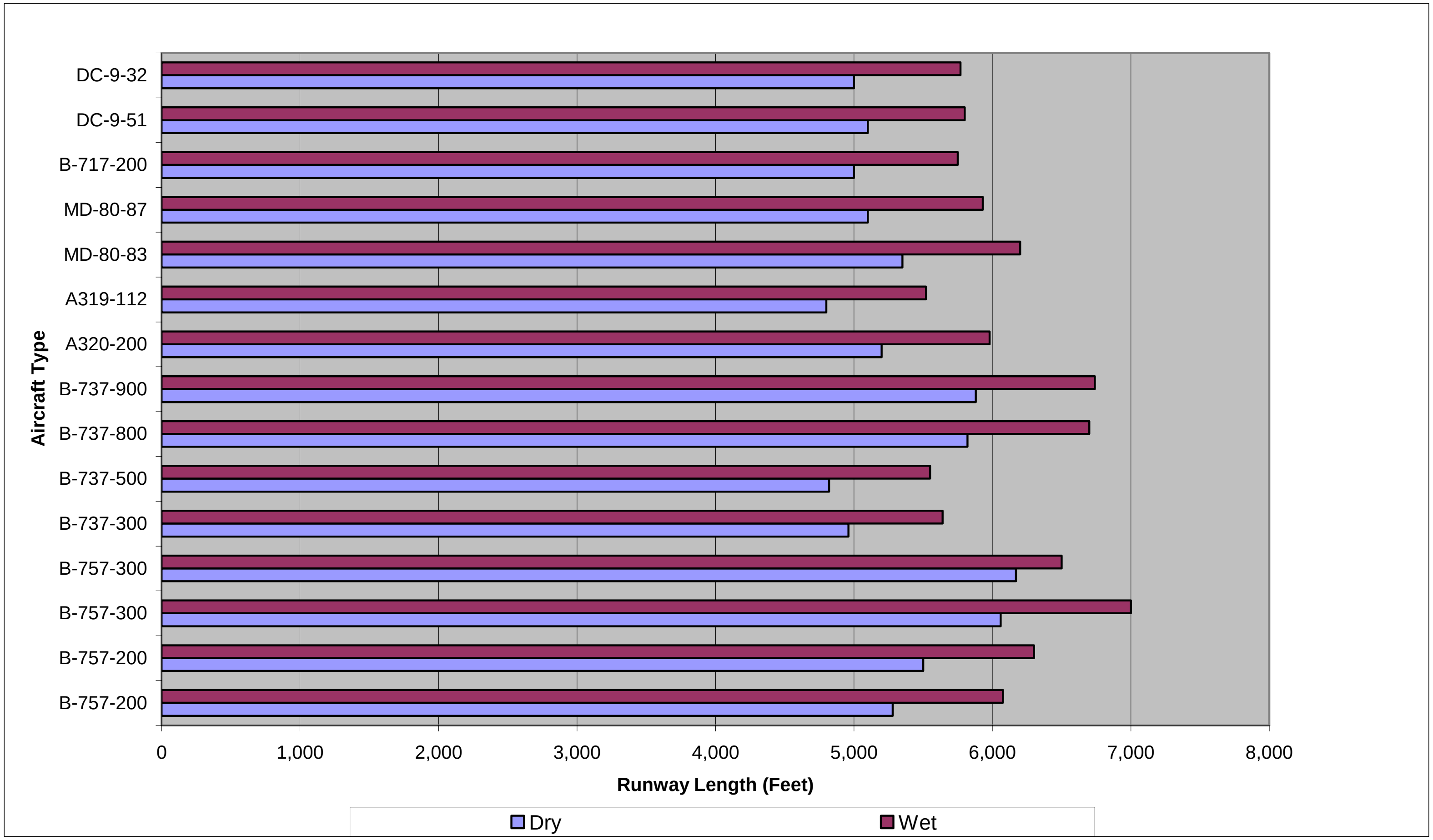
Source: Aircraft Characteristic Manuals
H:\DAY\Runway Length\[Rwy 6R Length Analysis_12-04.xls]Cargo T-O Graph 01/27/05

DAYTON INTERNATIONAL AIRPORT

Dayton
International Airport

Runway Takeoff Length Requirements
Cargo Aircraft - 100% MTOW

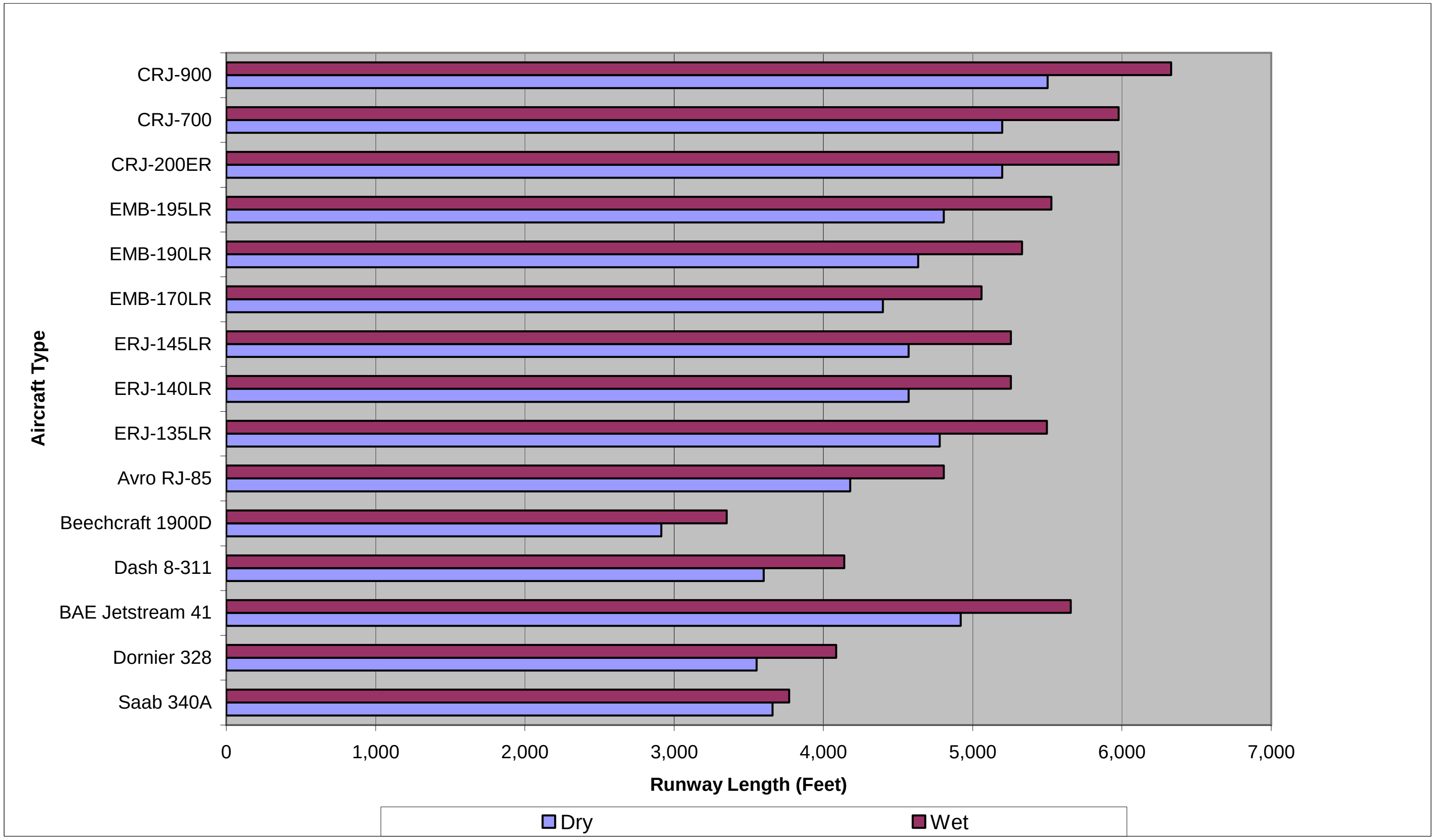
Exhibit
3



Notes: 1. Mean daily high temperature of 85 degrees F and a pressure altitude of 1,009 feet yields a density altitude of approximately 3,000 feet.
2. Runway lengths calculated based on specific aircraft manufacturers manuals for standard day temperature (15 degrees C) and adjusted for density altitude.

Source: Aircraft Characteristic Manuals
H:\DAY\Runway Length\[Rwy 6R Length Analysis_12-04.xls]Cargo T-O Graph 01/27/05

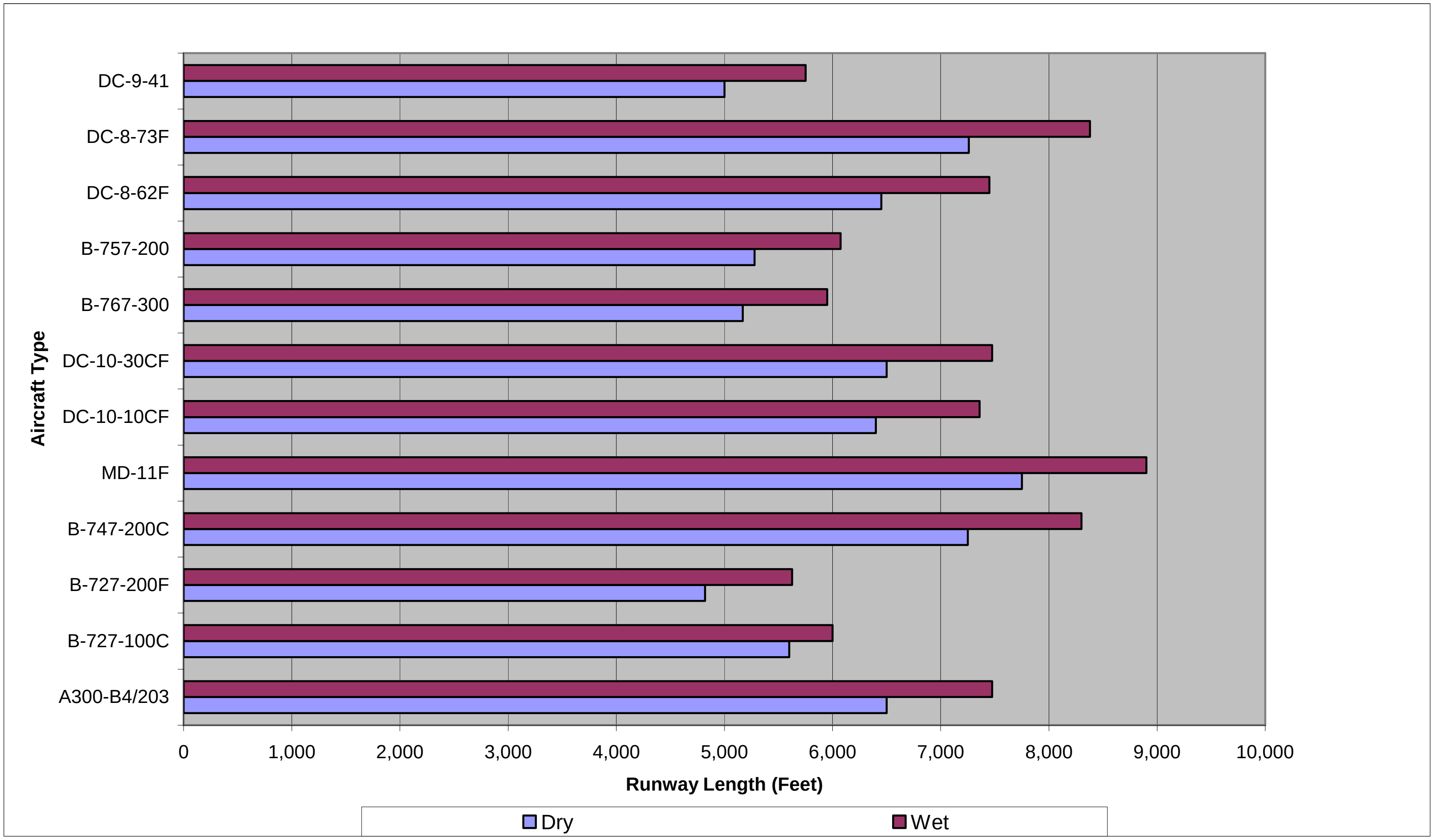
Dayton International Airport	**Runway Landing Length Requirements Air Carrier Aircraft**	**Exhibit 4**



Notes: 1. Mean daily high temperature of 85 degrees F and a pressure altitude of 1,009 feet yields a density altitude of approximately 3,000 feet.
2. Runway lengths calculated based on specific aircraft manufacturers manuals for standard day temperature (15 degrees C) and adjusted for density altitude.

Source: Aircraft Characteristic Manuals
H:\DAY\Runway Length\[Rwy 6R Length Analysis_12-04.xls]Cargo T-O Graph 01/27/05

Dayton International Airport	Runway Landing Length Requirements Commuter Aircraft	Exhibit 5



Notes: 1. Mean daily high temperature of 65 degrees F and a pressure altitude of 1,009 feet yields a density altitude of approximately 1,900 feet.
2. Runway lengths calculated based on specific aircraft manufacturers manuals for standard day temperature (15 degrees C) and adjusted for density altitude.

Source: Aircraft Characteristic Manuals
H:\DAY\Runway Length\[Rwy 6R Length Analysis_12-04.xls]Cargo T-O Graph 01/27/05

Dayton International Airport

Runway Landing Length Requirements Cargo Aircraft

Exhibit 6

APPENDIX A

EXHIBIT A-1
DENSITY ALTITUDE CALCULATOR FOR AIR CARRIER AIRCRAFT

Density altitude is defined as the altitude in the International Standard Atmosphere that has the same air density as the air being evaluated.

Density Altitude Calculator

Altitude	1009	feet
Air Temperature	85	degrees F
Altimeter Setting	29.92	inches Hg
Dew Point	50	degrees F

Reset

Density Altitude	3054	feet
Absolute Pressure	28.845	inches Hg
Relative Density	91.37	percent

EXHIBIT A-2
DENSITY ALTITUDE CALCULATOR FOR CARGO AIRCRAFT

Density altitude is defined as the altitude in the International Standard Atmosphere that has the same air density as the air being evaluated.

Density Altitude Calculator

Altitude	1009	feet
Air Temperature	65	degrees F
Altimeter Setting	29.92	inches Hg
Dew Point	60	degrees F

Reset

Density Altitude	1867	feet
Absolute Pressure	28.845	inches Hg
Relative Density	94.65	percent

ATTACHMENT E

Alternative Runway 6R-24L Extension Analysis

DAYTON INTERNATIONAL AIRPORT

ALTERNATIVE RUNWAY 6R-24L EXTENSION ANALYSIS

Draft
April 19, 2007

1. CURRENT PLANNING PARAMETERS

The Runway Safety Area (RSA) Study dated April 3, 2006 presented a series of viable alternatives for addressing the RSA deficiencies at each end of Runway 6R-24L. The results of this study concluded that Alternative 3F would provide the most feasible and cost effective means of rectifying the RSA deficiencies for Runway 6R-24L. This alternative provides a full RSA for both runway ends that are in compliance with current FAA standards, while staying within the current airport boundary. The Partial Airport Layout Plan (ALP) drawings dated December 15, 2006 were prepared specifically to reflect the 6R-24L Alternative 3F RSA project and were approved by the FAA on March 19, 2006 for immediate implementation. The following projects will be undertaken on each runway end:

Runway 6R

- Extend the 6R threshold 285 feet;
- Construct a new 25-foot wide airside service road approximately 10 feet offset and parallel with the existing airport security fence and U.S. 40;
- Relocate windsock and place on 3-inch frangible mount;
- Demolish previous ATA service road;
- Remove drainage swale and re-grade to FAA specifications; and
- Relocate natural gas pipeline and install at-grade markers.

Runway 24L

- Relocate windsock and place on 3-inch frangible mount.

The 24L threshold will remain in its current location and the use of declared distance criteria will be necessary in order to maintain the minimum of 7,000 feet for takeoff and landing operations. The use of declared distance criteria will product the following runway distances.

Runway 6R-24L Declared Distance Lengths

RUNWAY END	TORA (FT.)	TODA (FT.)	ASDA (FT.)	LDA (FT.)
6R	7,000	7,000	7,285	7,285
24L	7,000	7,000	7,285	7,285

TORA – Takeoff Run Available
TODA – Takeoff Distance Available
ASDA – Accelerate Stop Distance Available
LDA – Landing Distance Available

The above referenced runway geometry and length will be used as the bases for the ultimate Runway 6R-24L geometry analysis. In addition, the City of Vandalia has indicated that they intend to pursue commercial development of approximately 252 acres of land between Peters Pike and the Airport Access Road, just south of U.S. 40. These factors will be taken into consideration when analyzing the ultimate future geometry and length of Runway 6R-24L.

2. FUTURE PLANNING PARAMETERS

The current Ultimate Future Airport Layout Plan (ALP) dated March 16, 2007 proposes that Runway 6R be extended 2,615 feet to provide an ultimate Runway 6R-24L length of 9,900 feet. This proposed Runway 6R extension will result in the following projects and is shown on **Exhibit 3**:

- Runway 6R extension (2,615 feet) and Taxiway 'E' extension
- U.S. 40 tunnel (2,570 feet) under Runway 6R-24L
- Relocate Airport Access Road
- Relocate Terminal Drive
- New grade separated interchange at U.S. 40 and Airport Access Road
- Approximately 102 acres of land acquisition within the City of Vandalia
- New instrument landing system (ILS) on Runway 6R

However, due to the proposed City of Vandalia commercial development program, it will not be possible to construct the proposed Runway 6R extension as planned. This study will look at other runway extension alternatives that will achieve the desired results as proposed in the current Dayton Master Plan.

3. PROPOSED RUNWAY 6R EXTENSION ALTERNATIVE

Due to the proposed City of Vandalia commercial development area south of U.S. 40 it will not be possible to extend the Runway 6R threshold beyond its current location (threshold location based on the 6R-24L RSA Study dated April 3, 2006 and the Partial ALP drawings dated December 15, 2006. In order to upgrade the 6R approach to Category I capability and maintain adequate clearance over U.S. 40, the following modifications will be necessary:

- Displace the 6R threshold 260 feet;
- Install a glide slope, RVR, and MALSR approach light system;
- Future avigation easement areas;

- Impose height restrictions within the future FAR Part 77 surface areas;
- Relocate runway markings, lighting, and guidance signage; and
- Use of declared distance criteria.

Based on these proposed modifications, it should be possible to achieve full Category I approach capability for Runway 6R landings. This is all predicated on having no penetrations to the TERPS approach surfaces and Inner Approach OFZ surface. Additional analysis may be required to provide detailed information pertaining to the proposed ILS upgrade to Runway 6R. At this time, there are no other alternative extension recommendations for the Runway 6R end.

4. PROPOSED RUNWAY 24L EXTENSION ALTERNATIVES

Due to the anticipated inability to extend the Runway 6R threshold (2,615 feet) as proposed under the Master Plan Study, it will be necessary to look at the possibility of extending the Runway 24L threshold to the northeast to achieve the desired ultimate runway length. This study will present two possible runway extension alternatives for Runway 24L.

4.1 Runway 24L – Proposed 2,300' Extension

Based on a preliminary analysis, it appears that the maximum extension possible of the Runway 24L threshold is approximately 2,300 feet. This Runway 24L threshold extension length is similar to that proposed by Tipp City as shown on Exhibit B of their Draft Analysis of Proposed Runway Development for Dayton International Airport dated October 17, 2001.

This runway extension will result in a runway length of 9,585 feet and will cross over the existing North Dixie Drive. The following modifications will be required:

- Extend the 24L threshold 2,300 feet northeast;
- Extend Taxiway 'F' 2,300 feet northeast;
- Extend Taxiway 'H' 2,300 feet northeast;
- Relocate aircraft hold pad;
- Relocate railroad tracks;
- Relocate or tunnel North Dixie Drive;
- Relocate airside service road and security fence;
- Relocate existing MALSR approach light system, Runway Visual Range, Glide Slope, PAPI and Windsock facilities;
- Land acquisition of approximately 21 acres;
- Future avigation easement areas;
- Potential demolition of structures within the future Runway Protection Zone (RPZ) area;
- Impose height restrictions within the future FAR Part 77 surface areas;
- Relocate runway markings, lighting, and guidance signage;
- Relocate off airport utility lines (gas, water, telephone, electric, etc.); and

- Potential environmental remediation of the area within to the existing railroad track right-of-way and Delphi land parcel.

In combination with the Runway 6R proposed upgrades, the following landing and takeoff runway lengths will be available for this alternative:

Runway 6R-24L Declared Distance Lengths – 2,300' Extension

RUNWAY END	TORA (FT.)	TODA (FT.)	ASDA (FT.)	LDA (FT.)
6R	9,585	9,585	9,585	9,325
24L	9,300	9,300	9,585	9,585

TORA – Takeoff Run Available
TODA – Takeoff Distance Available
ASDA – Accelerate Stop Distance Available
LDA – Landing Distance Available

Based on a runway takeoff length of 9,500 feet, the current air carrier fleet will be able to operate with a maximum takeoff weight of no less than 90.1% (B-737-900).

4.2 Runway 24L – Proposed 1,215' Extension

A shorter extension of 1,215 feet for Runway 24L is proposed under this alternative. This runway extension will result in a runway length of 8,500 feet and will cross over the existing North Dixie Drive. The following modifications will be required:

- Extend the 24L threshold 1,216 feet northeast;
- Extend Taxiway 'F' 1,215 feet northeast;
- Extend Taxiway 'H' 1,215 feet northeast;
- Relocate aircraft hold pad;
- Relocate or tunnel North Dixie Drive;
- Relocate airside service road and security fence;
- Relocate existing MALSR approach light system, Runway Visual Range, Glide Slope, PAPI and Windsock facilities;
- Land acquisition of approximately 7 acres;
- Future avigation easement areas;
- Potential demolition of structures within the future Runway Protection Zone (RPZ) area;
- Impose height restrictions within the future FAR Part 77 surface areas;
- Relocate runway markings, lighting, and guidance signage;
- Relocate off airport utility lines (gas, water, telephone, electric, etc.); and
- Potential environmental remediation of the area within to the existing railroad track right-of-way and Delphi land parcel.

In combination with the Runway 6R proposed upgrades, the following landing and takeoff runway lengths will be available for this alternative:

Runway 6R-24L Declared Distance Lengths – 1,215' Extension

RUNWAY END	TORA (FT.)	TODA (FT.)	ASDA (FT.)	LDA (FT.)
6R	8,500	8,500	8,500	8,240
24L	8,215	8,215	8,500	8,500

TORA – Takeoff Run Available
TODA – Takeoff Distance Available
ASDA – Accelerate Stop Distance Available
LDA – Landing Distance Available

Based on a runway takeoff length of 8,500 feet, the current air carrier fleet will be able to operate with a maximum takeoff weight of no less than 86.7% (B-737-900).

5. CURRENT ULTIMATE ALP COMPARISON

The above proposed modifications to Runway 6R-24L are proposed as a means of achieving the ultimate runway length to meet future aircraft demand without imposing an impact on the proposed City of Vandalia commercial development plans. These usable runway distances will be less than those proposed on the current Ultimate ALP as shown below.

Runway 6R-24L Declared Distance Lengths –Ultimate ALP

RUNWAY END	TORA (FT.)	TODA (FT.)	ASDA (FT.)	LDA (FT.)
6R	9,615	9,615	9,900	9,900
24L	9,900	9,900	9,900	9,900

TORA – Takeoff Run Available
TODA – Takeoff Distance Available
ASDA – Accelerate Stop Distance Available
LDA – Landing Distance Available

H:\DAY\Airfield Geometry\Alt RW 6R-24L Extensions 4-19-07.doc

ATTACHMENT F

Aviation Activity Forecast Update

Aviation Activity Forecast Update
Dayton International Airport

Prepared by
Landrum & Brown

DRAFT
November 27, 2007

AVIATION ACTIVITY FORECAST UPDATE

The purpose of this document is to update the Dayton International Airport (DAY) aviation activity forecast that is being used to support the planning efforts in the Master Plan Update.

Passenger air traffic after September 11, 2001 rebounded much faster at DAY than the typical U.S. airport. Enplanements increased 6.1 percent in 2002, 14.3 percent in 2003, and 10.1 percent in 2004. In 2005, however, enplanements declined almost 16 percent at DAY due to Delta's implementation of its "SimpliFare" program which resulted in significant fare discounting at its Cincinnati hub (CVG). By 2006, much of the fare stimulus at CVG had abated and traffic returned to an upward trend at DAY, increasing 6.9 percent in 2006. Estimates for 2007 suggest that demand for air travel from DAY will continue to be relatively robust in the near term, with enplanements projected to increase 9.5 percent over 2006 levels.

The annual forecast enplaned passenger and aircraft operations activity levels in the draft 2007 Terminal Area Forecast (TAF) for years 2008 through 2025 have been adopted for this forecast. Values for 2026 and 2027 were extrapolated using the TAF growth rates from 2020 to 2025.

Table 1 presents the updated enplaned passenger forecast. The forecast 2007-2027 average annual growth rate of 1.4 percent is slightly less than half of the 1998 to 2007 growth rate of 3.0 percent. The average annual growth rate from 1998 to 2007 is relevant because in addition to locally-generated traffic, Dayton enjoys significant leakage from northern Cincinnati residents.

The forecast split between air carrier and regional airline enplanements reflects, particularly in the near term: (1) AirTran's new service to Las Vegas and increased frequency to Baltimore-Washington, and (2) Frontier's planned shift to an all air carrier A319 fleet at DAY.

Table 2 presents the assumptions on the average size of aircraft (seats per departure) that will be used by the passenger airlines and the average percentage of seats that will be filled (load factor). The average size of air carrier aircraft is expected to grow gradually as AirTran shifts to a higher percentage of B737-700 operations and legacy carriers replace ageing MD80 aircraft with somewhat higher seating capacity B737-800 aircraft. Regional airlines are expected to continue to shift to a higher percentage of 50-70 seat regional jet operations and either reduce or eliminate smaller regional jet and turboprop service over the forecast period. Air carrier load factors are expected to remain relatively high at DAY versus historical standards for both air carrier and commuter operators, reflecting the need for greater aircraft utilization mainly due to continued high oil prices.

Table 3 presents the updated aircraft operations forecast. The passenger aircraft operations are calculated based upon the forecast enplaned passengers and the assumed average seats per departure and load factor. Due to the increase in average passenger aircraft gauge and maintenance of the average load factor, passenger aircraft operations will increase at a slower rate than passenger enplanements.

In December 2004, UPS acquired Menlo Worldwide which operated an air cargo hub at DAY and subsequently decided to close the hub in June 2006. As a result, air cargo operations have declined significantly at DAY. The forecast of operations assumes that no air cargo operator will establish a significant hubbing presence at DAY over the forecast period, however the Airport is pursuing an aggressive marketing program with several domestic and international cargo carriers. The Airport is hopeful that by 2012, one or more carriers will operate 20 flights (10 arrivals and 10 departures) per day, during the nighttime hours. It is the DAY Airport's goal to have a minimum of five cargo operations by 2009, and increase this by five cargo operations per year through 2012.

Non-commercial operations (non-commercial air taxi, general aviation and military operations) are projected to grow at approximately 1.4 percent per year on average after 2007. Forecast annual total operations tie to the draft 2007 TAF at an average annual growth rate of 1.4 percent from 2007 to 20027.

Table 4 presents the forecast fleet mix for passenger aircraft. The air carrier fleet is projected to remain a narrow-body fleet. Older aircraft such as MD80s will be phased out and replaced by newer generation Boeing 737-800 equipment. The Boeing 717 has become and is expected to remain the dominant aircraft for air carrier airlines.

Today, the regional carrier fleet is dominated by 50-seat regional jets. Over the forecast horizon, the regional carriers are expected to phase out all of the turboprop aircraft in favor of regional jets ranging in size from 32 to 70 seats.

TABLE 1
ENPLANED PASSENGER FORECAST

	Year	Air Carrier	Regional	Total	Annual Change
Actual	1998	797,710	298,903	1,096,613	8.5%
	1999	811,985	314,178	1,126,163	2.7%
	2000	840,273	343,289	1,183,562	5.1%
	2001	712,192	371,769	1,083,961	-8.4%
	2002	625,922	524,495	1,150,417	6.1%
	2003	577,238	737,868	1,315,106	14.3%
	2004	627,518	820,423	1,447,941	10.1%
	2005	458,667	763,596	1,222,263	-15.6%
	2006	534,471	771,766	1,306,237	6.9%
Estimate	2007	631,000	799,000	1,430,000	9.5%
Forecast	2008	620,100	782,949	1,403,049	-1.9%
	2009	634,400	791,007	1,425,407	1.6%
	2010	649,000	799,178	1,448,178	1.6%
	2011	663,900	807,471	1,471,371	1.6%
	2012	679,200	815,793	1,494,993	1.6%
	2013	694,900	824,152	1,519,052	1.6%
	2014	711,000	832,559	1,543,559	1.6%
	2015	727,500	841,021	1,568,521	1.6%
	2016	744,300	849,647	1,593,947	1.6%
	2017	761,700	858,147	1,619,847	1.6%
	2018	779,400	866,831	1,646,231	1.6%
	2019	797,600	875,507	1,673,107	1.6%
	2020	816,200	884,287	1,700,487	1.6%
	2021	829,600	898,779	1,728,379	1.6%
	2022	843,300	913,494	1,756,794	1.6%
	2023	857,200	928,544	1,785,744	1.6%
	2024	871,300	943,937	1,815,237	1.7%
	2025	885,700	959,586	1,845,286	1.7%
	2026	900,300	975,393	1,875,693	1.6%
	2027	915,200	991,401	1,906,601	1.6%
Average Annual Growth Rates					
	1998-2007	-2.6%	11.5%	3.0%	
	2007-2012	1.5%	0.4%	0.9%	
	2012-2027	2.0%	1.3%	1.6%	
	2007-2027	1.9%	1.1%	1.4%	

TABLE 2
PASSENGER AIRCRAFT AND LOAD FACTOR ASSUMPTIONS

		Air Carrier		Regional	
	Year	Gauge	Load Factor	Gauge	Load Factor
	2003	131.4	79.9%	40.2	71.7%
	2004	132.9	72.8%	46.8	66.7%
	2005	127.3	65.9%	50.0	64.0%
	2006	125.3	76.5%	50.7	73.2%
Estimate	2007	125.7	78.2%	50.3	74.0%
Forecast	2012	128.4	78.0%	50.4	75.0%
	2017	129.0	78.0%	51.4	75.0%
	2027	130.4	78.0%	53.4	75.0%

Note: Gauge equals average seats per departure
Load factor equals average percentage of seats filled

TABLE 3
AIRCRAFT OPERATIONS FORECAST

		Passenger					Annual
	Year	**Air Carrier**	**Regional**	**Cargo**	**Other**	**Total**	**Change**
Actual	1998	24,148	31,398	42,540	53,393	151,479 \1	
	1999	24,239	30,330	38,987	58,448	152,004 \1	0.3%
	2000	25,540	33,466	35,118	51,277	145,401 \2	-4.3%
	2001	21,795	40,114	22,706	47,994	132,609 \2	-8.8%
	2002	16,210	42,108	16,078	50,821	125,217 \2	-5.6%
	2003	11,264	50,587	14,963	49,033	125,847 \2	0.5%
	2004	12,982	52,588	10,784	47,717	124,071 \2	-1.4%
	2005	10,944	47,710	9,028	53,414	121,096 \2	-2.4%
	2006	11,162	41,582	4,022	52,887	109,653 \2	-9.4%
Estimate	2007	12,836	42,871	600	50,837	107,144	-2.3%
Forecast	2008	12,400	42,400	600	53,685	109,085	1.8%
	2009	12,700	42,500	1,900	53,463	110,563	1.4%
	2010	13,000	42,600	3,200	53,267	112,067	1.4%
	2011	13,300	42,900	4,500	52,894	113,594	1.4%
	2012	13,600	43,200	5,800	52,545	115,145	1.4%
	2013	13,900	43,400	5,900	53,520	116,720	1.4%
	2014	14,200	43,700	6,000	54,422	118,322	1.4%
	2015	14,500	44,000	6,100	55,352	119,952	1.4%
	2016	14,800	44,300	6,200	56,306	121,606	1.4%
	2017	15,100	44,500	6,300	57,390	123,290	1.4%
	2018	15,500	44,800	6,400	58,304	125,004	1.4%
	2019	15,900	45,100	6,500	59,244	126,744	1.4%
	2020	16,200	45,300	6,600	60,413	128,513	1.4%
	2021	16,500	45,900	6,700	61,213	130,313	1.4%
	2022	16,700	46,500	6,800	62,142	132,142	1.4%
	2023	17,000	47,100	6,900	63,002	134,002	1.4%
	2024	17,200	47,700	7,000	63,994	135,894	1.4%
	2025	17,500	48,300	7,100	64,919	137,819	1.4%
	2026	17,700	48,900	7,200	65,960	139,760	1.4%
	2027	18,000	49,500	7,300	66,927	141,727	1.4%
Average Annual Growth Rates							
	1998-2007	-6.8%	3.5%	-37.7%	-0.5%	-3.8%	
	2007-2012	1.2%	0.2%	57.4%	0.7%	1.5%	
	2012-2027	1.9%	0.9%	1.5%	1.6%	1.4%	
	2007-2027	1.7%	0.7%	13.3%	1.4%	1.4%	

Notes

Other Operations includes military, non-commercial air taxi, and general aviation.

Forecast update November 9, 2007

\1 Total from FAA TAF

\2 Total from Airport records

TABLE 4
PASSENGER AIRCRAFT FLEET MIX

Air Carrier Aircraft	Seats	2005	2007	2012	2017	2027
738	146	0.0%	0.0%	5.0%	13.0%	26.0%
M80	140	40.7%	12.2%	11.5%	6.0%	0.0%
M88	142	0.0%	16.3%	13.0%	10.5%	0.0%
M83	140	1.2%	3.2%	1.0%	0.0%	0.0%
320	138	1.3%	0.7%	1.0%	1.0%	1.0%
73G	137	0.0%	4.4%	10.0%	12.5%	17.0%
319	128	0.6%	4.9%	15.0%	17.0%	19.0%
733	120	1.8%	3.8%	0.0%	0.0%	0.0%
318	118	0.0%	7.1%	2.0%	2.0%	2.0%
717	117	50.2%	44.6%	39.0%	38.0%	35.0%
735	110	4.3%	2.6%	2.5%	0.0%	0.0%
D9S	100	0.0%	0.2%	0.0%	0.0%	0.0%
Total		100.0%	100.0%	100.0%	100.0%	100.0%
Total Operations		10,944	12,836	13,600	15,100	18,000

Regional Aircraft	Seats	2005	2007	2012	2017	2027
146	100	1.2%	0.0%	0.0%	0.0%	0.0%
CR9	70	0.0%	0.7%	2.0%	3.2%	6.6%
CR7/E70	69	12.9%	13.1%	9.0%	11.0%	14.0%
CRJ/ERJ	50	66.3%	70.3%	72.0%	71.0%	67.0%
DH3	50	0.0%	0.0%	0.0%	0.0%	0.0%
ERD	44	4.2%	4.7%	6.0%	6.0%	5.5%
ER3	37	2.3%	2.8%	3.0%	3.0%	2.5%
SF3/DH8/DH2	34	10.7%	3.9%	3.0%	1.0%	0.0%
FRJ	32	0.0%	4.0%	5.0%	4.8%	4.4%
J41	27	0.0%	0.0%	0.0%	0.0%	0.0%
BE1	19	2.3%	0.5%	0.0%	0.0%	0.0%
Total		100.0%	100.0%	100.0%	100.0%	100.0%
Total Operations		47,710	42,871	43,200	44,500	49,500

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