Narrative Report

for

AIRPORT LAYOUT PLAN

for the

MARION MUNICIPAL AIRPORT

2017

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SECTION ONE - EXISTING CONDITIONS

The City of Marion selected Anderson Bogert to create the Marion Municipal Airport Layout Plan (ALP). The City received Iowa Department of Transportation (IDOT) Airport Improvement Program (AIP) funding to complete this project. The notice to proceed was issued on February 18, 2016.

On March 29, 2016, a Master Plan Development Stakeholders Meeting was held at the Marion Municipal Airport. The minutes from this meeting have been included in Appendix A, along with the attendee list.

The scope of this project includes: creating an ALP to meet the state minimum standards, along with the accompanying Narrative Report. A cursory review of improvements needed to meet FAA Standards will be made, and a discussion of these improvements will be included in the Narrative Report.

The ALP is a graphic representation of existing and future facilities at the airport. The Narrative Report provides supporting documentation and justification for future facilities shown on the ALP.

The importance of creating the ALP is demonstrated by the following requirement from the Iowa Department of Transportation Airport State Funding Application Checklist:

> *Please attach the following documents with your application...*
>
> *Verification that project is identified in a current ALP on file with the Office of Aviation (when applying for new construction of buildings or airfield expansion).*

This document presents the Narrative Report for the Marion, Iowa, Municipal Airport. It features information on current and projected activity levels at the airport, facility requirements, alternatives and recommendations, and an implementation plan.

The following is the general process utilized in developing the Narrative Report and Airport Layout Plan for Marion Municipal Airport.

- **Current and Projected Activity Levels –** Aeronautical demand is forecasted using historical and current information to project levels for short (1-5 years), intermediate (6-10 years), and long-range (11-25 years) timeframes.

- **Facility Requirements –** The capability of the existing airport to support the forecast demand is determined. Facilities required to meet the airport's ultimate needs are determined.
- **Implementation Plan –** A proposed plan for development is presented, which includes concepts and schedules for proposed development.

This Narrative Report is an assessment of the general aviation needs of the Marion and Linn County area. The goal of this Narrative Report is to determine how to best accommodate these needs in a responsible manner to the surrounding environment and the local citizens. The Narrative Report will provide analysis and recommendations from which local authorities may take action to continue improvement to the operation of the airport.

IOWA AVIATION SYSTEM PLAN

Airport System Stratification

According to the IDOT Office of Aviation, the state has eight commercial service and 101 general aviation airports that are publicly owned. An additional eight privately-owned airports are open for public use. The publicly owned airports are divided into a five-level system in the 2010-2030 Iowa Aviation System Plan, which can be viewed at http://www.iowadot.gov/aviation/studiesreports/systemplanreports.html These levels include commercial service airports (8), enhanced service airports (15), general service airports (31), basic service airports (19), and local service airports (44). The Marion Municipal Airport is currently considered a basic service airport. The current system plan does not include an individual report for Marion. The IDOT is tentatively looking at starting an update to the system plan in FY 2018. An individual report for Marion is expected to be generated with the update.

Specific criteria for the **Basic Service Airport** include:

- 3,000 feet or greater **paved** runway
- Availability of aircraft fuel
- Some availability of airport or FBO personnel or on-call availability 24 hours

The next step up is the **General Service Airport**, which has the following specific criteria:

- 4,000 foot or greater paved runway
- Availability of the following based services:

- o Aircraft maintenance and repair
- o Flight training
- o Rental aircraft
- o Aircraft charter
- o Staffing during regular business hours

After the General Service Airport category, the next step up is the **Enhanced Service Airport**, which has the following specific criteria:

- 5,000 foot or greater paved runway
- Airport Reference Code (ARC) of C-II or greater
- Full-time staffing during regular weekday and weekend business hours
- Availability of the following based services:
  - o Aircraft maintenance and repair
  - o Flight training o Rental aircraft
  - o Aircraft charter
  - o Airport or Fixed Base Operator (FBO) staffing 24 hours a day
  - o Availability of jet fuel
  - o Weather observing system located on airport (ASOS or AWOS)

Even though the Marion Municipal Airport is only considered a Basic Service Airport, it already meets many of the criteria of the General Service Category and even the Enhanced Service Category. Where Marion is severely lacking is with its runway. The existing runway is considered a turf runway; although, a 23' wide section in the middle is paved. The target runway for a Basic Service Airport, which is Marion's current classification, is paved with a 60' minimum width.

Refer to the following table for a comparison of facility development at the Marion Municipal Airport to other Basic Service Airports in Iowa.

Table 1

Iowa Basic Service Airports								
City	Runway		Width (ft)	Length (ft)	Edge Lights	Fuel	Based Aircraft	Opera-tions
Belle Plaine	18/36	PCC	75	4,000	MIRL	100LL	8	2,000
Bloomfield	18/36	PCC	75	3,401	MIRL	100LL	9	2,500
Chariton	10/28	PCC	75	4,000	MIRL	100LL	14	3,250
	17/35	*PCC*	*75*	*2,800*	*MIRL*			
Clarinda	02/20	PCC	75	5,000	MIRL	100LL	19	2,750
	13/31	*TURF*	*280*	*2,730*	*NONE*			
Emmetsburg	*04/22*	*TURF*	*120*	*2,545*	*NONE*	100LL	9	2,250
	13/31	PCC	60	3,401	MIRL			
	17/35	*TURF*	*150*	*2,170*	*NONE*			
Fort Madison	17/35	PCC	75	4,002	MIRL	100LL	7	2,250
Greenfield	07/25	PCC	60	3,400	MIRL	100LL	22	4,998
	14/32	PCC	50	2,500	MIRL	100LL		
Jefferson	14/32	PCC	75	3,200	MIRL	100LL	17	5,750
	18/36	*TURF*	*150*	*1,696*	*NONE*			
Manchester	18/36	ACC	50	3,465	LIRL	100LL	11	1,100
Marion	***17/35***	***ACC***	***23***	***3,775***	***NSTD***	***100LL***	**42**	**10,920**
						Jet A		
Pocahontas	12/30	ACC	60	4,100	MIRL		17	4,500
	18/36	*TURF*	*135*	*1,998*	*NONE*			
Rock Rapids	16/34	ACC	50	3,097	MIRL	100LL	14	3,500
Sac City	14/32	PCC	60	2,330	MIRL	100LL	10	2,500
Shenandoah	04/22	PCC	75	5,000	MIRL	100LL	14	3,500
						Jet A		
Sibley	17/35	PCC	50	3,000	MIRL	100LL	11	2,750
Sioux Center	18/36	PCC	50	3,802	NSTD	100LL	14	6,810
						Jet A		
West Union	17/35	PCC	60	4,248	MIRL		9	1,250
Winterset	14/32	ACC	50	3,000	MIRL	100LL	31	4,750

The primary goal of the system plan is to provide a framework that supports informed decisions related to planning and developing the Iowa aviation system. This framework consists of the following five goals: development, economic support, safety and security, accessibility, and education. In comparing the existing airport facilities to the system objective, the plan recommends two actions to meet the objectives, which included extending the turnarounds and adding three tee hangar units. In reviewing the general goal performance measure & benchmark summary in the system plan, the following action items can be identified for the Marion Municipal Airport: aircraft storage objective – 100% of based aircraft (development goal), airport included in a local comprehensive plan or surrounding land use controls/zoning (development goal), and minimum 50' wide paved runway. Other objectives to be checked include: is the aircraft apron sized to handle 50% of the daily transient aircraft and is the auto parking area sized to handle 75% of the based aircraft?

NATIONAL PLAN OF INTEGRATED AIRPORT SYSTEMS

The Marion Municipal Airport is a General Aviation Airport that is currently not a part of the National Plan of Integrated Airport Systems (NPIAS), due to its close proximity to the Eastern Iowa Airport in Cedar Rapids; therefore, the Marion Municipal Airport is currently not eligible to receive federal funding for improvements. The NPIAS is a Federal Aviation Administration (FAA) report to the United States Congress which reviews and considers recommendations on the status of the national airport system. It identifies the needs of the system to meet future demands and also identifies the role of each airport. The NPIAS also provides an estimated cost of maintenance to assure the airports will continue their role in the success of the national system.

The plan identifies more than 3,300 existing airports that are significant to the national air transportation system. The NPIAS includes a section on the condition and performance of the airport's system, highlighting six topics: safety, capacity, pavement condition, financial performance, accessibility, and noise. The findings are generally favorable, indicating that the system is safe, convenient, well maintained, and largely supported by rents, fees, and taxes paid by users.

According to NPIAS, general aviation airports are intended to accommodate the moderate sized aircraft in the aviation fleet. These aircraft have approach speeds of up to 121 knots and wingspans of up to 78 feet. These types of aircraft are being used in increasing numbers to service the growing market of personal and business use.

The entire NPIAS report can be viewed at
http://www.faa.gov/airports_airtraffic/airports/planning_capacity/npias/reports/

AIRPORT SIGNIFICANCE

The function of the Marion Municipal Airport is to work in tandem with the Eastern Iowa Airport to serve the general aviation needs of the Marion and Linn County area. General aviation includes every type of civil flying activity, but excludes certified air carriers. It is the largest and possibly the most significant element of the air transportation system in the United States today. General aviation aircraft constitute 97 percent of all civil aircraft in use, and general aviation airports comprise approximately 90 percent of all public-use airports nationwide. General aviation is a major contributor to the national air transportation system, the aviation industry, and our national economy.

General aviation activity provides a variety of aviation services that commercial aviation is unable to accommodate. This is a possible reason why industries in the United States have relocated to smaller communities away from larger metropolitan areas. It is not the only factor, but a community's airport can be a principle consideration when potential industries evaluate a possible site location. Larger and more sophisticated aircraft are becoming popular with businesses and corporations. Smaller communities, such as Marion, need to provide the airport facilities to accommodate these aircraft and increase the economic attractiveness of their community.

AIRPORT SETTING

This section of the Marion Municipal Airport Master Plan will give a feeling for the airport itself. It will cover such topics as the location of the airport, the airport's history, and the local climate.

Location

The Marion Municipal Airport is a single runway airfield which is just inside the easterly city limits and is located approximately three miles from downtown Marion. Access to the airport is provided from Marion Airport Road via Highway 151.

Airport History

The Marion Airport partnered with the City of Marion for more than 50 years to provide a privately owned, public use airport. The Marion Airport opened in 1963 and operated as Air Land. In 1986, Perry and Jan Walton purchased the Marion Airport. They worked to improve the Airport by improving the runway to a paved surface, lengthening the runway, and adding additional hangars to service the growing airplane base.

In the spring of 2015, the Marion Airport transferred into a hybrid public-private ownership to ensure that the Airport continues to meet the needs of Marion. With the new joint ownership, the Marion Airport became the Marion Municipal Airport. The City of Marion oversees the administration of the airport. The City also plans on purchasing more land in the vicinity of the airport for further

improvements, such as a taxiway and another runway. The operations and maintenance of the facility is being contracted with a private company that will continue to maintain flight training, aircraft maintenance, private hangar rentals/sales, fuel sales, and other supporting services that ensure the airport remains operational.

Climate

Local weather conditions have a significant role in the planning and development of an airport. Temperature, wind direction, and speed are influential components in deciding runway length and optimum runway orientation.

Marion has a temperate climate with a long-term mean annual precipitation of about 37.6 inches and an average snowfall of 32.0 inches. Average temperatures range from a low of 13 degrees during the winter to a high of 85 degrees during the summer. It is important in airport planning to note the mean daily maximum temperature of the hottest month for Marion is 85°F. This information will help determine the optimal runway length in the Section Three, Facility Requirements.

Soils

According to the Soil Conservation Service "Soil Survey of Linn County", the soils at the airport consist primarily of Klinger silty clay loam, Franklin silt loam, and Dinsdale silty clay loam.

The following information comes from the soil survey:

Klinger Silty Clay Loam:

- Topsoil good/high in organic matter
- Not suitable as a source of sand or gravel
- Moderate to high shrink swell potential
- Fair bearing capacity
- Good workability
- Easily compacted to high density
- Low compressibility
- Seasonal high water table

Franklin Silt Loam:

- Topsoil fair with thin layer of organic matter
- Not suitable as a source of sand or gravel
- Moderate to high shrink swell potential
- High susceptibility to frost heave
- Fair bearing capacity
- Good workability and compaction

- Narrow range of optimum moisture for satisfactory compaction
- Seasonal high water table

Dinsdale Silty Clay Loam:
- Topsoil good/high in organic matter
- Not suitable as a source of sand or gravel
- High frost-heave potential
- Good bearing capacity
- Good workability and compaction
- Low compressibility

Local Ordinances
The following requirement appeared on the airport state funding application for the first time for the FY 2013 application: Beginning in FY 2014, airport sponsors must document that the airport is protected by an airport zoning ordinance, in order to receive state funding. Grants are available to assist sponsors in developing or updating current airport zoning ordinances.

In addition to the grant to create an ALP and this report, the City received a grant to update their zoning ordinance and comprehensive plan in regards to the airport. Work on the Zoning Ordinance and Comprehensive Plan is scheduled to begin in conjunction with the final phases of the ALP and is expected to be substantially complete in 2017.

This ALP update marks the first step in airport zoning. The ALP depicts the land the airport should own in fee, as well as land for which easements may be necessary. The airspace drawings show obstructions to navigation and indicate areas that may need to be regulated, in order to prevent or remove such obstructions. The Part 77 imaginary surfaces should be protected through height limitations on development both on and around the airport and especially in the approach areas and departure areas of the runways. The IDOT has the following information on their website concerning compatible land use near airports: Iowa Airport Land Use Guidebook, Recommended Airport Land Use Zones poster, and the Airports and Communities Brochure at the following link: http://www.iowadot.gov/aviation/studiesreports/compatibleland.html.

Neighboring Airports
Area publicly-owned general aviation airports are located in the following cities:

- Cedar Rapids
- Independence
- Manchester
- Monticello
- Tipton
- Vinton

The extent of facility development at each of the publicly-owned airports is summarized below:

Table 2
Facility Development at Neighboring Airports

Eastern Iowa Airport - Cedar Rapids (Commercial Service)

RWY	SURFACE	WIDTH	LENGTH	RWY LGTS	FUEL	BASED AIRCRAFT	OPERATIONS
09/27	ACC-PCC	150	8600	HIRL	100LL	125	49,909
13/31	ACC-PCC	150	6200	MIRL	JET A		

Independence Municipal

RWY	SURFACE	WIDTH	LENGTH	RWY LGTS	FUEL	BASED AIRCRAFT	OPERATIONS
18/36	PCC	100	5500	MIRL	100LL JET A	32	9,100

Manchester Municipal

RWY	SURFACE	WIDTH	LENGTH	RWY LGTS	FUEL	BASED AIRCRAFT	OPERATIONS
18/36	ACC	50	3465	LIRL	100LL	11	1,100

Marion Municipal

RWY	SURFACE	WIDTH	LENGTH	RWY LGTS	**FUEL**	**BASED AIRCRAFT**	**OPERATIONS**
17/35	**ACC-TURF**	**23 (ACC)**	**3775**	**NSTD**	**100 LL JET A**	**42**	**10,290**

Mathews Memorial - Tipton

RWY	SURFACE	WIDTH	LENGTH	RWY LGTS	FUEL	BASED AIRCRAFT	OPERATIONS
11/29	PCC	60	3000	MIRL	100LL	16	2,000

Monticello Municipal

RWY	SURFACE	WIDTH	LENGTH	RWY LGTS	FUEL	BASED AIRCRAFT	OPERATIONS
09/27	TURF	90	2316	NONE	100LL	32	10,850
15/33	PCC	75	4400	MIRL	JETA		

Vinton Veterans Memorial Airpark

RWY	SURFACE	WIDTH	LENGTH	RWY LGTS	FUEL	BASED AIRCRAFT	OPERATIONS
09/27	PCC	60	4000	MIRL	100LL	21	4,750
16/34	ACC	50	2500	NONE	JETA		

SOCIOECONOMIC CHARACTERISTICS

There are many factors that can be evaluated to give an indication of future demands on an airport facility. Past aviation trends can sometimes be extrapolated to indicate future activity. Trends in demographics such as population and economic factors can be important indicators. As the population and/or economy grow, so does aviation activity. Conversely, as the population and/or economy decline, aviation activity decreases. The perceptions and expectations of the airport users can also provide important insight into the future of the airport.

Since so many factors play a part in the direction future demand may take, it must be remembered a forecast is still only a general prediction of what can be anticipated to occur. For this reason, long-range planning must incorporate some flexibility to respond to actual activity.

Population

Historic census records show a total population of approximately 2,000 citizens in 1860. This number has since grown to a total number of 34,770 citizens in 2010. For historical purposes, Marion's only population dip in a census year occurred between 1910 to 1920, with the population going from 4,400 to 4,138 (-262). The population shift was likely caused by several events both locally and worldwide including the moving of the County Seat to Cedar Rapids, World War I, and the Flu Epidemic of 1917. Additional Marion population benchmarks in a Census year include a population of 5,000 or greater in 1950, 10,000 or greater in 1960, 20,000 or greater in 1990, and 30,000 or greater in 2010. Marion will likely reach a 40,000 or greater population prior to the 2020 U.S. Census.

In the last 30 years, the Linn County population has also seen growth, similar to the City of Marion. Projections of county growth by Woods and Poole Economics, Inc. anticipate continued growth in total county population over the next 20 years.

The Cedar Rapids, IA Metropolitan Statistical Area (defined as Linn, Benton, and Jones Counties) has also exhibited an increasing population trend over the last 30 years. Woods and Poole Economics, Inc. projects the population of the statistical area to continue this trend.

Historic State of Iowa population trends have had slightly erratic trends. However, population projections for the State of Iowa by Woods and Poole Economics, Inc. anticipate a steady growth trend between 2015 and 2050.

Table 3 shows historic and projected population figures for Marion, Linn County, Cedar Rapids, IA (MSA), and the State of Iowa.

Table 3

POPULATION				
Year	**Marion**	**Linn County**	**Cedar Rapids, IA (Metropolitan Statistical Area)***	**State of Iowa**
1970	18,030	163,510	206,270	2,830,460
1975		167,050	209,880	2,880,690
1980	19,480	169,740	213,790	2,915,500
1985		164,840	207,000	2,829,750
1990	20,400	169,300	211,200	2,781,020
1995	22,820	181,870	226,360	2,867,370
2000	26,290	192,370	237,950	2,929,070
2005	30,410	200,400	247,270	2,964,450
2010	34,770	211,620	258,360	3,050,310
2015		219,070	265,620	3,113,030
2020	40,000	227,430	274,770	3,182,090
2025		235,930	284,030	3,251,440
2030		244,330	293,110	3,317,710
2035		252,040	301,330	3,373,430
2040		258,850	308,430	3,416,170
2045		264,910	314,620	3,448,610
2050		270,490	320,210	3,474,650

Table 3 Source: U.S. Census, Woods and Poole Economics, Inc.
**** Cedar Rapids, IA (Metropolitan Statistical Area) Includes Linn, Benton, and Jones Counties***

Employment

Employment levels correlate well with aviation activity. In particular, with services industries and manufacturing sector employment.

Historic total employment for Linn County, Cedar Rapids, IA (MSA), and the State of Iowa have all established positive trends. The average annual rates of growth of employment projected by Woods and Poole Economics for the 2015 – 2050 time frame are as follows:

Linn County	0.99%
Cedar Rapids, IA (MSA)	0.93%
State of Iowa	0.84%

According to the Cedar Rapids Metro Economic Alliance 2015 Demographics and Economy Report, some of the largest for-profit non-government employers in Marion, Linn County, and the Cedar Rapids MSA include:

Company Name	Product or Service	No. of Employees
Rockwell Collins	Aviation Communications	8,700
Transamerica	Insurance/Financial	3,800
UnityPoint Health	Healthcare	2,979
Nordstrom Direct	Logistics/Distribution	2,150
Quaker	Food Processing	920
General Mills	Food Processing	650
Toyota Financial	Insurance/Financial	600
Ruffalo	Information Services	575
CRST	Logistics/Distribution	564
GE Capital	Insurance/Financial	563
United Fire Group	Insurance/Financial	514
ADM	Bio-processing/Food Ingredient	471

To see the entire list of Largest Employers, go to https://www.cedarrapids.org/application/files/7214/7135/1841/Demographics_and_Economic_Report_2015_New.pdf

Area businesses with potential airport needs include Rockwell Collins, Michels, Limolink, Northway Well and Pump, and Wright-Way Trailers.

Service employment levels in Linn County are predicted to increase 52% from year 2015 to year 2050. As a point of reference, total employment is expected to increase 41% over that same period.

Table 4 shows historic and projected total, service, and manufacturing employment for Linn County, Cedar Rapids, IA (MSA), and the State of Iowa.

Table 4

	TOTAL EMPLOYMENT			SERVICE EMPLOYMENT			MANUFACTURING EMPLOYMENT		
Year	Linn County	Cedar Rapids, IA (MSA)	State of Iowa	Linn County	Cedar Rapids, IA (MSA)	State of Iowa	Linn County	Cedar Rapids, IA (MSA)	State of Iowa
1970	80,280	96,650	1,294,610	11,140	12,960	176,240	23,960	24,920	212,560
1975	88,280	105,550	1,406,940	13,170	14,990	198,030	24,850	26,360	224,190
1980	101,450	119,630	1,536,810	16,240	18,320	235,180	26,790	28,530	239,100
1985	98,200	115,480	1,495,070	18,600	20,900	259,790	20,340	21,550	199,700
1990	113,360	131,540	1,635,010	24,170	26,730	301,310	20,870	22,490	231,580
1995	128,020	146,630	1,784,920	29,670	32,530	344,310	20,110	22,000	245,570
2000	144,270	164,720	1,913,430	34,300	37,590	387,320	21,400	23,590	255,680
2005	143,180	164,080	1,934,810	34,350	37,850	414,490	18,710	20,730	243,910
2010	150,460	171,150	1,946,540	35,920	39,430	425,730	19,240	20,820	206,670
2015	159,000	180,500	2,072,770	37,990	41,650	458,550	19,040	20,730	222,700
2020	169,650	191,970	2,198,610	40,830	44,710	491,260	19,220	20,890	226,420
2025	179,960	202,970	2,317,080	43,760	47,860	524,940	19,300	20,940	229,020
2030	189,630	213,180	2,423,470	46,660	50,970	557,870	19,100	20,690	228,440
2035	198,610	222,580	2,517,550	49,410	53,920	588,670	18,750	20,270	225,990
2040	207,180	231,490	2,603,350	52,150	56,840	619,190	18,320	19,780	222,650
2045	215,510	240,090	2,683,660	54,910	59,780	649,960	17,830	19,220	218,560
2050	223,630	248,450	2,759,410	57,650	62,680	680,230	27,300	18,620	213,970

Table 4 Source: Woods and Poole Economics, Inc.

SUMMARY

The information discussed in Section One establishes the foundation for this plan upon which the remaining components of the airport planning processes will be developed. Information on the basic existing conditions of the airport and local community affect the use of the airport and are important when projecting future activity and facility requirements. Notably, population and service employment trends will be used to project the future activity and facility requirements.

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SECTION TWO - CURRENT AND PROJECTED AVIATION ACTIVITY

This section reviews the past and current aviation activity and develops forecasts which define future air transportation demands for the Marion Municipal Airport. These forecasts will be the foundation for identifying the facility requirements to meet the aviation needs of Marion and the surrounding area.

This section will examine local and regional aviation trends. It is the analysis of these trends and other important influences that will form the underlying decision in the development of forecast models.

FORECASTING APPROACH

Information at both the local and regional levels is needed for the understanding of historical aviation trends and the forecasting of facility requirements demands. Aviation demand forecasts are developed by combining these past trends in aviation activity, the aviation industry, and the local perception of the airport and its activity. Past trends include information on based aircraft, recorded operations, and operational mix. Analyzing these trends is the initial process of developing aviation demand forecasts.

The second process of demand forecasting is to project the trends into the future using various techniques and assumptions. These projections will form a range of tendencies in which the actual growth should be identified. These tendencies may be altered by possible changes in employment, aviation, and/or new construction in the region and around the airport. Employment opportunities, especially service industries and manufacturing, can have a large impact on aviation activity. The expansion or removal of an industry can essentially shift the level and nature of aviation demand in a community, like Marion. New legislation and advances in aviation technology can also alter these aviation trends.

Aviation forecasts should only be used as general indication of future demand. There are many factors that may have a tendency to be altered; any one can change aviation trends. Variations in the demand forecast should be expected, anticipated, and airport decisions need to have some flexibility in order to respond to actual activity and changes in aviation.

DESIGNATING A FORECAST MODEL

Selecting the appropriate forecast model is possibly the most important factor in determining future aviation activity. Trends such as population, employment, based aircraft, aircraft operations, and airport user beliefs need to be analyzed. Forecast models can then be compared and contracted and a suitable methodology and technique can be chosen.

A trend line projection model has been selected for Marion Municipal Airport based on the information available. This model is possibly the simplest and most familiar technique used in airport planning and also has very reliable predictions when compared to the other types of projections. Trend line projections utilize historic trends to develop growth curves and extend them into the future. This technique does not take into account any unforeseen exterior influences; rather, this technique makes projection based solely on past trends.

AIR TRAFFIC ACTIVITY

Air traffic activity is an important factor in determining the appropriate types of facilities which should be planned for the Marion Municipal Airport. These factors include based aircraft, aircraft operations, and information on the current and projected use of the airport.

Based Aircraft

The based aircraft information and aircraft mix dating back to 1980 for the Marion Municipal Airport was obtained from the Marion Municipal Airport; this data is represented in Table 5.

Table 5

BASED AIRCRAFT			
Year	**Total**	**Single**	**Multi**
1980	10		
1993	36		
1999	48		
2001	51		
2008	61		
2012	51		
2013	42	38	4
2015	40	35	5

Table 5 Source: Marion Municipal Airport

There are currently 40 based aircraft at Marion Municipal Airport. This consists of 35-single engine aircraft and five multi-engine aircraft. Table 6 exhibits information about these based aircraft:

Table 6

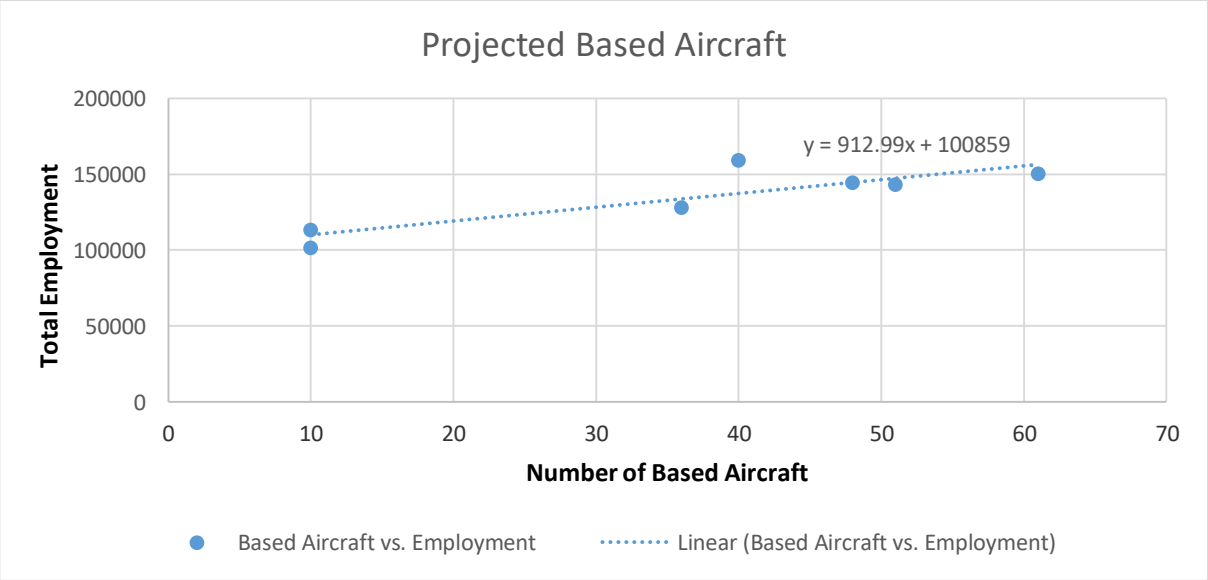
Aircraft	Owner	N-Number
1940 Taylorcraft BC-65	Carson, Carl E.	N29624
1960 Piper PA-23-250	Red Sky Aviation, LLC	N113JB
1963 Cessna 150D	Midland Motor Car Co Inc	N4149U
1965 Piper PA-28-180	Metternich, Gregory D	N8138W
1965 Piper PA-28-235	Wilson, Roger G	N9090W
1965 Cessna 310	Karns, Meredith	N6919L

Table 6 (continued)

Aircraft	Owner	N-Number
1966 Cessna 150G	P & N Corporation	N3824J
1966 Beech 95-C55	Craft, Charles Edward	N65AC
1967 Cessna 177	Lammers, Peter G.	N3181T
1967 Piper PA-28-180	Naaktgeboren, Joyce M	N9763J
1968 Champion 7ECA	Lammers, Peter G.	N1866G
1968 Cessna 177	Rieck, Ken	N29411
1968 Cessna 172L	P & N Corporation	N35714
1968 Piper PA-28R-180	Walton, Janice	N4921J
1968 Piper Apache	Beard, Michael	N1306P
1970 Piper PA-28-180	Hasley, Matthew J	N3428R
1970 Piper PA-28-140	Roth, Larry	N5943U
1972 Cessna 150L	Walton, Perry J	N5392Q
1972 Piper PA-23-250	New Age Aero, LLC	N90253
1973 Cessna 150L	Sky Air, Inc.	N10604
1973 Cessna 172M	Walton, Janice	N13198
1973 Beech F33A	Northwoods Aviation	N1842W
1974 Piper PA-28-151	Walton Aviation, Inc.	N44690
1975 Cessna 150M	P & N Corporation	N45132
1976 Piper PA-28-151	P & N Corporation	N75187
1978 Cessna 182Q	Central Foundation Inc.	N759WN
1979 Cessna 172	Hill, Kay	N4877J
1990 Piper PA-46-350P	Abode Construction, Inc.	N350AR
1995 Quicksilver MLX	Sulek, Kyle A	N5034T
1999 Cessna 172R	Kaminski, Jeffrey M	N71755
2000 Thie Charles W Challenger II	Eganhouse, Martin M	N90039
2000 Cirrus Design Corp SR20	Wright Way Trailers, Inc.	N999GE
2002 Cirrus Design Corp SR20	Squires Aviation, LLC	N871CD
2005 Cessna T182T	Northway, Kevin J	N88HL
2007 Jabiru USA Sport Aircraft LLC J250-SP	Caribou Newark Aviation, LLC	N57CE
2008 Welch T McCormick G Sonex	Welch, Thomas B.	N265SX
2010 Zodiac 601XL	Scotter, Richard A	N524RS
2013 Bell Helicopter Textron Canada 407	Helifleet 2015 LLC/MedTrans Corporation	N911LG
Piper PA-28-181	J & N Aviation, LLC	N28652
Cessna 177RG	Taylor, Bruce D	N35852

Table 6 Source: Marion Municipal Airport

Due to the correlation between total employment in Linn County and based aircraft at Marion Municipal Airport, future-based aircraft are projected to increase. This increase is based on the continued increase in total employment in Linn County, and Marion Municipal Airport becoming a public airport. The graph below shows the correlation between the numbers of based aircraft over the past 50 years verses the total employment in Linn County and the projected trend line for determining future based aircraft numbers.



Projected based aircraft are presented in Table 7. The numbers were determined using the trend line equation. Based on past based aircraft data, approximately 80 percent of the aircraft are estimated to be single engine.

Table 7

PROJECTED BASED AIRCRAFT			
Year	**Total**	**Single**	**Multi**
2020	75	60	15
2025	87	69	17
2030	97	78	19
2035	107	86	21
2040	116	93	23
2045	126	100	25

Table 7 Source: Anderson Bogert

Aircraft Operations and Operational Fleet Mix

An aircraft operation is a landing (arrival) or a take-off (departure) from an airport. A "touch and go" for example, is considered two operations. Aircraft operations are difficult to quantify at airports without control towers since there is no continuous monitoring. An airport manager or fixed-base operator can

make average counts and then extrapolate them to estimate annual counts. The Airport Manager Survey indicated 7,500 annual operations, of which 3,250 were itinerant and 3,250 were local.

A commonly accepted method of projecting aircraft operations is to develop a ratio of operations to the number of based aircraft. For Marion, IDOT estimated about 17,500 total operations in 2010 with 50 based aircraft. This indicates a ratio of 350 operations per based aircraft for the Marion Municipal Airport. It is anticipated that aviation trends will increase based on Marion Municipal Airport becoming a public airport. Aviation trends are also expected to increase based on the State of Iowa employment and aviation trends and on the basis of anticipated increases in based aircraft located in Marion. It is estimated the operations per based aircraft for Marion will follow the 2010-2030 Aviation System Plan for airports without an air traffic control tower. Table 8 presents projected operation levels.

Table 8

PROJECTED OPERATIONS					
Year	Based Aircraft	Operations Per Based Aircraft	Total	Single	Multi
2010	50	350	17,500	13,650	1,050
2015	40	350	14,000	11,200	2,800
2020	75	350	26,250	21,000	5,250
2025	87	350	30,450	24,360	6,090
2030	97	350	33,950	27,160	6,790
2035	107	450	48,150	38,520	9,630
2040	116	450	52,200	41,760	10,440
2045	126	450	56,700	45,360	11,340

Table 8 Source: Iowa DOT, Anderson Bogert

There are two types of operations associated with general aviation, local, and itinerant. In general, local operations are arrivals and departures of aircraft which operate in the local traffic pattern and are known to be arriving from within a 20-mile radius. Also, simulated instrument approaches or low passes are considered to be a local operation. Itinerant operations include all arrivals and departures other than local. Based on the airport manager survey, it has been estimated itinerant operations account for approximately 50 percent of total operations.

Table 9 presents a summary of anticipated local and itinerant operations.

Table 9

OPERATIONAL MIX			
Year	**Itinerant**	**Local**	**Total**
2010	8,750	8,750	17,500
2015	7,000	7,000	14,000
2020	13,125	13,125	26,250
2025	15,225	15,225	30,450
2030	16,975	16,975	33,950
2035	24,075	24,075	48,150
2040	26,100	26,100	52,200
2045	28,350	28,350	56,700

Table 9 Source: Iowa DOT, Anderson Bogert

SUMMARY

Section 2 has generated the future trends in various aviation demand categories that can be anticipated at Marion Municipal Airport. Based aircraft are projected to increase from 50 in 2010 to 126 in 2045, and operations are projected to increase from 17,500 in 2010 to 56,700 in 2045. Section Three will translate these forecasts and incorporate the existing airport facilities to determine what facilities will need to be improved or added to accommodate the projected demand.

These projected based aircraft and operations numbers are judged to be reasonable, since they are very similar to the numbers that the Ankeny Regional Airport is expected to achieve after a thirty year period of being in existence. The Ankeny Regional Airport opened in 1994 and according to the 5010 Airport Master Record, it currently has 100 based aircraft and 48,600 operations. According to the Iowa Aviation System Plan (2010-2030), Ankeny is forecast to have 124 based aircraft in 2025 (end of the thirty year period mentioned above), and 55,800 operations.

The Marion Municipal Airport has the potential to complement the services provided by the Eastern Iowa Airport in Cedar Rapids, as the Ankeny Regional Airport complements the services of the Des Moines International Airport.

SECTION THREE – FACILITY REQUIREMENTS

To properly plan for the future of Marion Municipal Airport, it is necessary to translate the forecast of aviation demand into specific types and quantities of facility needs that will serve the identified demand. It is intended this information be presented in a form that can be readily used in preparing the Airport Layout Plan for the existing airport site.

The selection of the appropriate standards for the development of the facilities is based primarily on the characteristics of the aircraft which are expected to use the airport. The most critical characteristics are the approach speed and the size of the critical design aircraft now or in the future.

CRITICAL AIRCRAFT AND REFERENCE CODE

Future airport facilities at Marion need to be planned in such a manner they will safely accommodate anticipated aircraft operations in order to accomplish transportation and economic goals.

The designation of the appropriate Design Standards for the planning and development of the airport facilities is based primarily on the operational and physical characteristics of the aircraft expected to operate at the airport. This *Critical Design Aircraft* is defined by the FAA as the most demanding category of aircraft which makes 500 or more itinerant operations per year. These 500 itinerant operations are required by the FAA to justify the construction of new or improved facilities using federal funding, yet 250 itinerant operations are enough to warrant the planning for these facilities. The *Airport Reference Code* (ARC) of the aircraft has important characteristics which related to its approach speed and size and are defined in two categories. The first component, depicted by a letter, is the *Aircraft Approach Category* and relates to aircraft approach speed. The second component, depicted by a Roman numeral, is the *Airplane Design Group* and relates to aircraft wingspan.

The type of facilities to plan for are based on these components and are characterized as:

Aircraft Approach Category
Category A: Speed less than 91 knots
Category B: Speed between 91 knots or more but less than 121 knots
Category C: Speed between 121 knots or more but less than 141 knots
Category D: Speed between 141 knots or more but less than 166 knots
Category E: Speed 166 knots or more

Airport Design Group

Group I:	Wingspan up to, but excluding 49 feet
Group II:	Wingspan 49 feet up to, but excluding 79 feet
Group III:	Wingspan 79 feet up to, but excluding 118 feet
Group IV:	Wingspan 118 feet up to, but excluding 171 feet
Group V:	Wingspan 171 feet up to, but excluding 214 feet
Group VI:	Wingspan 214 feet up to, but excluding 262 feet

Examples of aircraft in various ARC's are as follows:

Small Airplane (An aircraft of 12,500 pounds or less maximum certified takeoff weight.)

- A-I Beech Bonanza V35B, Beech 55 Baron, Cessna Centurion, Piper PA-28-140 Cherokee
- B-I Beech 60 Duke, Beech 100 King Air, Cessna Stationair 6, Cessna 182 Skylane
- B-II Cessna Citation CJ2+

Large Airplane (An aircraft of more than 12,500 pounds maximum certified takeoff weight.)

- B-I Gates Learjet 28/29, Rockwell Sabre 40, Rockwell Sabre 60
- C-I Gates Learjet 24, Gates Learjet 25
- B-II Cessna Citation CJ3, Cessna Citation Sovereign
- C-II Bombardier BD-100-1A10, Cessna Citation Ten, Embraer ERJ135, Gulfstream G450,

Source: FAA AC 150/5300-13A

Combining the critical aircraft's approach category and design group identified a coding system which sets criteria for airport layouts. The aircraft approach speed relates to the runway and runway related facilities, while the aircraft wingspan relates to separation criteria involving taxiways and turnarounds. In order to develop this system, the ARC of the critical aircraft needs to be determined. This will enable the application of the airport design criteria.

Based on current operations, it is justified that the Marion Municipal Airport's facilities should accommodate *Airport Reference Code B-I* aircraft now and in the near future. The current Iowa Aviation System Plan classifies the Marion Municipal Airport as a Basic Service Airport, which corresponds to a B-I airport reference code. Looking at the future of aviation activity and employment opportunities in the area, the Marion Municipal Airport should be planned to better accommodate B-II type business jets in the future. The airport advisory committee and the City of Marion want to be ready if an event occurs, such as a large jet being based at the airport, which would require larger airport facilities. Ultimately, the longer term projected employment growth and

corresponding aviation activity growth are expected to warrant facilities that accommodate Airport Reference Code C-II.

The final portion of Section Three will discuss the reasoning behind this decision and the facility requirements that will accommodate this type of aircraft. The planning for the future of Marion Municipal Airport is particularly important because once separation distances are set, it would be extremely costly to relocate facilities at a later date.

AIRSIDE REQUIREMENTS

Airfield Capacity

The capacity of airfield facilities can be measured to identify and plan for additional development needs. The demand/capacity analysis shows the annual capacity of a single runway with a parallel taxiway far exceeds 150,000 operations. Runway 17/35 does not have a parallel taxiway at this time. The addition of a parallel taxiway may be provided. Operations at Marion Municipal Airport are expected to remain below this 150,000 annual operation level.

Runway Orientation

The primary runway of an airport should be oriented as close as possible and practical in the direction of the predominant winds. This type of orientation will minimize the time a runway will be unusable due to strong cross winds. Marion Municipal Airport's primary runway, 17/35, is 3,775 feet long, and is oriented in a Northwest-Southeast direction.

FAA AC 150/5300-13A, Airport Design, recommends crosswind runways should be made available when the primary runway orientation provides less than 95 percent wind coverage for any aircraft forecast to use the airport on a regular basis. The 95 percent wind coverage is based on a cross wind not exceeding 10.5 knots (12 mph) for categories A-I and B-I, 13 knots (15 mph) for category B-II, and 16 knots (19 mph) for category C-II. Existing runway 17/35 has a 10.5-knot wind coverage of 85.46%, a 13-knot wind coverage of 91.93 percent, and a 16-knot wind coverage of 97.41%. Wind data specific to Marion is not available; therefore, Cedar Rapids (Eastern Iowa Airport) data was used. Cedar Rapids is the closest site to Marion with data available for a wind rose tabulation; it is approximately 14 miles to the Southwest. A Wind Rose for the Marion Municipal Airport is included on the Airport Layout Plan.

Runway 17/35 does not have acceptable wind coverage for categories A-I, B-1, or B-II. This wind coverage is of concern because of the frequency of use of this airport by airplanes which are smaller than those in the C-II Category. A cross wind runway would satisfy the 95 percent wind coverage requirement for the smaller aircraft.

Runway Length and Width

According to FAA Advisory Circular 150/5325-4B, Runway Length Requirements for Airport Design, required runway length is based on the following variables:

- Critical design aircraft.
- Airport elevation.
- Mean daily maximum temperature of the hottest month.
- Maximum difference in runway centerline elevation.
- Pavement surface conditions (wet or slippery vs. dry).

At the Marion Municipal Airport, the critical design aircraft, is C-II, the existing airport elevation is 862 feet, the mean daily maximum temperature is 85°F, and the maximum difference in runway centerline elevation is 9 feet. The runway surface is assumed to be wet and slippery. Based on these variables, runway lengths recommended by the FAA Advisory Circular for various aircraft at the Marion Municipal Airport are as follows:

Small airplanes with approach speeds of less than 30 knots.....330 feet
Small airplanes with approach speeds of less than 50 knots.....870 feet
Small airplane with less than 10 passenger seats:
75 percent of these small airplanes.....2,750 feet
95 percent of these small airplanes.....3,270 feet
100 percent of these small airplanes.....3,890 feet
Small airplanes with 10 or more passenger seats .....4,250 feet

Large airplanes of 60,000 pounds or less:
75 percent of these large airplanes at 60 percent useful load.....5,460 feet
75 percent of these large airplanes at 90 percent useful load.....7,000 feet
100 percent of these large airplanes at 60 percent useful load.....5,500 feet
100 percent of these large airplanes at 90 percent useful load.....8,280 feet

Airplanes of more than 60,000 pounds ..... Approximately 5,310 feet

Based on future projections of based aircraft and operations, it is desirable to plan for a facility that will ultimately accommodate the C-II type aircraft. This type of aircraft includes small jet and turboprop planes which will require a 5,500-foot runway.

Cross wind runways are typically designed to accommodate the wind coverage for smaller aircraft, which the primary runway does not. Based on FAA AC-150/5325-4B, the initial cross wind runway length shall be between **870' and 2,750',** and the ultimate crosswind runway length shall be between **3,890' and 4,250'**. In Table 1-3 of the AC, it is stated that the runway length for a cross wind runway should equal 100% of the recommended runway length determined for the lower cross wind capable airplanes using the primary runway. For the small airplanes with approach speeds of less than 50 knots, this indicates a length of 870' is needed; this is the lower limit given above. However, a general rule of thumb is the cross wind runway needs to be at least 80 percent of the recommended primary runway length, in order to accommodate the same aircraft, only with a large headwind component. Eighty percent of the recommended 5,500 feet length gives an upper limit of 4,400'. Considering existing terrain constraints, a **4,000**-foot ultimate cross wind runway is recommended for planning purposes.

Due to limited available locations for the cross wind runway, only one alignment was given serious consideration. This alignment parallels the Grant Wood Trail.

Currently the airport does not have a cross wind runway. According to the airport manager, a crosswind runway that was used by twin engine aircraft did exist for many years. This runway was turf, but there were plans to develop it. In addition, it has been reported that the 1980's airport layout plan showed a crosswind runway.

Runway and taxiway widths are identified in accordance with FAA Advisory Circular 150/5300-13. The indicated ultimate runway width for Runway 17/35 is 100 feet, the ultimate Cross Wind Runway width is 75 feet, and the taxiway width is 35 feet.

Pavement Strength

The existing pavements at Marion Municipal Airport have a pavement strength of $\leq$ 12,500 pound Single Wheel Load (SWL). With limited use expected of aircraft over 30,000 pounds, the 30,000 SWL pavement strength is reasonable and should be considered for construction of the cross wind runway. Paving of the primary runway may be planned for 60,000 pound DWL.

Landing and Safety Devices

Airport navigational aids and lighting shall be designed in accordance with FAA Standards in DOT/FAA Handbook 7031.2B, Airway Planning Standard Number One and FAA 150/5300-2D, Airport Design Standards, Site Requirements for Terminal Navigation Facilities. This involves specific standards for the following:

- Navigational Aids
- Global Positioning Systems
- Visual Glide Path Indicators
- Runway Identification Lighting
- Wind Direction and Weather Reporting

Navigational Aids

Navigational aids (NAVAID) at airport facilities serve two primary functions for airport operations. They provide guidance to a specific runway or to the airport itself. The difference between a precision and a non-precision navigational aid is that a precision approach provides electronic descent, alignment, and position guidance on a unique glide path. A non-precision navigational aid provides position and alignment, or possibly only position information. The need for navigational aids is determined by design standards based on safety considerations and operational needs.

The Marion Municipal Airport currently has no published instrument approach procedures. However, the airport is equipped with a rotating beacon light, which allows pilots to visually locate the airport.

Global Positioning Systems

The technology of Global Positioning Systems (GPS) has become an important component in aviation transportation. It has become the dominant instrument approach system and most aircraft are equipped with it. GPS requires a series of 24 satellites in orbit that can give precise measurements in the location, speed, elevation, and direction of an aircraft. It can be precise within a few meters by using the relative positions of at least three satellites and a wide area augmentation system.

GPS equipment has the ability to replace electronic navigational aids; however, GPS approaches require the same visual aids and clearance requirements as conventional approaches. The Marion Municipal Airport should be planned for GPS for non-precision approaches. According to the Iowa Department of Transportation, the waiting period for getting a GPS approach is approximately two years.

Visual Glide Path Indicator
Visual glide path indicators (VGI) are systems of lights located at the side of each runway and provide visual descent guidance information during an approach to the runway. Ultimately, Precision Approach Path Indicators (PAPIs) should be planned for each runway.

Runway Identification Lighting
Runway identification lighting provides the pilot of an approaching aircraft with a quick and positive identification of runway sides and ends. The most basic system involves runway end identifier lights (REILs) and runway edge lights. REILs help identify the end of the runway and distinguish it from other lights around the airport. Runway edge lights help define the landing area.

Runway 17/35 currently has non-standard edge lights but no runway end identifier lights. In the future, the edge lights need to be replaced with standard medium intensity runway lights. These lights should be planned to be pilot controlled and remain on at their lowest setting from dusk until dawn. As an aircraft approaches, the pilot may switch the light setting to medium or high intensity. A timer will reduce the lights back to the low setting after the aircraft has landed. Strong consideration should be given to using LED technology for the bulbs, since most airfield lighting is moving in that direction; therefore, parts for older technologies are getting more and more difficult to find.

On the airport layout plan, the addition of REILs is recommended to be shown as a part of future or ultimate development.

The lighting system at Marion Municipal Airport is currently adequate for the existing facilities at their present state. Lighting upgrades need to be included in any runway improvement plans to upgrade the safety and reliability of the system.

Wind Direction and Weather Reporting
Wind information is currently provided by a lighted windsock.

An Automated Weather Observing Systems (AWOS) should be considered for the ultimate development at the airport. It will allow pilots to obtain real time weather conditions at the airport. The airport advisory committee expressed interest in adding an AWOS.

LANDSIDE REQUIREMENTS

Aircraft Apron and Parking

The aircraft parking area required can generally be projected based on the forecast of itinerant operations. A general design practice provides for computing apron space and tie-down spaces for itinerant aircraft as follows:

- Assume 50 percent of busiest day itinerant aircraft are on the apron at a given time,
- the busiest itinerant day is assumed to be 10 percent busier than an average day, and
- a tie-down is provided for each itinerant aircraft on the apron.

Based on this discussion and the projected number of itinerant operations, the number of required apron tie-down spaces should be planned as shown in Table 10.

Table 10

PROJECTED AIRCRAFT TIE-DOWNS		
Year	**Itinerant Operations**	**Total Tie Downs**
2020	13,125	6
2025	15,225	6
2030	16,975	7
2035	24,075	10
2040	26,100	11
2045	28,350	12

Table 10 Source: Anderson Bogert

Currently, no paved tie downs exist and four turf tie downs exist.

Total apron area requirements should provide adequate space for the following:

- Tie-down of itinerant aircraft
- Tie-down of local aircraft
- Fueling area
- Short-term parking, loading, and unloading
- FBO operations
- Aerial spray operations (as appropriate)

With proper planning, the apron will accommodate the maximum number of aircraft, while maintaining ease of ingress and egress. The apron should be planned with a certain degree of flexibility and expandability.

The FAA General Aviation Apron Design Spreadsheet was used to estimate the number of itinerant aircraft and the recommended apron area for itinerant aircraft. This spreadsheet has been included in Appendix B. With the existing operations, approximately 5,082 square yards of apron pavement is recommended for itinerant aircraft. Calculations indicate 2,424 square yards are currently available. For year 2045, 61,460 square yards of apron pavement is recommended for transient aircraft.

Hangars

Hangar space requirements are in two forms, T-hangars and conventional hangars. The majority of aircraft owners will prefer to store their aircraft in T-hangars, the most economical form of aircraft storage for individual owners. Some owners, typically corporate aircraft owners, may prefer to hangar their aircraft in an individual conventional hangar.

Hangar space should be provided for the number of based aircraft at the airport. In addition, providing for one or two extra spaces for itinerant aircraft is desirable; this also provides a space for attracting new based aircraft. Refer to Table 11 for the projection of required hangar spaces.

Table 11

PROJECTED HANGAR SPACES		
Year	**Based Aircraft**	**Hangar Spaces**
2015	40	34
2020	75	77
2025	87	89
2030	97	99
2035	107	109
2040	116	118

Table 11 Source: Anderson Bogert

The Marion Airport currently has 34 total T-hangar stalls, which are completely full. The five conventional hangars can accommodate up to 18 additional aircraft, depending on type and size. Ten pilots are currently on the waiting list for hangar space.

General Aviation Terminal

Terminal facilities for general aviation airports need to serve several required functions. Requirements for these facilities include space for passenger waiting, flight planning, a pilot's lounge, concessions, restrooms, telephone access, management, storage, and various other needs. The terminal building also needs to provide space for management services.

The original terminal building at the Marion Municipal Airport is an older facility and is currently planned to be torn down. The building is adjacent to the aircraft apron and the automobile parking lot. Construction is now complete on the interim terminal building to the southeast of the old terminal building. An ultimate terminal building is planned to be constructed near the northeast corner of the intersection of the two runways.

SUMMARY

The purpose of this chapter has been to gain insight into the facilities needed to meet aviation demands that are projected for Marion Municipal Airport through the year 2045. These demands include improvements to both the airside and the landside facilities at the airport. We are planning to accommodate the larger CII aircraft, which will require a 5,500-foot primary runway. The crosswind runway is proposed to have an ultimate length of 4,000'. However, the airport layout plan runway data table shows a 5,600 foot long ultimate runway in the north-south direction and a 5,400 foot long ultimate runway in the east-west direction. Please refer to the following section of the report (Alternatives) for an explanation.

The next step after determining the facility requirements in this Airport Layout Plan is to develop alternatives to accommodate the demands, which is discussed in the following section.

SECTION FOUR – ALTERNATIVES

The Facility Requirements section of this report outlined the basic parameters defined for use in the analysis of airport alternatives. This analysis evaluates alternative airport layouts that will accommodate the facilities needed for the future of the Marion Municipal Airport.

The concepts and alternatives discussed in this section examine the Airport's ability to handle projected aviation demand in a productive and effective manner. Analysis of these development alternatives will provide the basis for the detailed Airport Layout Plan.

STAKEHOLDER/PUBLIC INVOLVEMENT

The first task of this ALP Update was to put together a stakeholder/public involvement program. Meetings were held with:

1. The general public
2. Concerned neighboring property owners
3. LuxAir Aviation, LLC
4. the Airport Advisory Committee

Minutes from these meetings can be seen in Appendix A.

In summary, the airport advisory committee believes that the current airfield does not serve economic needs but does serve recreational needs. In the future, they would like the airfield to meet both needs. Some feel a 5,500' primary runway is needed to get more businesses to locate in town. LuxAir Aviation, LLC believes the first priority at the airport is widening and reconstructing the existing runway.

DO NOTHING ALTERNATIVE

The Do Nothing Alternative might initially appear to be the most favorable alternative from an environmental point of view. This alternative involves maintaining the airport in its present condition and not provide for expansion. The adverse impacts and other factors discussed elsewhere in this report would seem to be avoided. However, this is not necessarily the case.

The airport is being used more and more, even without any improvements. This increased activity results in certain environmental effects. Therefore, even if no facility expansion is realized, some adverse environmental effects will occur with increased airport operations and activity.

The Do Nothing Alternative may also have a negative effect upon the economic development of the Marion area. The employment opportunities associated with construction and operation of the proposed facilities would not be realized. Also, economic gains through industrial activity can be directly tied to the existence of improved airport facilities. Without development of the proposed enhancements to the Marion airport, the effect on economic growth can only be viewed as negative.

In addition, this alternative would do nothing for the safety of the flying public and those in the vicinity of the airport. Many of the proposed improvements would enhance the operational safety of the airport. This benefit would not be realized under the Do Nothing Alternative.

ALTERNATIVE SITES

Developing an airport on a new site is not feasible from an economic point of view. The development of a new airport would require a significant capital outlay far exceeding that required for improvements to the existing facilities. In addition, the investment in the existing facilities would be lost.

Also, the environmental impacts of developing a new airport site would be greater than expanding the existing site. These increased impacts would be difficult to justify.

SERVICE FROM ANOTHER AIRPORT

The impacts of relying on the service from other general aviation airports could be significant to the local economy. Marion and Linn County would need to rely on the airport facilities of other communities which are considered as competitors in attracting new business and industry. This would place Marion and Linn County at a competitive disadvantage.

Local firms requiring improved air service would need to evaluate the benefits and costs of the time and travel to another airport, relocating to another area, utilizing less than adequate airport facilities or doing without air transportation. All of these would result in negative impacts on the local economy.

DEVELOPMENT ALTERNATIVES AT THE EXISTING SITE

Feasible development alternatives at the existing airport are somewhat limited by site constraints. Following are some of the options.

EXISTING RUNWAY EXTENSION

It is recommended to plan for a future facility that will accommodate B-II type aircraft on a regular basis at the Marion Municipal Airport. A 4,000-foot runway will be sufficient to accommodate such aircraft.

- *Runway Extension to the North*

  At the request of the Airport Advisory Committee, extension of the existing runway to the North was reviewed. Due to Marion Airport Road and Highway 151 being in very close proximity to the north, extension in this direction is limited. However, the City is interested in exploring the possibility of closing Marion Airport Road and moving the airport entrance to the east to the Culver's Garden Center entrance on Highway 151. The Existing Marion Airport Road entrance on Highway 151 would remain to serve the Marion Enterprise Center (MEC). With Marion Airport Road being closed, Runway 17 can be extended to the north approximately 225' and still maintain the required 15' over Highway 151 with its ultimate 34:1 approach slope. This extension to the north has been shown on the airport layout plan as "Future" and will result in a 4,000' long runway.

Looking North near the end of Runway 17

- *Runway Extension to the South*

  A more substantial extension of Runway 17/35 can more practically occur in the southerly direction. The disadvantage of extension in this direction is the fill required and the infrastructure needed to cross Grant Wood trail. In addition, land acquisition will be required from property owners that may potentially oppose the project. With this potential obstacle in mind, the Airport Advisory Committee has decided to reserve both the north-south corridor and the east-west corridor for an ultimate primary runway.

Looking South from the end of Runway 35

- *Alternate North-South Alignment*
  At the request of the Airport Advisory Committee, Anderson Bogert explored a north-south runway alignment just to the west of Hindman Road, which is about a half mile east of the existing runway. Since Highway 151 and the Grant Wood trail diverge away from the airport as they head east, more length could potentially be available for the runway at this location, without crossing the Grant Wood trail, assuming that Marion Airport Road is closed. At this location, 5,400' in length is available for the north-south runway. However, this runway alignment requires the crossing of three drainageways and hilly terrain, resulting in the need for extensive amounts of fill. For this reason, this option was rejected.

CROSS WIND RUNWAY DEVELOPMENT

A cross wind runway is desired in by pilots in Marion to meet the FAA target of 95% wind coverage.

- *East-West Cross Wind Runway #1*
  As initially suggested by LuxAir Aviation, LLC, this alignment was explored as an option. It parallels the Grant Wood Trail and is approximately centered on the south end of existing Runway 17/35. From the land acquisition and environmental perspective, this runway

location is the most favorable. However, in order to meet FAA standards for the runway profile, large volumes of fill will be required.

- *East-West Cross Wind Runway #2*
  The development of Cross Wind Runway #2 was reviewed as another option. This runway alignment begins east of the existing runway midpoint and extends in the easterly direction.

  The disadvantages of this alignment includes the crossing of Hindman Road and the crossing of a major drainageway to the east of Hindman Road. Alignment #2 is likely to require even more fill than alignment #1, and would likely result in the closure of Hindman Road. Environmental concerns could potentially be an issue with the crossing of the drainageway.

TERMINAL AREA DEVELOPMENT

A primary need of the Marion Municipal Airport will be hangar space. This need has been identified by LuxAir Aviation, LLC and the Airport Advisory Committee.

A draft terminal area plan was presented to LuxAir Aviation, LLC. Based on comments received from LuxAir, the plan was revised to include twenty-seven T-Hangar stalls and nine corporate hangars.

This overall layout was chosen, because it makes the most efficient use of the land already owned by LuxAir Aviation, LLC and to be owned in the near future, has the most potential for future expansion, has the least negative impact on the existing facilities, and maintains a clear line of sight from the ultimate terminal building to the runways. The layout also reduces the need for planes to travel through the ultimate apron area to reach the hangars. An additional advantage to the layout chosen is the ability to easily phase improvements as they become necessary. Both the interim apron and the ultimate apron will allow for additional tie down space and more room to maneuver around the fueling station.

TERMINAL AREA PHOTOS

Existing apron looking north

Existing apron looking northwest

Existing apron looking south

New FBO building

New Maintenance Hangar

Existing hangars

Existing hangars

Existing hangar

Existing hangar

This hangar shed has been removed

Existing fueling station

Helicopter pad

Old FBO Building

SUMMARY

Several alternatives were compared and contrasted to determine the best possible layout for the future for the Marion Municipal Airport.

Recommendations were made for the facilities required to accommodate future aviation projections. Recommendations include the following:

1. Existing runway 17/35 to be reconstructed and widened to 75' future minimum width per Airport Advisory Committee request, which corresponds with the future approach category/design group B-II requirements.
2. Terminal area expansion, starting with the construction of relocated interim apron space, including fueling station relocation, Phase 1 north-south parallel taxiway, and connecting taxiway. Following construction of the interim apron space, additional expansion will be made as the numbers of based aircraft and operations increase.
3. A crosswind runway (10/28) developed with an initial length of 2,700' as a turf runway and a future/ultimate paved length of 4,000'. The crosswind runway could potentially be developed to an ultimate length of 5,400 feet and become the primary runway, if extension of Runway 35 to the south becomes unattainable due to land acquisition difficulties.
4. Existing runway 17/35 to be expanded to the north to a future length of 4,000 feet and then to the south to an ultimate length of 5,600'. If land acquisition difficulties to the south are encountered, runway 17/35 could be developed as the crosswind runway, with an ultimate length of 4,000'. However, it is the preference of the airport advisory committee for runway 17/35 to become the ultimate primary runway, with runway 10/28 designated as the crosswind runway, due to the costs associated with the fill required for runway 10/28.

SECTION FIVE – AIRPORT LAYOUT PLAN

Section Four made an evaluation of the possible airport development alternatives for the Marion Municipal Airport. The best alternative was selected based on development costs, airport layout, and the ability to accommodate projected aviation activity at the airport. This section will summarize the recommended development as aviation demands increase at the airport.

The future recommendations for the airport are referred to as the **Airport Layout Plans**. These are a set of drawings that graphically depict the recommended improvements for the airport layouts, airspace, and land use. The set of Airport Layout Plans are included at the end of this section in 11" x 17" format. In addition, they will be provided to the City in 22"x34" format and include the following sheets:

- Cover sheet
- Airport Layout Plan
- Airport Airspace Drawing - Runway 17/35
- Airport Airspace Drawing - Runway 10/28
- Inner Approach Surface – Runway 17
- Inner Approach Surface - Runway 35
- Inner Approach Surface – Runway 10
- Inner Approach Surface – Runway 28
- Plan & Profile – Runways
- Terminal Area Drawing
- Airport Land Use Map
- Airport Property Map

CURRENT RUNWAY/ULTIMATE PRIMARY RUNWAY

The Airport Layout Plan provides for an ultimate 5,600 foot by 100 foot north-south primary runway. This will be accomplished by extending the existing Runway 17/35 to the north by 225 feet and then to the south by 1,600 feet. The Ultimate Runway 17/35 is planned to be accompanied by a full parallel taxiway on the east side of the runway.

CROSS WIND RUNWAY

The Airport Layout Plan also provides for an initial 2,700 foot turf runway, a 4,000 foot future runway, and an ultimate 5,400 foot by 100 foot east-west runway (10/28). This runway is also planned to be accompanied by a full parallel taxiway.

TERMINAL AREA

Future/ultimate development of the terminal facilities will consist of relocation of the existing apron area and terminal building. It is recommended this relocation

continue to the South of the existing terminal area. This development will include such things as relocation of the aircraft parking apron, new T-hangar buildings, new corporate hangars, new tie downs, and a new terminal building. These facilities will be built when the current terminal area is no longer able to accommodate the aviation activity at Marion.

AIRPORT REFERENCE CODE

The facilities presented in the Airport Layout Plan for the primary runway will meet Airport Reference Code C-II requirements. As mentioned earlier in this report, it is desirable to plan for a primary runway that will accommodate the larger C-II type aircraft, which includes certain business jet operations. The proposed cross wind runway will meet the requirements of Airport Reference Code B-II. It is intended to serve the smaller airplanes with lesser cross wind capabilities, which is basically all the aircraft currently based at the airport. Due to uncertainties of property acquisition to the south, both ultimate runways are being shown on the airport layout plan to meet Airport Reference Code C-II requirements. This layout will provide the City the flexibility to provide an ultimate primary runway in either direction.

The purpose of the Airport Layout Plan (ALP) is to provide City officials with basic guidelines for making decisions associated with future development at the Marion Municipal Airport. The ALP uses projected aviation activity to plan development to accommodate short, intermediate, and long range needs. Airport planning is successful only if flexibility is adopted into the future developments of the airport. Aviation demands are not likely to develop on an even time line, creating the importance of the ALP to become a working document that changes as the needs of the airport change. By using the recommendations and guidelines established in the ALP, the City and the airport can maintain its long term success of providing first-class customer service to the community and its users.

SECTION SIX – IMPLEMENTATION PLAN

DEVELOPMENT PHASES

The analysis conducted in the previous sections considered various alternatives that would accommodate existing and future levels of aviation activity. The proposed capital improvements program shall consider safety first, as well as the preservation of existing facilities. Implementation of proposed capital facilities is expected to occur over the 20-year planning period. Obviously, the priorities will vary depending on the growth of the community and its aviation needs. Hangars and landside facilities are typically constructed in response to demand for such facilities.

Projects that should be given first preference are those that enhance the level of safety and preserve existing facilities. The development schedule is presented in two (2) five-year phases and one (1) ten-year phase. Phase One extends from 2017 to 2021. Phase Two covers the period 2022 through 2026, while Phase Three extends from 2027 to 2036.

- Phase One 2017 – 2021
- Phase Two 2022 – 2026
- Phase Three 2027 – 2036

EXISTING FACILITIES

Inspections of public airports are conducted by the Iowa DOT on a three year cycle. Presumably, Marion has not had their pavement evaluated through the IDOT pavement management system previously, as there is no report on the IDOT website. The next year the IDOT will be applying for a grant will be FY2017, and they typically will look at which non-NPIAS airports to review in conjunction with that grant.

The Iowa DOT uses the Pavement Condition Index (PCI) procedure to inspect the pavements; this procedure provides a numerical indication of overall pavement condition. The types and amounts of deterioration are used to calculate the PCI value of the section. The PCI ranges from 1 to 100, with 100 representing a pavement in excellent condition.

In general terms, pavements with a PCI of 65 to 100 that are not exhibiting significant load-related distress will benefit from preventative maintenance actions, such as crack sealing and surface treatments. Pavements with a PCI of 40 to 65 may require major rehabilitation, such as an overlay. No current PCI data exists for the Marion Municipal Airport.

All pavements should be monitored on a regular basis and remedial actions taken as required. Delaying such action will exacerbate the pavement distresses that appear, resulting in higher future repair costs and eventually will pose an operational safety problem. This could also lead to liability risks. Therefore, the airport should have a pavement maintenance plan in place to schedule periodic pavement inspections and to record the findings. Currently, the IDOT does not fund pavement maintenance projects; however, they do fund immediate safety enhancements that include emergency pavement patching.

CAPITAL COSTS

A preliminary opinion of costs for each project included in the development plan presented was calculated. The preliminary cost opinions were based upon average 2016 pricing. Since the final design has not been completed, the cost associated with the site grading, drainage, paving, and lighting may vary from the preliminary opinion of cost provided. Other capital costs may also vary depending on several parameters, such as construction condition, specification requirements, and time of construction. Future costs may be updated by comparing Engineering News Record Construction Cost Indexes or IDOT Cost Indexes and applying those to the average 2016 construction costs. Fifteen (15) percent was added for the component costs for engineering, legal, and administrative costs. A twenty-five (25) percent contingency was added to the probable construction cost. The total cost represents the sum of construction costs, engineering, legal, and administrative costs. These costs are summarized in Table 12. The following costs have not been included in the table: pavement maintenance and avigation easements.

Table 12

Development Cost				
Year	**Project Description**	**Total Cost**	**Estimated Maximum IDOT Share**	**Other/Local Share**
2017	Engineering Design Runway Reconstruction	$75,000	$63,750	$11,250
2018	Land Acquisition for Partial N-S Parallel Taxiway (for Temporary Runway) and for Interim Apron	$458,609	$389,818	$68,791
2019	N-S Parallel Taxiway Grading and Paving (for Temporary Runway)	$998,312	$0	$998,312
2019	Runway 17/35 Reconstruction/Widening	$3,107,638	$400,000	$2,707,638
2019	Runway 17/35 lighting and marking	$385,849	$0	$385,849
2020	Construction of Interim Apron and Relocation of Fuel Farm	$1,175,029	$400,000	$775,029
2021	Land Acquisition for Runway 17-35 North extension & airport entrance road relocation	$162,936	$138,496	$24,440
2022	Construction of relocated entrance road	$539,532	$400,000	$139,532
2023	Construction of runway 17/35 north extension	$372,917	$316,979	$55,937
2024	Land Acquisition for Runway 10-28	$2,468,000	$400,000	$2,068,000
2025	Runway 10-28 Grading for 2700' Turf Runway	$2,980,093	$400,000	$2,580,093
2026	Land Acquisition for Runway 17-35 extension to the South	$424,172	$360,546	$63,626
2027	Grading/site preparation for Runway 17-35 extension to the South	$1,992,017	$400,000	$1,592,017
2028	Runway 17/35 Paving (extension to south)	$1,042,026	$400,000	$642,026
2029	Runway 17/35 widening (75 to 100) and NAVAIDS	$1,870,151	$400,000	$1,470,151
2030	N-S Parallel Taxiway Construction	$2,138,110	$400,000	$1,738,110
2031	Runway 10-28 Grading/site preparation of west end (to 4000' long)	$1,045,325	$400,000	$645,325
2032	Runway 10-28 Paving & Lighting (4,000')	$1,401,258	$400,000	$1,001,258
2033	Land Acquisition Ultimate FBO Building & Apron	$292,133	$248,313	$43,820
2034	Ultimate FBO Building Construction	$2,250,000	$150,000	$2,100,000
2035	Ultimate Apron construction - Phase 1	$3,014,791	$400,000	$2,614,791
2036	Relocation of Fuel Farm	$200,000	$170,000	$30,000
2037	E-W Parallel Taxiway Grading	$384,881	$327,149	$57,732
2038	E-W Parallel Taxiway Paving/lighting	$1,205,869	$400,000	$805,869
	TOTAL	**$29,984,648**	$7,365,050	$22,619,597

Table 12 Source: Anderson Bogert

Improvements identified for Phase One (2017-2021) include engineering design for runway reconstruction, land acquisition for temporary runway along north-south parallel taxiway alignment and for interim apron, grading and paving for temporary runway, runway 17/35 reconstruction and widening, runway 17/35 lighting and marking, construction of interim apron, relocation of fuel farm, and land acquisition for runway 17-35 north extension and for airport entrance road relocation. Cost for these Phase One improvements totals $6,363,374.

Phase Two improvements (2022-2026) could include construction of relocated airport entrance road, construction of runway 17/35 north extension, land acquisition for runway 10/28, runway 10/28 grading for 2,700' turf runway, and land acquisition for runway 17/35 extension to the south. These improvements have a total cost of $6,784,713.

Phase Three improvements (2027-2036) could include grading/site preparation for runway 17/35 extension to the south, runway 17/35 paving (of extension to the south), runway 17/35 widening (75 to 100) and NAVAIDS, north-south parallel taxiway construction, runway 10/28 grading/site preparation of west end (to 4,000' long), runway 10/28 paving and lighting (to 4,000' long), land acquisition for ultimate FBO building and apron, ultimate FBO building construction, ultimate apron construction (phase 1), and relocation of fuel farm. These improvements have a total cost of $15,245,810.

The remaining improvements are currently identified as long-range needs and are dependent on increases in airport operations

AIRPORT REVENUE/EXPENDITURES

Revenues generated at the airport are expected to satisfy annual operating and maintenance (O&M) expenditures; LuxAir Aviation is responsible for operation and maintenance. Intergovernmental revenues and revenues from other sources will be required to satisfy local obligations associated with the implementation of major capital projects.

FEDERAL ASSISTANCE

Public law 97-24B (Airport and Airway Improvement Act of 1982) required the publication of a National Plan of Integrated Airport Systems (NPIAS) by September 3, 1984, and created the Airport Improvement Program (AIP). The Airport and Airway Trust Fund created in 1970 acts as a repository for the tax monies paid by aviation users to support federal programs. Airports in Iowa have benefited from the various Federal Airport Assistance Programs since FAAP was created in 1946.

Federal assistance is not available at this time, since Marion is not a NPIAS airport.

At present, the Federal Aviation Administration provides grants-in-aid up to 90 percent of the project cost on eligible items. In general, eligible airside items include:

- Runway construction/rehabilitation
- Taxiway construction/rehabilitation
- Apron construction/rehabilitation
- Airfield Lighting
- Airfield Signage
- Airfield Drainage
- Land Acquisition
- Weather Observation Stations (AWOS)
- Navaids such as REILs & PAPIs
- Planning Studies
- Environmental Studies
- Safety Area Improvements
- Snow Removal Equipment
- Snow Removal Equipment Storage

The following items are allowed if the airside needs are met:

- Fuel farms
- Aircraft Hangars
- General Aviation Terminal Buildings
- Parking Lots
- Approaches to Hangars

AIP funding provides both discretionary and entitlement funds. Non-primary airports, similar to Marion, currently receive an annual entitlement of up to $150,000. The entitlements can be accrued up to three years for funding a particular project. Funding of costs exceeding entitlements depends on available state apportionment and on available federal discretionary funding. Projects are prioritized to determine which ones receive the discretionary funding. All entitlement funds are subject to appropriation by Congress.

IOWA AIRPORT IMPROVEMENT PROGRAM

The aviation fund was re-established by the Iowa Legislature in 2008. Beginning that year, one half of the aircraft registration fees and one half of aviation fuel taxes collected will be deposited into an aviation fund to be appropriated for the aviation development program. The FY 2016 State Airport Improvement Program totaled to approximately 3.1 million dollars. The overall FY 2016 State aviation Program also included 1.5 million for Commercial Service Vertical Infrastructure and $850,000 for General Aviation Vertical Infrastructure. Available funds for FY 2017 and beyond for both the Airport Improvement

Program and the vertical infrastructure programs are dependent on appropriations during the 2016 legislative session.

General Aviation Vertical Infrastructure Program: This program includes new construction and rehabilitation of hangars, terminals, maintenance buildings, fuel facilities, and other vertical infrastructure located on the airport. Applications are accepted once each year through the annual state application process. State share is up to 85%. Local participation will be considered when prioritizing projects. Both new and rehabilitation projects will be funded each year.

Airport Improvement Program

Airfield and Security Projects: This program includes airside improvements and security related projects. Applications are accepted once each year through the annual state application process. State share is up to 85%. Local participation will be considered when prioritizing projects.

Eligible projects include:

- runway, taxiway, apron, and ramp preservation and development
- communication and navigational equipment
- security lighting or access control
- airfield lighting
- obstruction removal
- airfield drainage
- airfield signage
- planning studies

Windsocks: Windsocks are available to public use airports. They may be ordered through the annual application process on the Sponsor/Program Identification sheet, or at any time by contacting the Office of Aviation 515-239-1875.

Immediate Safety Enhancements (ISE): This program includes emergency repair to communication and navigational equipment, airside infrastructure, lighting, and other safety related components. Applications accepted throughout the year. State share is 70% of project up to a maximum of $10,000.

Implementation of the capital projects proposed in each of the phases is dependent to some extent on the availability of grants-in-aid from either the Iowa DOT and/or Federal Aviation Administration (FAA), if Marion is entered into the NPIAS. Equally important, the City of Marion will have to provide the local match to projects eligible for participation in cost by Iowa DOT and/or the FAA.

PRIVATE SECTOR INVESTMENT

The investment of public funds should also provide an impetus for private investment. An area in which private investment may be used effectively is for the development of T-hangar facilities. Hangars benefit specific airplane owners. Consequently, it is reasonable to place at least part of the responsibility for hangar development with the private sector.

Such facilities constructed with private capital on the airport facility may be deeded to the airport owner in trade for a long-term lease. The advantage of such an arrangement is it relieves the airport owner (sponsor) of the burden of financing private hangars facilities, while retaining possession and control of all real property on the airport.

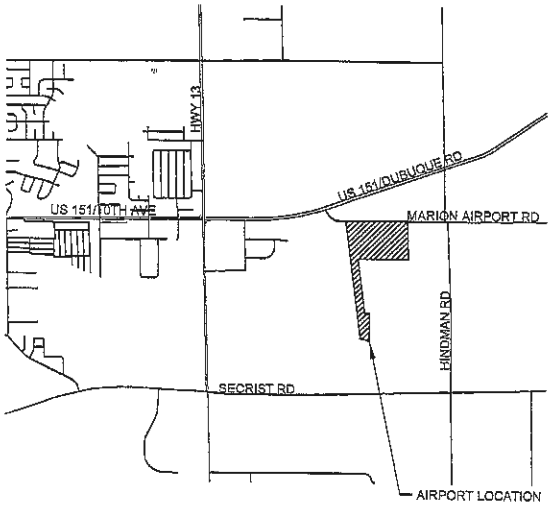
Typical airport development policy assumes the private sector will construct future T-hangar facilities and taxiway pavement within twenty (20) feet of the hangar. After a 15-to-20 year amortization period, the hangars constructed by the private sector could become airport property. Revenue generated from hangar rental would at this point be available to the airport owner.

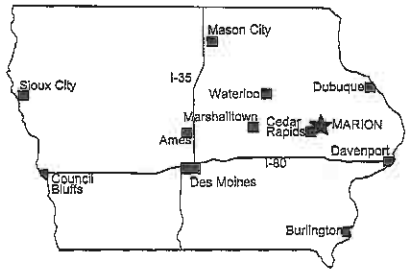
However, at Marion, a public-private partnership is proposed to be used to develop the airport, where the City owns the runways and taxiways, and hangars are owned privately.

AIRPORT MAINTENANCE

The primary emphasis of the Airport Development Plan is placed upon identifying those facility needs required to bring the airport up to current design standards and satisfy aviation demand activity. However, once the facility component is constructed, maintenance becomes a major emphasis. Not only should the public investment in facilities be enhanced, those actions required to maintain a high degree of safety must be undertaken, and hazardous conditions should be corrected immediately. A daily airport inspection program should be established and deficiencies noted. This action should be undertaken by the airport manager, with deficiencies reported to the City for correction. The Iowa DOT Pavement Management Report combined with a daily inspection program will enable the City of Marion to identify areas where deficiency exists.

AIRPORT LAYOUT PLAN
MARION MUNICIPAL AIRPORT
MARION, IOWA
~2017~





AIRPORT ADVISORY COMMITTEE

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BONNIE ROTH
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MARION, IOWA 52302
844-589-2376

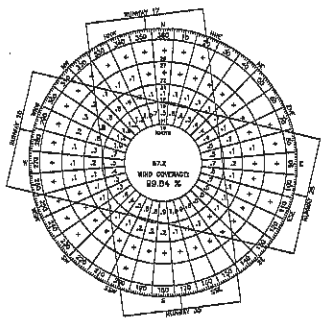
INDEX OF SHEETS

City of MARION IOWA

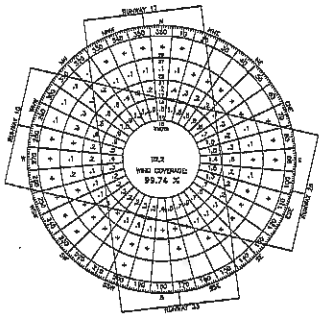
APPROVED:

Nicolas Abouassaly 3/9/17

CITY OF MARION — DATE



ALL-WEATHER CONDITIONS
WEATHER STATION: CEDAR RAPIDS, IOWA
2005 – 2014



IFR CONDITIONS
WEATHER STATION: CEDAR RAPIDS, IOWA
2005–2014

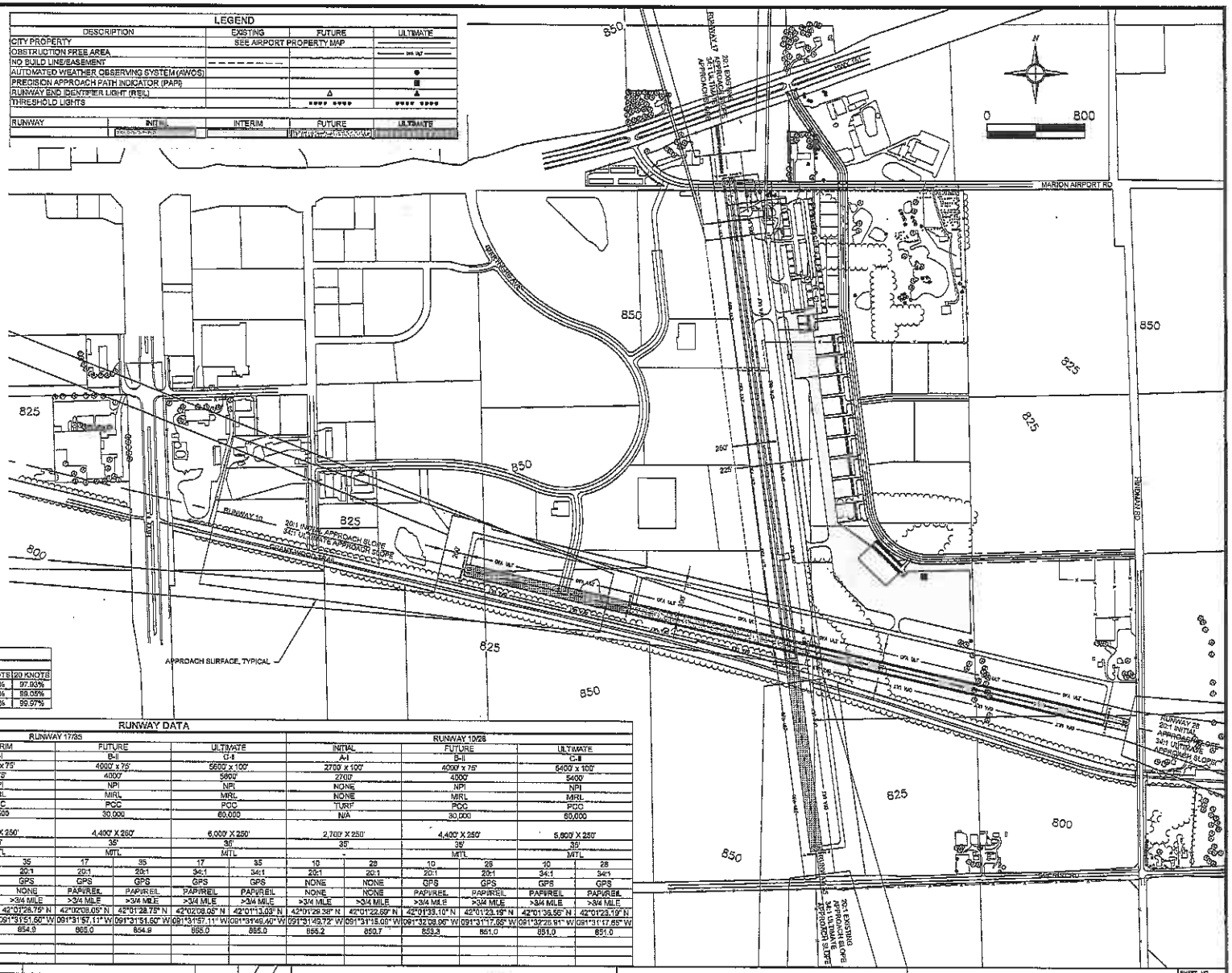
WIND DATA

RUNWAY	ALL WEATHER				IFR CONDITIONS			
	10.5 KNOTS	13 KNOTS	16 KNOTS	20 KNOTS	10.5 KNOTS	13 KNOTS	16 KNOTS	20 KNOTS
17/35	85.24%	91.03%	96.23%	98.85%	80.74%	87.81%	94.44%	97.93%
10/28	86.48%	92.80%	97.62%	99.44%	89.89%	95.53%	98.54%	99.05%
COMBINED	97.96%	99.23%	99.84%	99.98%	96.12%	98.76%	99.74%	99.97%

LEGEND

DESCRIPTION	EXISTING	FUTURE	ULTIMATE
CITY PROPERTY	SEE AIRPORT PROPERTY MAP		
OBSTRUCTION FREE AREA			
NO BUILD LINE/EASEMENT			
AUTOMATED WEATHER OBSERVING SYSTEM (AWOS)			●
PRECISION APPROACH PATH INDICATOR (PAPI)			■
RUNWAY END IDENTIFIER LIGHT (REIL)		△	▲
THRESHOLD LIGHTS		▪▪▪▪ ▪▪▪▪	▪▪▪▪ ▪▪▪▪

RUNWAY	INITIAL	INTERIM	FUTURE	ULTIMATE



RUNWAY DATA

ITEM	RUNWAY 17/35								RUNWAY 10/28					
	EXISTING		INTERIM		FUTURE		ULTIMATE		INITIAL		FUTURE		ULTIMATE	
APPROACH CATEGORY/DESIGN GROUP	A-I		B-I		B-II		C-II		A-I		B-II		C-II	
RUNWAY LENGTH/WIDTH	3415' x 23'/100'		3499' x 75'		4000' x 75'		5600' x 100'		2700' x 100'		4000' x 75'		6400' x 100'	
RUNWAY PAVEMENT LENGTH	3775'		3775'		4000'		5600'		2700'		4000'		5400'	
RUNWAY MARKINGS	NONSTANDARD		NPI		NPI		NPI		NONE		NPI		NPI	
RUNWAY LIGHTING	NONSTANDARD		MIRL		MIRL		MIRL		NONE		MIRL		MIRL	
PAVEMENT MATERIAL	ASPHALT/TURF		PCC		PCC		PCC		TURF		PCC		PCC	
PAVEMENT DESIGN STRENGTH (MIN)	-		12,500		30,000		60,000		N/A		30,000		60,000	
OBSTRUCTION-FREE AREA (OFA) LENGTH X WIDTH	4,175' X 250'		4,175' X 250'		4,400' X 250'		6,000' X 250'		2,700' X 250'		4,400' X 250'		6,800' X 250'	
TAXIWAY WIDTH	-		35'		35'		35'		35'		35'		35'	
TAXIWAY LIGHTING	-		MTL		MTL		MTL		-		MTL		MTL	
	17	35	17	35	17	35	17	35	10	28	10	28	10	28
APPROACH SURFACE SLOPE	20:1	20:1	20:1	20:1	20:1	20:1	34:1	34:1	20:1	20:1	20:1	20:1	34:1	34:1
ELECTRONIC AIDS	NONE	NONE	GPS	GPS	GPS	GPS	GPS	GPS	NONE	NONE	GPS	GPS	GPS	GPS
VISUAL APPROACH AIDS	NONE	NONE	NONE	NONE	PAPI/REIL	PAPI/REIL	PAPI/REIL	PAPI/REIL	NONE	NONE	PAPI/REIL	PAPI/REIL	PAPI/REIL	PAPI/REIL
APPROACH VISIBILITY MINIMUMS			>3/4 MILE	>3/4 MILE	>3/4 MILE	>3/4 MILE	>3/4 MILE	>3/4 MILE	>3/4 MILE	>3/4 MILE	>3/4 MILE	>3/4 MILE	>3/4 MILE	>3/4 MILE
LATITUDE	42°02'05.84" N	42°01'28.77" N	42°02'05.84" N	42°01'28.75" N	42°02'08.05" N	42°01'28.75" N	42°02'08.05" N	42°01'13.03" N	42°01'29.36" N	42°01'22.69" N	42°01'33.10" N	42°01'23.18" N	42°01'39.55" N	42°01'23.19" N
LONGITUDE	091°31'56.80" W	091°31'51.46" W	091°31'56.80" W	091°31'51.60" W	091°31'57.11" W	091°31'51.50" W	091°31'57.11" W	091°31'46.40" W	091°31'43.72" W	091°31'15.05" W	091°32'09.95" W	091°31'17.65" W	091°32'26.91" W	091°31'17.85" W
ELEVATION	859.3	854.2	862.9	854.9	865.0	854.9	865.0	855.0	855.2	850.7	853.3	851.0	851.0	851.0
DISPLACEMENT LATITUDE	42°02'03.23" N	42°01'28.75" N	42°02'02.59" N											
DISPLACEMENT LONGITUDE	091°31'56.43" W	091°31'51.74" W	091°31'56.34" W											
DISPLACEMENT ELEVATION	859.3	859.9	862.6											

ABES PROJECT NO: 216017
IDOT NO: SI160C17100

DRAWN BY: MJP
APPROVED BY: JCD
DATE: 1/10/2017

NO.	REVISION DESCRIPTION	APPROVED	DATE

City of Marion
ANDERSON BOGERT

Marion Municipal Airport

AIRPORT LAYOUT PLAN

SHEET NO. 2 OF 12

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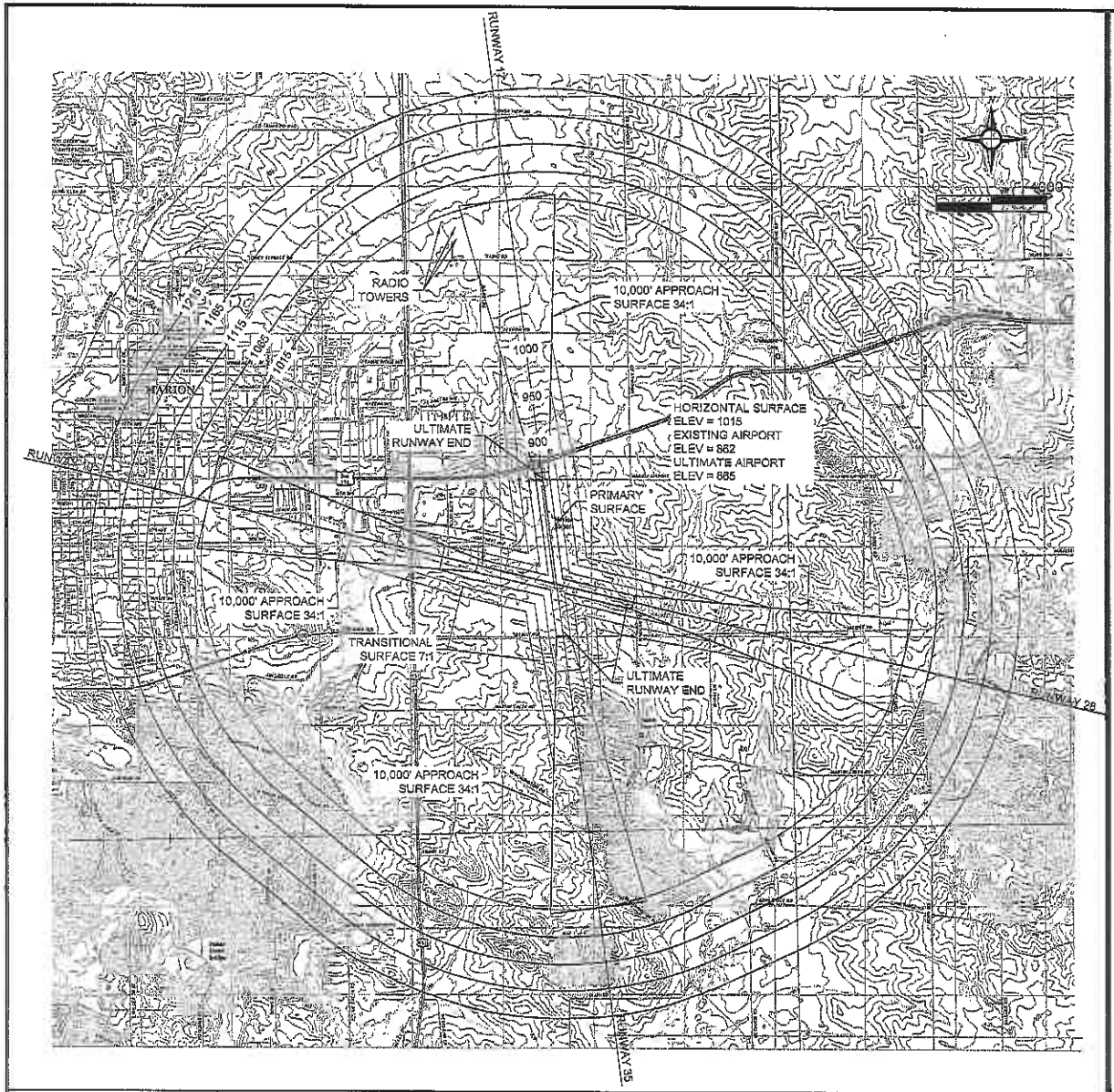
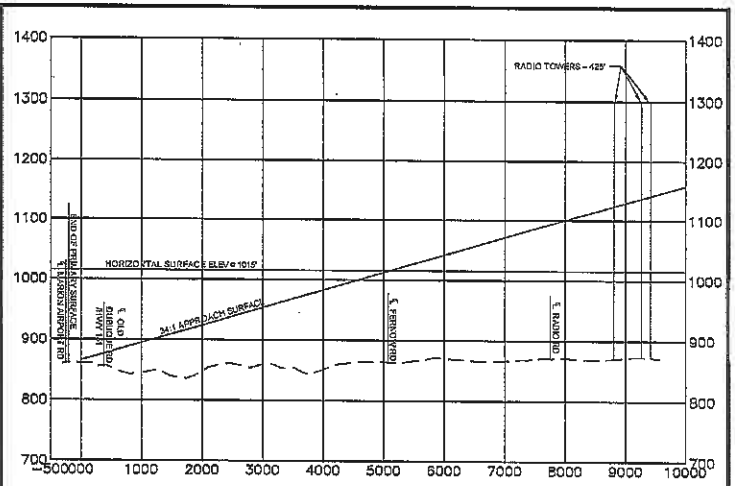
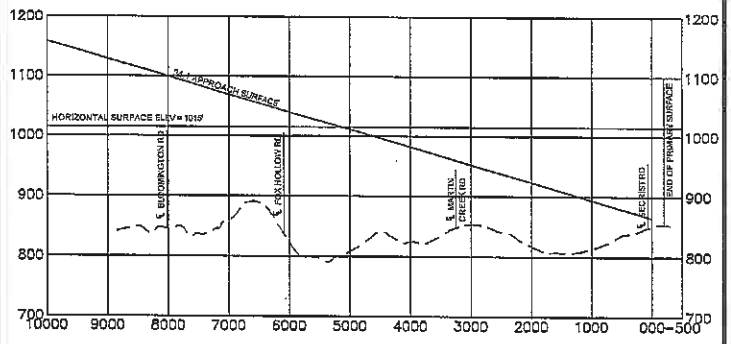




RUNWAY 17

RUNWAY 17 OBSTRUCTION TABLE					
#	DESCRIPTION	TOP ELEV.	PART 77 PENETRATION		DISPOSITION
1	RADIO TOWERS	1285	270'	HORIZONTAL	NONE

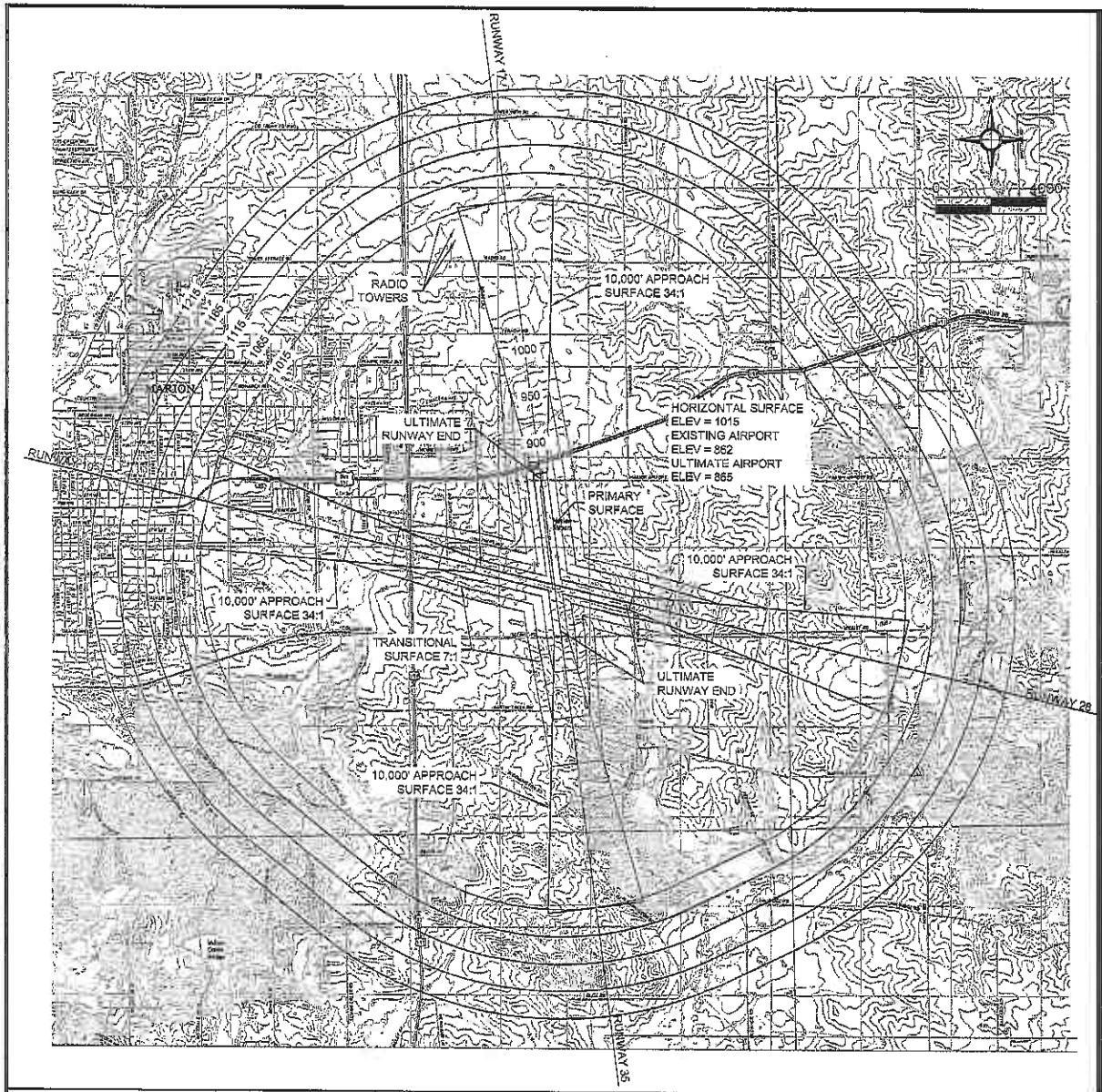


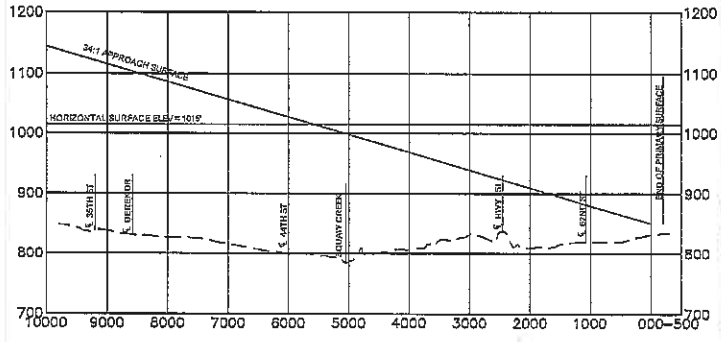
RUNWAY 35

RUNWAY 35 OBSTRUCTION TABLE					
#	DESCRIPTION	TOP ELEV.	PART 77 PENETRATION		DISPOSITION
			NONE		

ABES PROJECT NO: 215017 IDOT NO: 91160C17100	DRAWN BY: MJP APPROVED BY: JCD DATE: 1/10/2017	NO. REVISION DESCRIPTION	APPROVED	DATE	City of Marion ANDERSON BOGERT
Marion Municipal Airport	AIRPORT AIRSPACE DRAWING RUNWAY 17/35	SHEET NO. 1 OF 1			

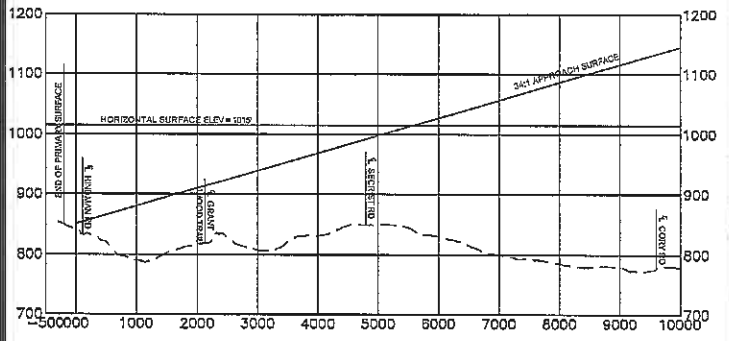
MJP399 T:\ACAD\2015\17\Sheets\Airport Airspace.dwg 4-27-17 05:53:27 PM





RUNWAY 10

RUNWAY 10 OBSTRUCTION TABLE				
#	DESCRIPTION	TOP ELEV.	PART 77 PENETRATION	DISPOSITION
NONE				



RUNWAY 28

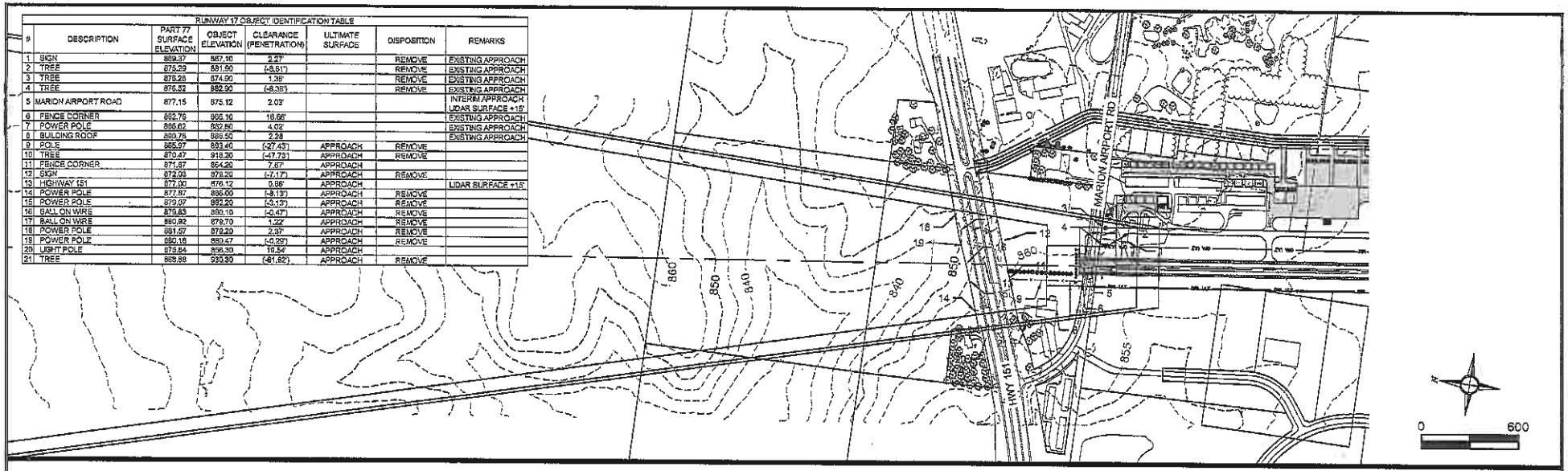
RUNWAY 28 OBSTRUCTION TABLE				
#	DESCRIPTION	TOP ELEV.	PART 77 PENETRATION	DISPOSITION
NONE				

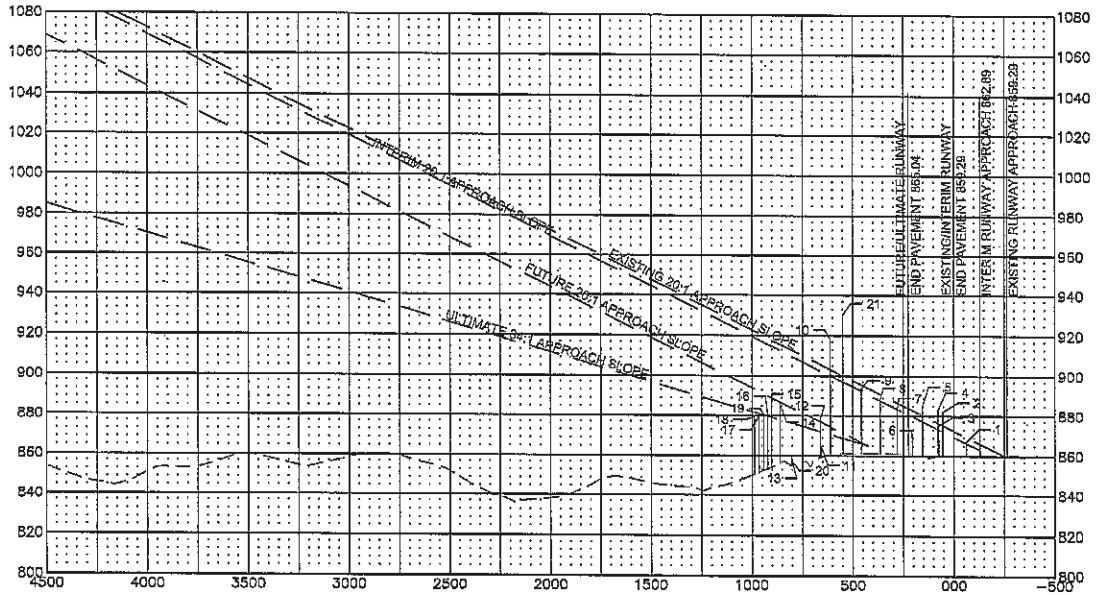
ABES PROJECT NO: 215017 IDOT NO: 91160C17100	DRAWN BY: MJP APPROVED BY: JCD DATE: 1/10/2017	NO.	REVISION DESCRIPTION	APPROVED	DATE
City of Marion ANDERSON BOGERT	Marion Municipal Airport	AIRPORT AIRSPACE DRAWING RUNWAY 10/28	SHEET NO. 1 OF 1		

MJP33b T:\ACAD\215017\Sheets\Airport Airspace.dwg 4-27-17 05:05:46 PM

RUNWAY 17 OBJECT IDENTIFICATION TABLE

#	DESCRIPTION	PART 77 SURFACE ELEVATION	OBJECT ELEVATION	CLEARANCE (PENETRATION)	ULTIMATE SURFACE	DISPOSITION	REMARKS
1	SIGN	869.37	867.10	2.27'		REMOVE	EXISTING APPROACH
2	TREE	875.29	881.90	(-6.61')		REMOVE	EXISTING APPROACH
3	TREE	875.26	874.90	1.36'		REMOVE	EXISTING APPROACH
4	TREE	876.52	882.90	(-6.38')		REMOVE	EXISTING APPROACH
5	MARION AIRPORT ROAD	877.15	875.12	2.03'			INTERIM APPROACH LIDAR SURFACE +15'
6	FENCE CORNER	862.76	866.10	16.66'			EXISTING APPROACH
7	POWER POLE	866.62	862.60	4.02'			EXISTING APPROACH
8	BUILDING ROOF	880.75	868.50	2.28			EXISTING APPROACH
9	POLE	885.97	893.40	(-27.43')	APPROACH	REMOVE	
10	TREE	870.47	918.20	(-47.73')	APPROACH	REMOVE	
11	FENCE CORNER	871.87	864.20	7.67'	APPROACH		
12	SIGN	872.03	879.20	(-7.17')	APPROACH	REMOVE	
13	HIGHWAY 151	877.00	876.12	0.86'	APPROACH		LIDAR SURFACE +15'
14	POWER POLE	877.87	886.00	(-8.13')	APPROACH	REMOVE	
15	POWER POLE	879.07	882.20	(-3.13')	APPROACH	REMOVE	
16	BALL ON WIRE	879.83	880.10	(-0.47')	APPROACH	REMOVE	
17	BALL ON WIRE	880.82	879.70	1.22'	APPROACH	REMOVE	
18	POWER POLE	881.57	879.20	2.37'	APPROACH	REMOVE	
19	POWER POLE	880.18	880.47	(-0.29')	APPROACH	REMOVE	
20	LIGHT POLE	879.84	896.30	16.54'	APPROACH		
21	TREE	888.88	930.30	(-81.82')	APPROACH	REMOVE	





ABES PROJECT NO: 215017 IDOT NO: 9H60C17100	DRAWN BY: MJP APPROVED BY: JCD DATE: 1/10/2017	NO. REVISION DESCRIPTION APPROVED DATE	City of Marion ANDERSON BOGERT	Marion Municipal Airport	INNER APPROACH RUNWAY 17	SHEET NO. 5 OF 12

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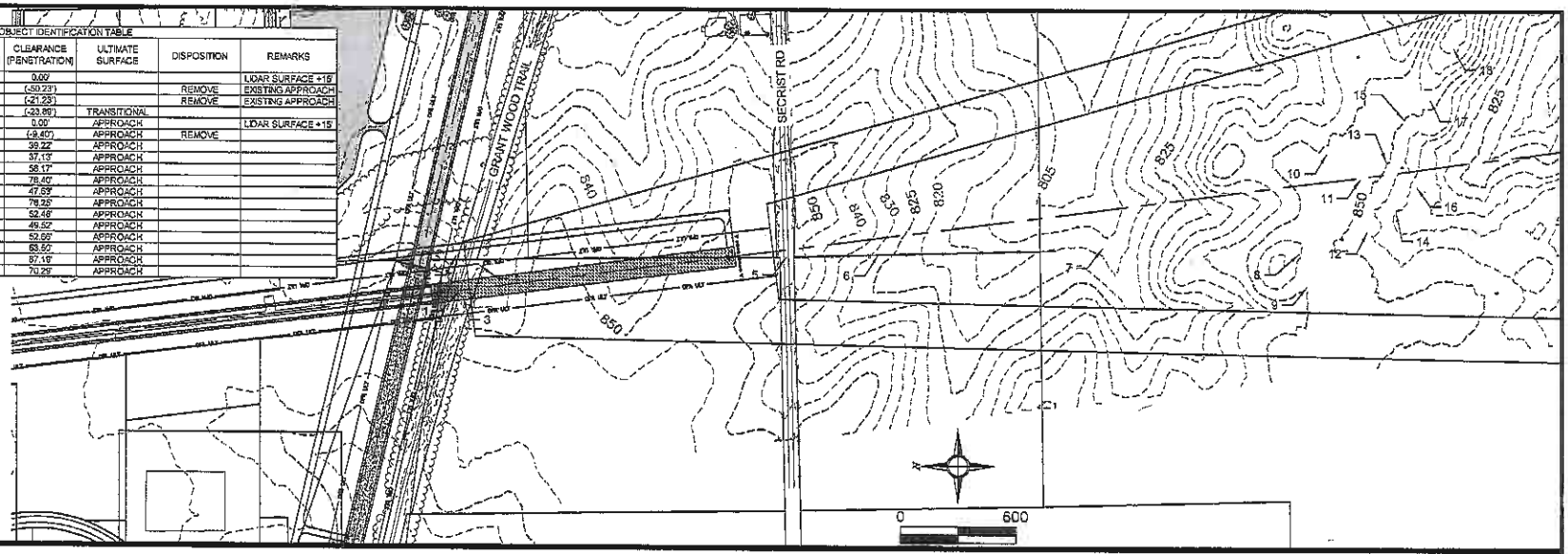
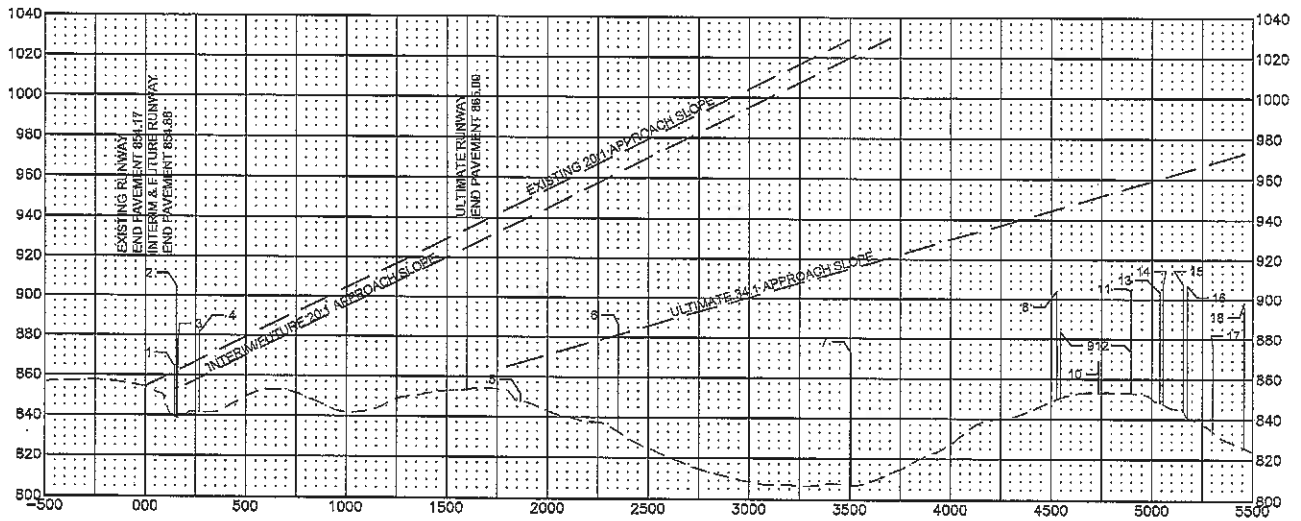
RUNWAY 35 OBJECT IDENTIFICATION TABLE

#	DESCRIPTION	PART 77 SURFACE ELEVATION	OBJECT ELEVATION	CLEARANCE (PENETRATION)	ULTIMATE SURFACE	DISPOSITION	REMARKS
1	GRANT WOOD TRAIL	854.17	854.17	0.00'			LIDAR SURFACE +15'
2	TREE	854.17	904.40	(-50.23')		REMOVE	EXISTING APPROACH
3	TREE	854.17	875.40	(-21.23')		REMOVE	EXISTING APPROACH
4	TREE	857.61	881.50	(-23.89')	TRANSITIONAL		
5	SECRIST ROAD	865.00	865.00	0.00'	APPROACH		LIDAR SURFACE +15'
6	TREE	877.10	886.50	(-9.40')	APPROACH	REMOVE	
7	TREE	911.12	871.90	39.22'	APPROACH		
8	TREE	941.13	904.00	37.13'	APPROACH		
9	POWER POLE	941.67	883.50	58.17'	APPROACH		
10	ROOF TOP	947.20	868.80	78.40'	APPROACH		
11	TREE	951.93	904.36	47.57'	APPROACH		
12	POWER POLE	951.95	873.70	78.25'	APPROACH		
13	TREE	955.68	903.80	52.48'	APPROACH		
14	TREE	956.62	907.00	49.62'	APPROACH		
15	TREE	959.56	906.90	52.66'	APPROACH		
16	GRAIN BIN	960.20	906.70	53.50'	APPROACH		
17	POWER POLE	963.89	876.70	87.19'	APPROACH		
18	POWER POLE	968.48	898.20	70.29'	APPROACH		





ABES PROJECT NO: 215017 IDOT NO: 9H60C17100	DRAWN BY: MJP APPROVED BY: JOD DATE: 1/10/2017	NO. | REVISION DESCRIPTION | APPROVED | DATE	City of MARION ANDERSON BOGERT	Marion Municipal Airport	INNER APPROACH RUNWAY 35	SHEET NO. 6 OF 12

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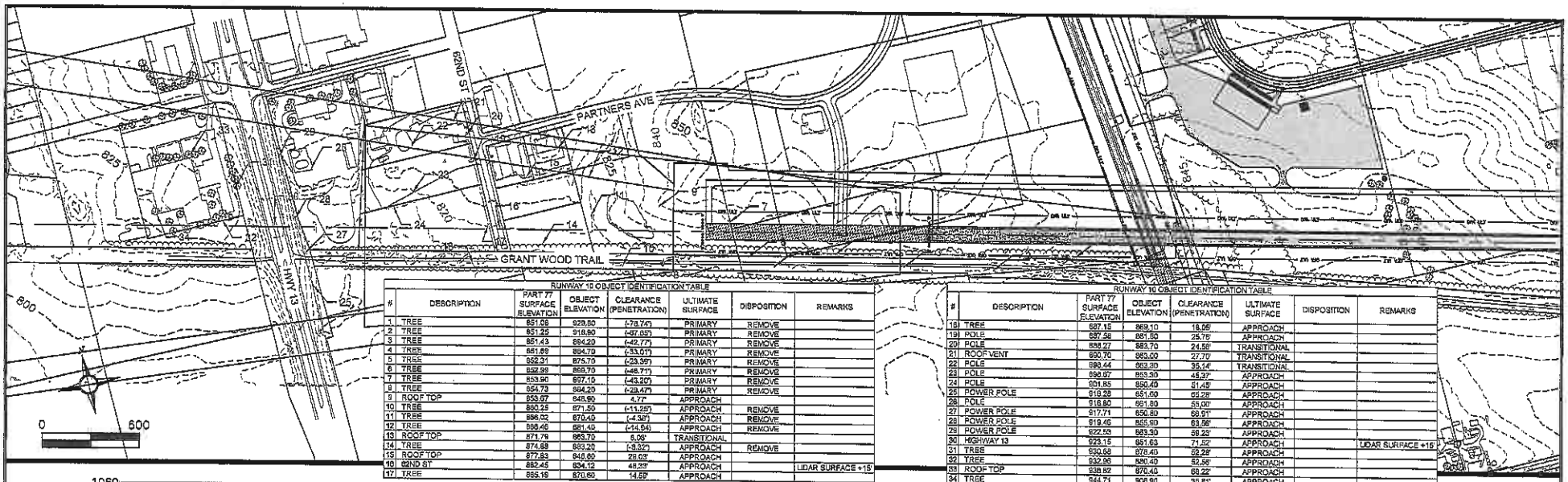
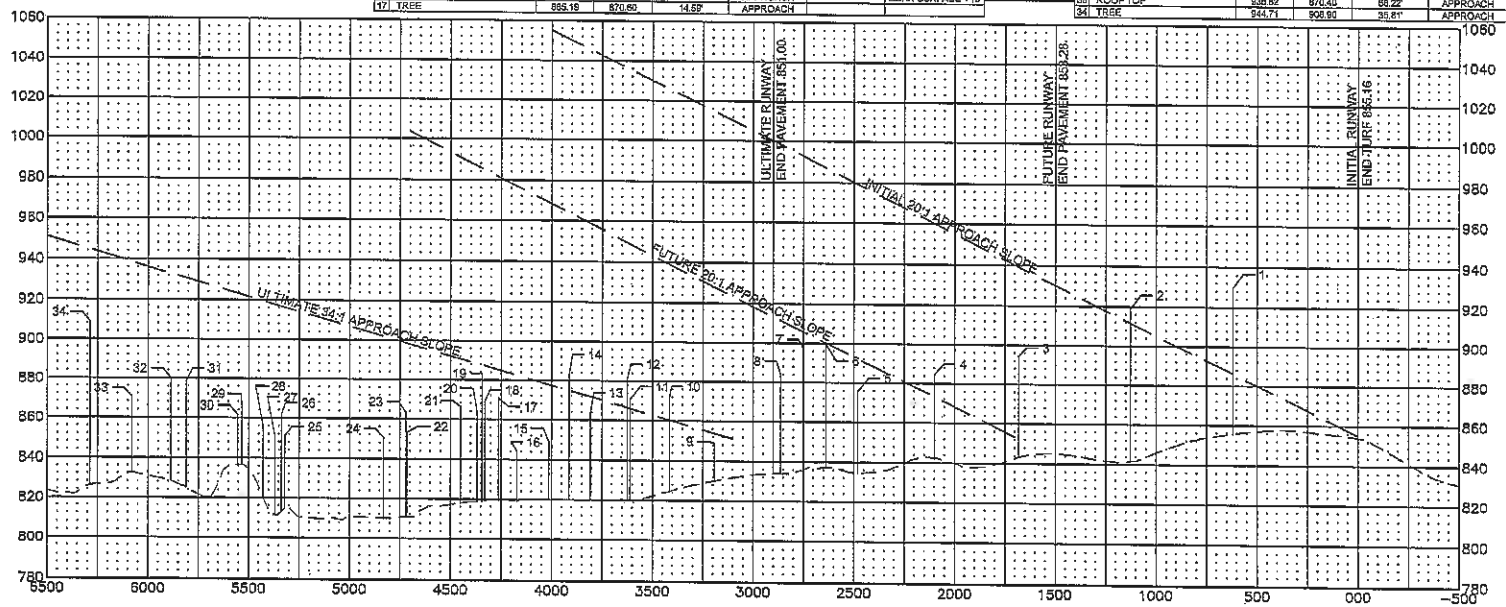


RUNWAY 10 OBJECT IDENTIFICATION TABLE

#	DESCRIPTION	PART 77 SURFACE ELEVATION	OBJECT ELEVATION	CLEARANCE (PENETRATION)	ULTIMATE SURFACE	DISPOSITION	REMARKS
1	TREE	851.08	929.80	(-78.74')	PRIMARY	REMOVE	
2	TREE	851.25	918.80	(-67.55')	PRIMARY	REMOVE	
3	TREE	851.43	894.20	(-42.77')	PRIMARY	REMOVE	
4	TREE	851.69	904.70	(-53.01')	PRIMARY	REMOVE	
5	TREE	852.31	875.70	(-23.39')	PRIMARY	REMOVE	
6	TREE	852.99	899.70	(-46.71')	PRIMARY	REMOVE	
7	TREE	853.90	897.10	(-43.20')	PRIMARY	REMOVE	
8	TREE	854.73	884.20	(-29.47')	PRIMARY	REMOVE	
9	ROOF TOP	853.67	848.90	4.77'	APPROACH		
10	TREE	882.25	871.20	(-11.05')	APPROACH	REMOVE	
11	TREE	886.02	870.40	(-4.38')	APPROACH	REMOVE	
12	TREE	886.46	881.40	(-14.94)	APPROACH	REMOVE	
13	ROOF TOP	871.79	865.70	6.09'	TRANSITIONAL		
14	TREE	874.88	883.20	(-8.32')	APPROACH	REMOVE	
15	ROOF TOP	877.83	849.80	28.03'	APPROACH		
16	62ND ST	882.45	834.12	48.33'	APPROACH		LIDAR SURFACE +15'
17	TREE	883.18	870.80	14.59'	APPROACH		

RUNWAY 10 OBJECT IDENTIFICATION TABLE

#	DESCRIPTION	PART 77 SURFACE ELEVATION	OBJECT ELEVATION	CLEARANCE (PENETRATION)	ULTIMATE SURFACE	DISPOSITION	REMARKS
18	TREE	887.15	869.10	18.05'	APPROACH		
19	POLE	887.56	861.80	25.76'	APPROACH		
20	POLE	888.27	863.70	24.58'	TRANSITIONAL		
21	ROOF VENT	890.70	863.00	27.70'	TRANSITIONAL		
22	POLE	898.44	863.30	35.14'	TRANSITIONAL		
23	POLE	898.67	853.30	45.37'	APPROACH		
24	POLE	901.85	850.40	51.45'	APPROACH		
25	POWER POLE	919.28	851.60	66.28'	APPROACH		
26	POLE	916.80	861.80	55.00'	APPROACH		
27	POWER POLE	917.71	850.80	66.91'	APPROACH		
28	POWER POLE	919.46	855.90	63.56'	APPROACH		
29	POWER POLE	922.53	863.30	59.23'	APPROACH		
30	HIGHWAY 13	923.18	851.63	71.55'	APPROACH		LIDAR SURFACE +15'
31	TREE	930.98	872.40	58.58'	APPROACH		
32	TREE	932.96	880.40	52.56'	APPROACH		
33	ROOF TOP	938.82	870.40	68.22'	APPROACH		
34	TREE	944.71	908.90	35.81'	APPROACH		



ABES PROJECT NO: 215017 IDOT NO: 91160C17100	DRAWN BY: MJP APPROVED BY: JCD DATE: 1/10/2017	NO. | REVISION DESCRIPTION | APPROVED | DATE	City of Marion / ANDERSON BOGERT	Marion Municipal Airport	INNER APPROACH RUNWAY 10	SHEET NO. 7 OF 12

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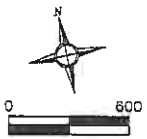
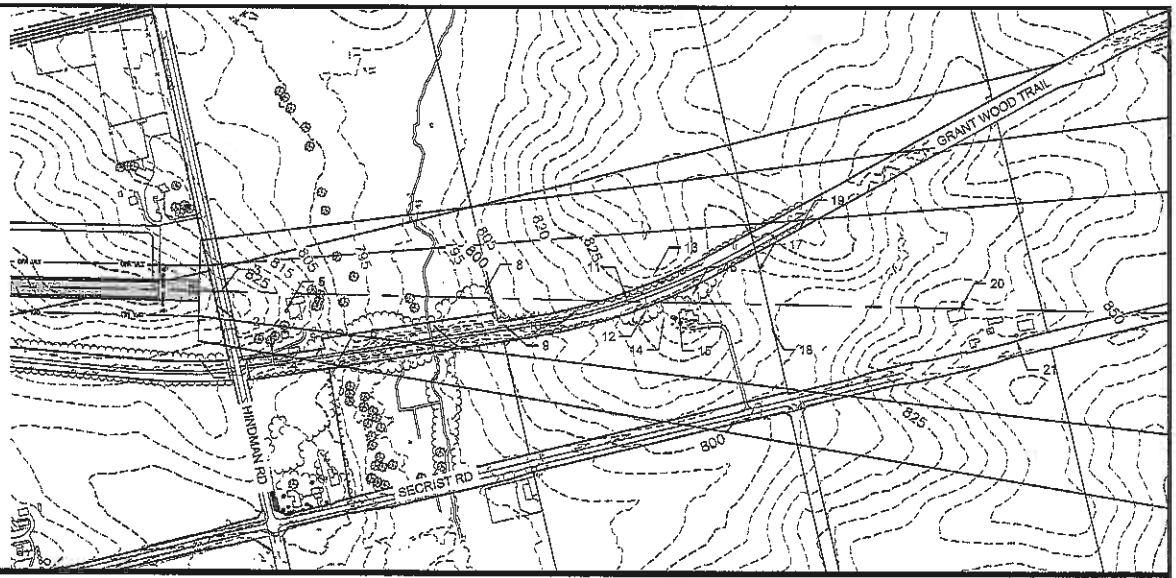
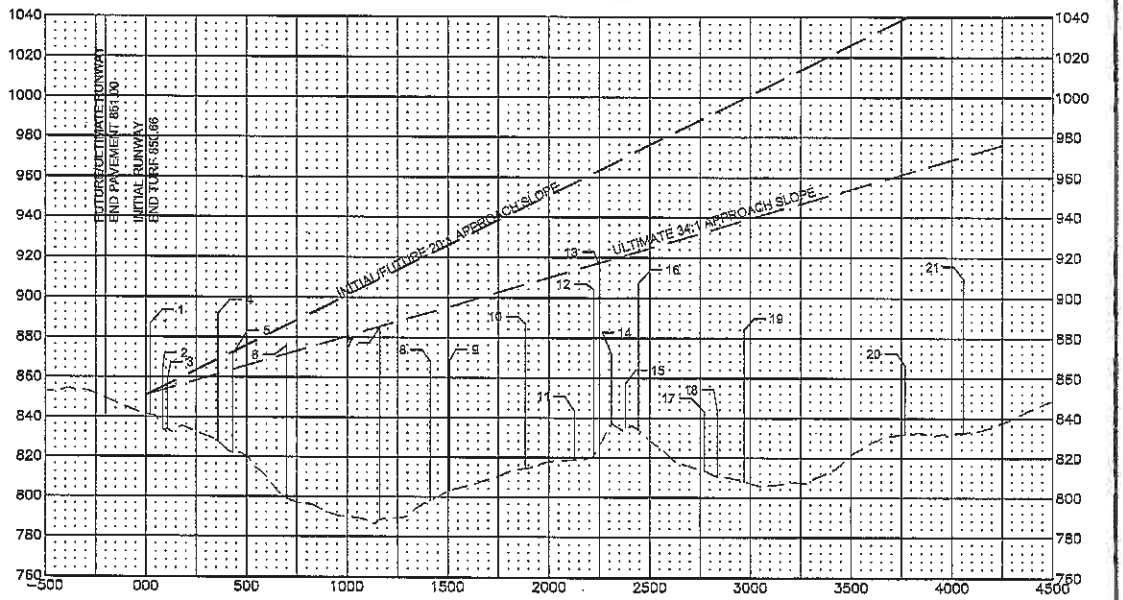


RUNWAY 28 OBJECT IDENTIFICATION TABLE

#	DESCRIPTION	PART 77 SURFACE ELEVATION	OBJECT ELEVATION	CLEARANCE (PENETRATION)	ULTIMATE SURFACE	DISPOSITION	REMARKS
1	TREE	851.63	886.90	(-34.87')	TRANSITIONAL	REMOVE	
2	POWER POLE	953.48	953.20	(-9.72')	APPROACH	REMOVE	
3	HINDMAN RD	854.16	855.00	1.16	APPROACH		LIDAR SURFACE +15'
4	TREE	881.53	891.70	(-30.17')	APPROACH	REMOVE	
5	GRAIN BIN	883.88	871.20	(-7.52')	APPROACH	REMOVE	
6	TREE	871.56	875.70	(-4.14')	APPROACH	REMOVE	
7	TREE	855.21	884.90	0.91'	APPROACH		
8	TREE	892.57	887.90	24.97'	APPROACH		
9	TREE	895.58	868.30	27.08'	APPROACH		
10	TREE	905.41	886.80	19.61'	APPROACH		
11	GRANT WOOD TRAIL	913.55	833.90	79.65'	APPROACH		LIDAR SURFACE +15'
12	TREE	916.38	904.00	12.36'	APPROACH		
13	TREE	917.27	915.20	2.07'	APPROACH		
14	WIND MILL	918.98	872.50	46.58'	APPROACH		
15	ROOF TOP	921.01	857.40	63.61'	APPROACH		
16	TREE	922.69	907.10	15.79'	APPROACH		
17	POWER POLE	932.59	843.20	89.39'	APPROACH		
18	POWER POLE	934.44	844.00	90.44'	APPROACH		
19	TREE	939.37	884.00	54.37'	APPROACH		
20	ROOF TOP	951.82	866.30	85.52'	APPROACH		
21	TREE	970.40	909.40	61.00'	APPROACH		





ABES PROJECT NO: 215017
IDOT NO: 9I160C17100

DRAWN BY: MJP
APPROVED BY: JCD
DATE: 1/10/2017

NO.	REVISION DESCRIPTION	APPROVED	DATE

City of Marion
ANDERSON BOGERT

Marion Municipal Airport

INNER APPROACH
RUNWAY 28

SHEET NO. 8 OF 12

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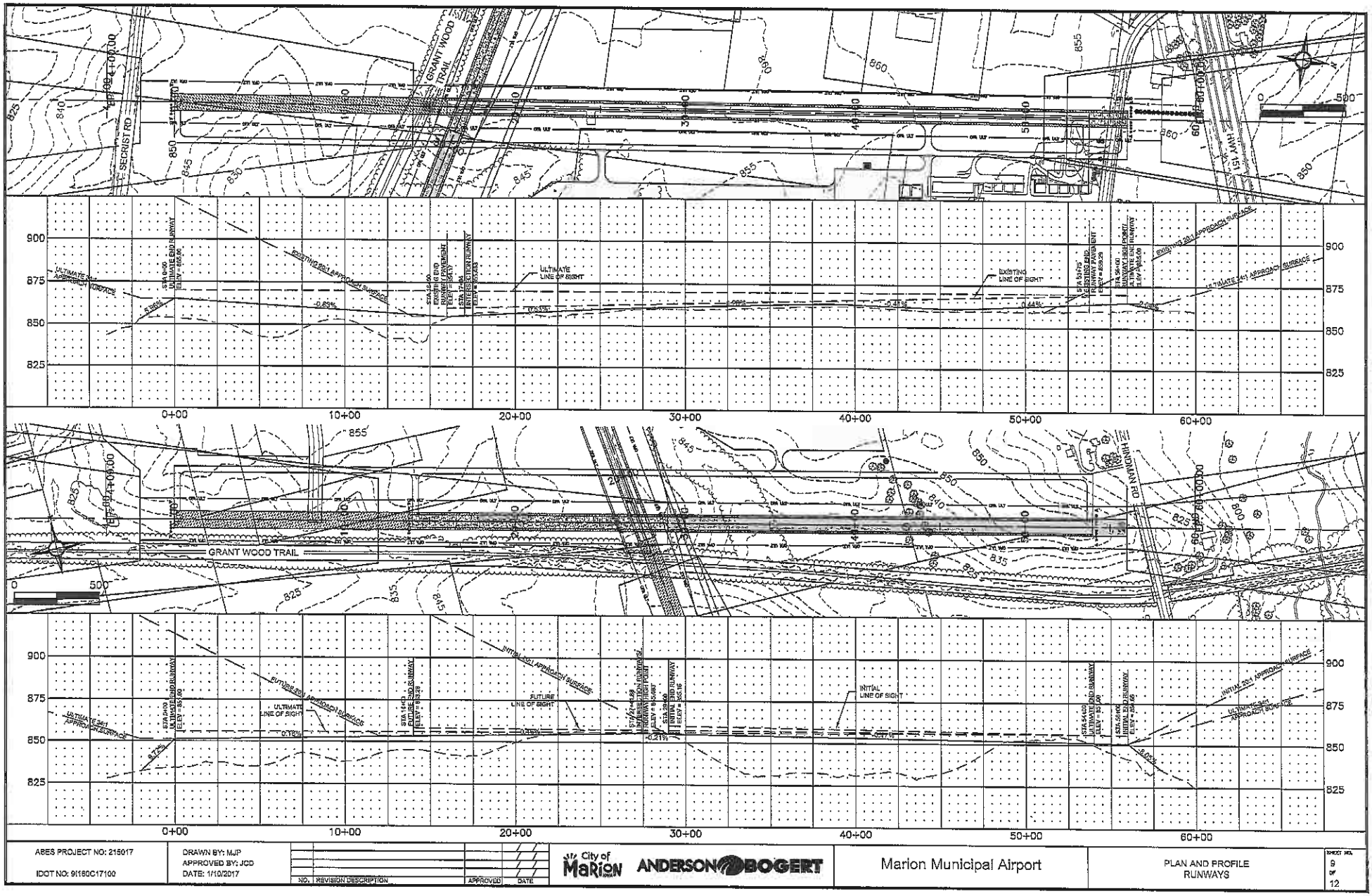

ABES PROJECT NO: 215017 IDOT NO: 91160C17100	DRAWN BY: MJP APPROVED BY: JCD DATE: 1/10/2017	NO.	REVISION DESCRIPTION	APPROVED	DATE	City of Marion / ANDERSON BOGERT	Marion Municipal Airport	PLAN AND PROFILE RUNWAYS	SHEET NO. 9 OF 12

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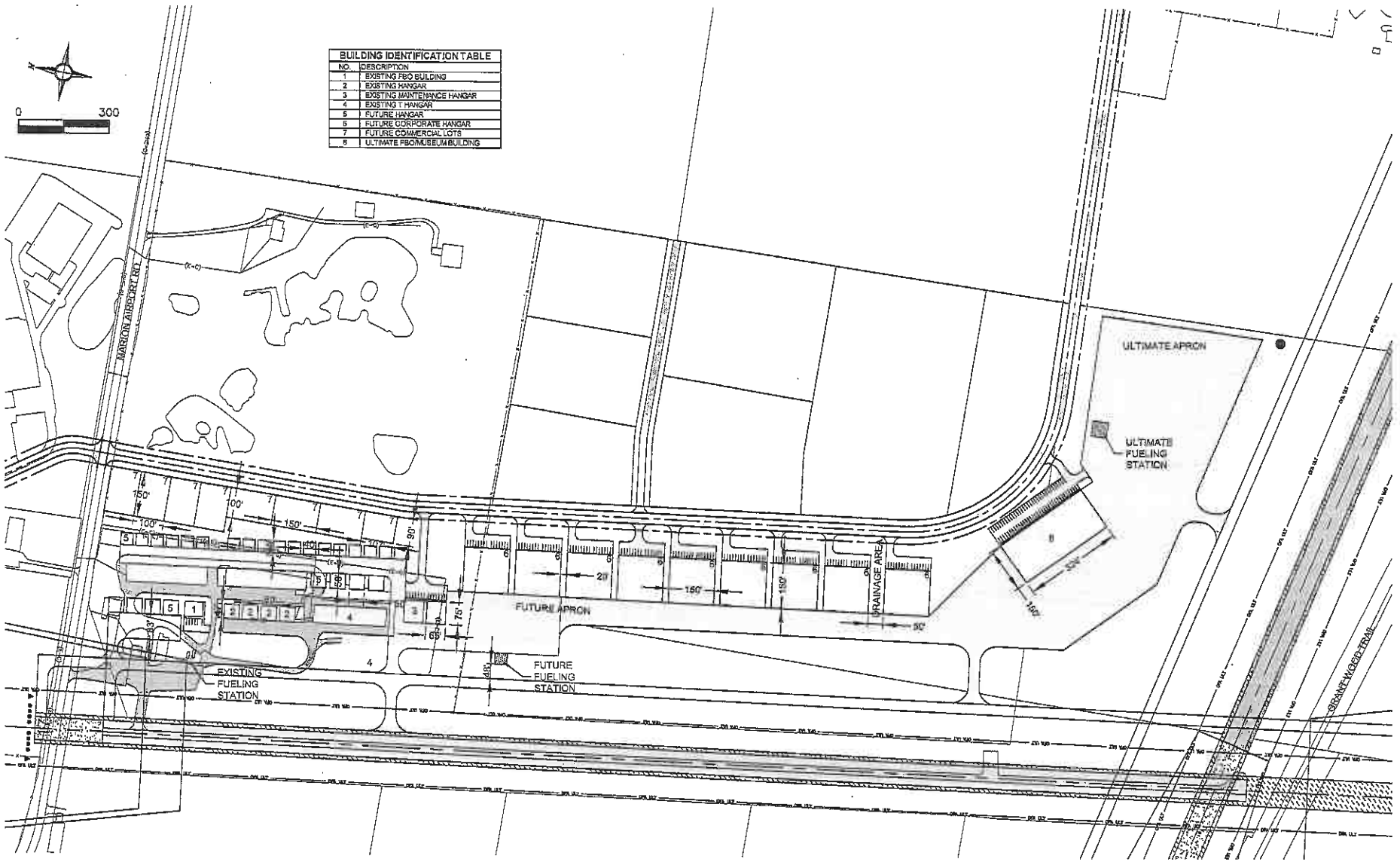
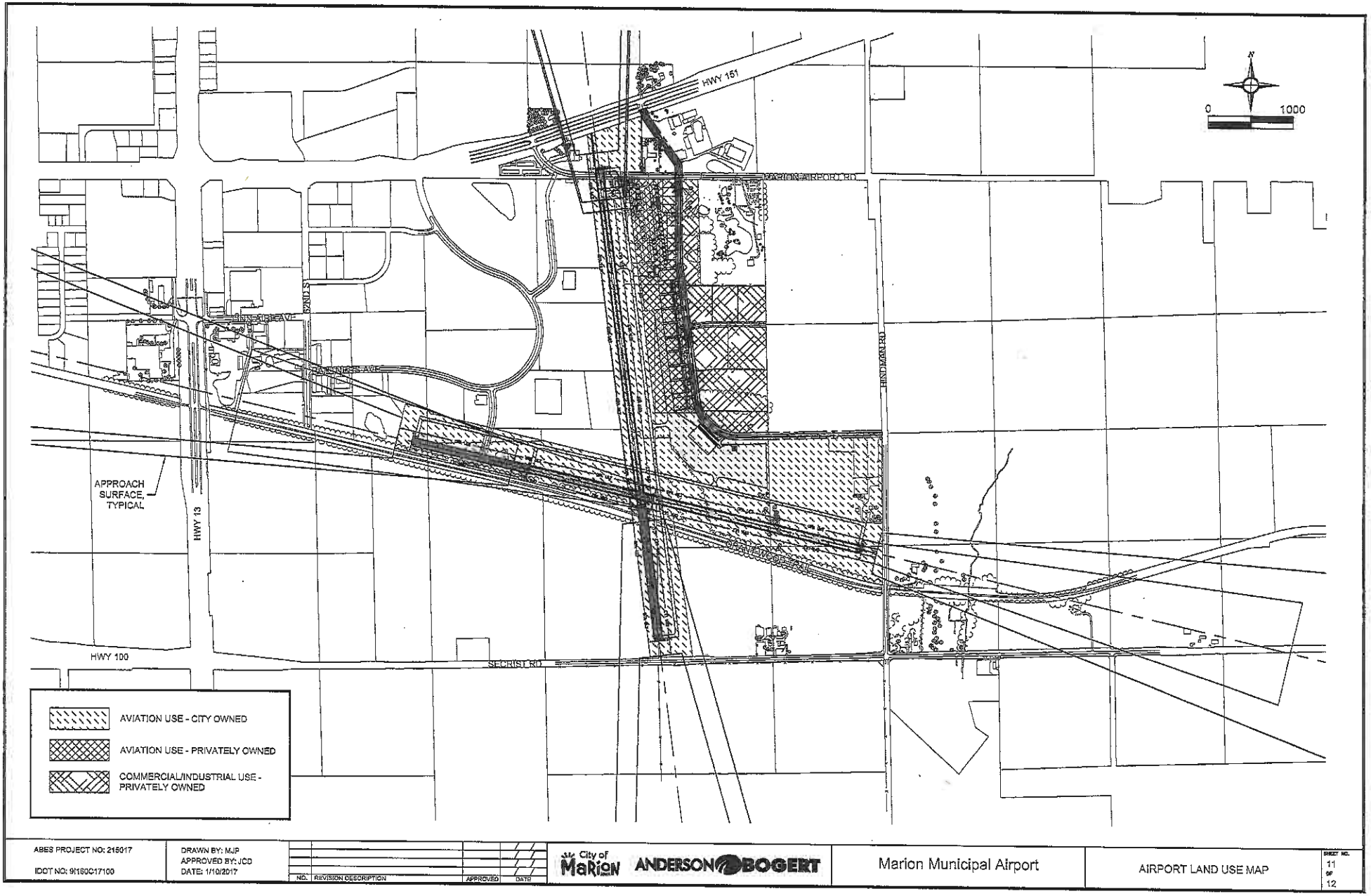


ABES PROJECT NO: 215017 IDOT NO: 91160C17100	DRAWN BY: MJP APPROVED BY: JCD DATE: 1/10/2017	NO. REVISION DESCRIPTION APPROVED DATE	City of Marion ANDERSON BOGERT Marion Municipal Airport TERMINAL AREA DRAWING SHEET NO. 10 OF 12

MJP399 T:\ACAD\215017\Sheets\Terminal Area.dwg 1-10-17 03:00:54 PM



ABES PROJECT NO: 215017 IDOT NO: 9/16GC17100	DRAWN BY: MJP APPROVED BY: JCD DATE: 1/10/2017	NO. REVISION DESCRIPTION — APPROVED — DATE	City of Marion ANDERSON BOGERT	Marion Municipal Airport	AIRPORT LAND USE MAP	SHEET NO. 11 OF 12

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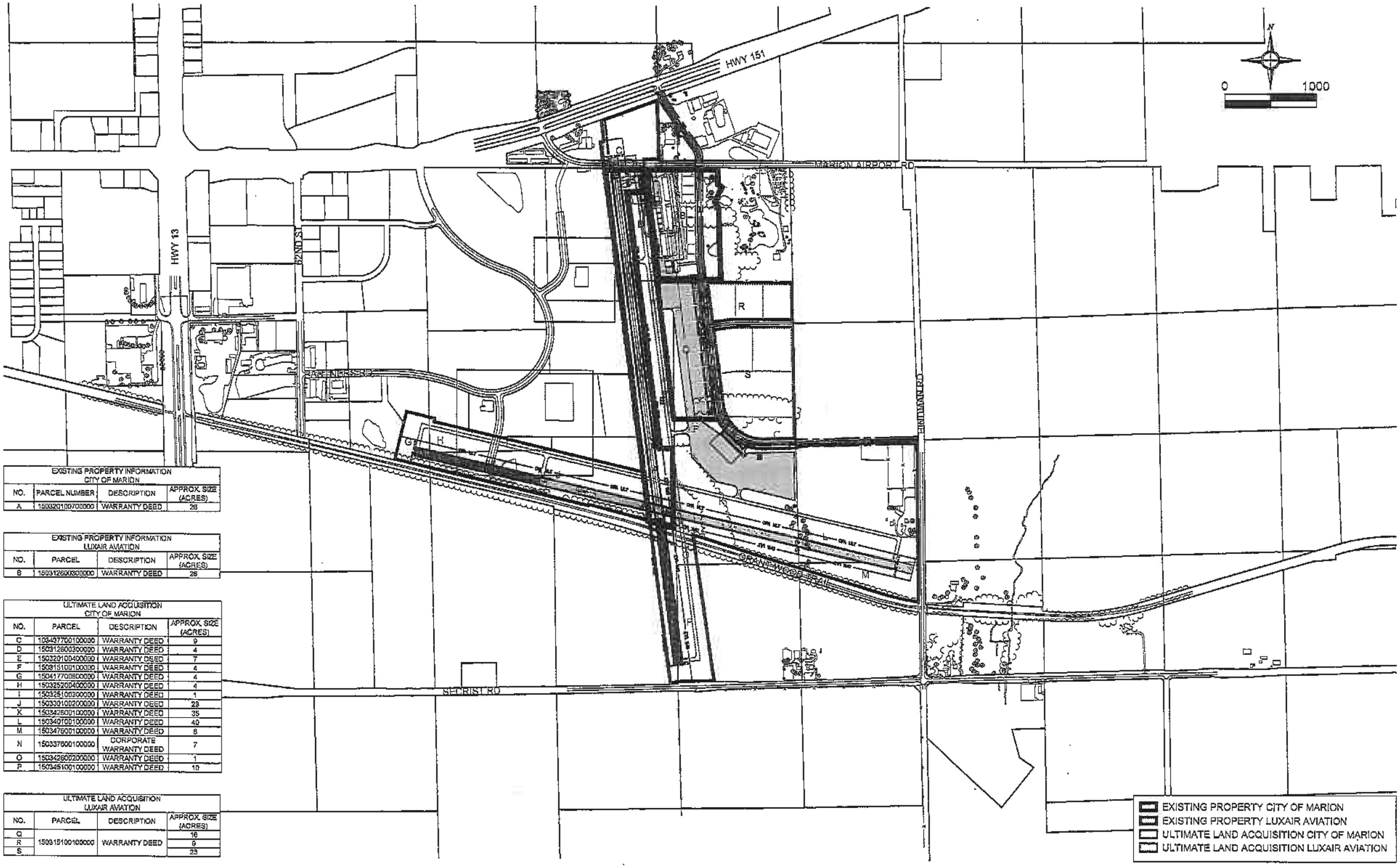

EXISTING PROPERTY INFORMATION CITY OF MARION			
NO.	PARCEL NUMBER	DESCRIPTION	APPROX. SIZE (ACRES)
A	150320100700000	WARRANTY DEED	26

EXISTING PROPERTY INFORMATION LUXAIR AVIATION			
NO.	PARCEL	DESCRIPTION	APPROX. SIZE (ACRES)
B	150312600300000	WARRANTY DEED	26

ULTIMATE LAND ACQUISITION CITY OF MARION			
NO.	PARCEL	DESCRIPTION	APPROX. SIZE (ACRES)
C	103437700100000	WARRANTY DEED	9
D	150312600300000	WARRANTY DEED	4
E	150320100400000	WARRANTY DEED	7
F	150315100100000	WARRANTY DEED	4
G	150417700800000	WARRANTY DEED	4
H	150325200400000	WARRANTY DEED	4
I	150325100300000	WARRANTY DEED	1
J	150330100200000	WARRANTY DEED	23
K	150342600100000	WARRANTY DEED	35
L	150340100100000	WARRANTY DEED	40
M	150347600100000	WARRANTY DEED	6
N	150337600100000	CORPORATE WARRANTY DEED	7
O	150342600200000	WARRANTY DEED	1
P	150345100100000	WARRANTY DEED	10

ULTIMATE LAND ACQUISITION LUXAIR AVIATION			
NO.	PARCEL	DESCRIPTION	APPROX. SIZE (ACRES)
Q	150315100100000	WARRANTY DEED	16
R			9
S			23

ABES PROJECT NO: 215017
IDOT NO: 9I160C17100

DRAWN BY: MJP
APPROVED BY: JCD
DATE: 1/10/2017

NO.	REVISION DESCRIPTION	APPROVED	DATE

City of Marion
ANDERSON BOGERT

Marion Municipal Airport

AIRPORT PROPERTY MAP

SHEET NO. 12 OF 12