H. GENE McKEOWN AND ASSOCIATES, INC.
hgm
CONSULTING ENGINEERS
P. O. BOX 43
DENISON, IOWA 51442

January 20, 1988

Honorable Chairman & Board Members
Harrison County Supervisors
Courthouse
Logan, Iowa 51546

Gentlemen:

We are pleased to present this report as the overall Airport Development Plan for the Harrison County Airport Service Area in accordance with your authorization of January, 1986.

The material presented in this report is designed to provide the necessary guidelines for the establishment and future development of the Harrison County Airport. The development proposed herein will satisfy the aviation demand of the Harrison County Airport Service Area, and will remain compatible with the environment, other county development efforts and other modes of transportation.

This report contains pertinent information about the county, aviation forecasts and a facility requirement schedule to satisfy the future aviation demand. A thorough site selection for an airport site was conducted and discussed herein along with a narrative evaluation of the socio-economic environmental feasibility of airport development.

The study also contains airport site plans depicting ultimate development of the facility, an outline of the stage development process, probable construction cost estimates, discussion of possible sources of financing to aid in the airport development and creation of an airport authority to actually implement the plan.

We would like to take this opportunity to thank the Harrison County Board of Supervisors for allowing us to be of service to you and we welcome the opportunity and challenge to aid in the implementation of this study.

Very truly yours,

H. GENE McKEOWN & ASSOCIATES, INC.

Richard C. Dueland

Richard C. Dueland, P.E.

AIRPORT DEVELOPMENT PLAN

HARRISON COUNTY AIRPORT
SERVICE AREA

January, 1988

The preparation of this document was financed in part through a planning grant from the Iowa Department of Transportation Planning and Research Division. The contents of this report reflect the views of H. Gene McKeown & Associates, Inc., Consulting Engineers and Professional Design Services, Inc. of Iowa, who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policy of the Iowa Department of Transportation.

I hereby certify that this report was prepared by me or under my direct personal supervision and that I am a duly registered Professional Engineer under the laws of the State of Iowa.

January 20, 1988
Date

Richard C. Dueland
Richard C. Dueland, P.E.
Iowa Reg. No. 5796

ACKNOWLEDGEMENT

We wish to gratefully acknowledge the cooperation and assistance of the Harrison County Board of Supervisors, Harrison County Development Corporation Board Members and Site Selection Committee and all the citizens of Harrison County who contributed time and effort to assist in this study.

H. GENE McKEOWN & ASSOCIATES, INC.
Consulting Engineers

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SECTION ONE

AIRPORT PLANNING PROCESS

Harrison County retained H. Gene McKeown and Associates to examine the feasibility of constructing a single airport facility in Harrison County to serve all users. A grant-in-aid was obtained from the Iowa Department of Transportation to carry out a scope of work designed to address extent, type, cost, feasibility, and schedule of future airport facility needs. The scope of work concluded that if it were feasible to construct, maintain, and operate a single public airport, a plan to include implementation stages would be prepared.

The primary goal of the Airport Development Plan was to identify future airport development needs which would satisfy aviation demand in a feasible and prudent manner. Professional Design Services of Iowa, Inc. was retained by H. Gene McKeown to assist in carrying out the primary goal and specific plan objectives. The objectives are noted below and were incorporated into the planning process described in Figure 1-1.

OBJECTIVES:

1. To provide an effective graphic presentation of the future development of the airport and anticipated land uses in the vicinity of the airport.

2. To establish a realistic schedule for the implementation of the development proposed in the plan, particularly for the short term capital improvement program.

3. To propose an achievable financial plan to support the implementation schedule.

4. To justify the plan technically and procedurally through a thorough investigation of concepts and alternatives on technical, economic, and enviornmental grounds.

5. To present for public consideration, in a convincing and candid manner, a plan which adequately addresses the issues and satisfies Local, State and, Federal regulations.

6. To document policies and future aeronautical demands for reference in municipal deliberations on spending and debt incurrence and land use controls, e.g., subdivision regulations and the erection of potential obstructions to air navigation.

7. To set the stage and establish the framework for a continuing planning process. Such a process should monitor key conditions and adjust plan recommendations if required by changed circumstances.

This report is presented in six sections, the first of which summarizes relevant background information used in the preparation of sections two through six.

FIGURE 1-1: AIRPORT DEVELOPMENT PLANNING PROCESS

I. INVENTORY

-Existing airport site(s)
-Airport service area
-Goals and objectives
-Socio-economic characteristics

II. FORECAST

-Registered aircraft
-Based aircraft
-Itinerant and local operations
-Air taxi operations
-Design aircraft
-Passenger and air freight
-Decision Point

III. BENEFIT/COST ASSESSMENT

-Demand/Capacity
-Airport service level
-Airside, landside
-Decision Point

IV. FACILITY NEED

-Wind coverage
-Runway length, width, strength
-Taxiway
-Landing and navigational aids
-FAR Part 77
-Terminal area

V. AIRPORT SITE SELECTION

-Candidate sites
-Decision Point

VI. ALTERNATIVES

-On/Off Airport land use
-Environmental considerations
-Development alternatives

VII. PLANS

-ALP
-Imaginary surfaces
-Clear zone plan/profile
-Terminal area plan

VIII. IMPLEMENTATION

-Development schedule
-Cost estimates
-O & M
-Capital revenue sources
-Strategy for implementation

Citizen Participation on-going

SOURCE: PDS of Iowa

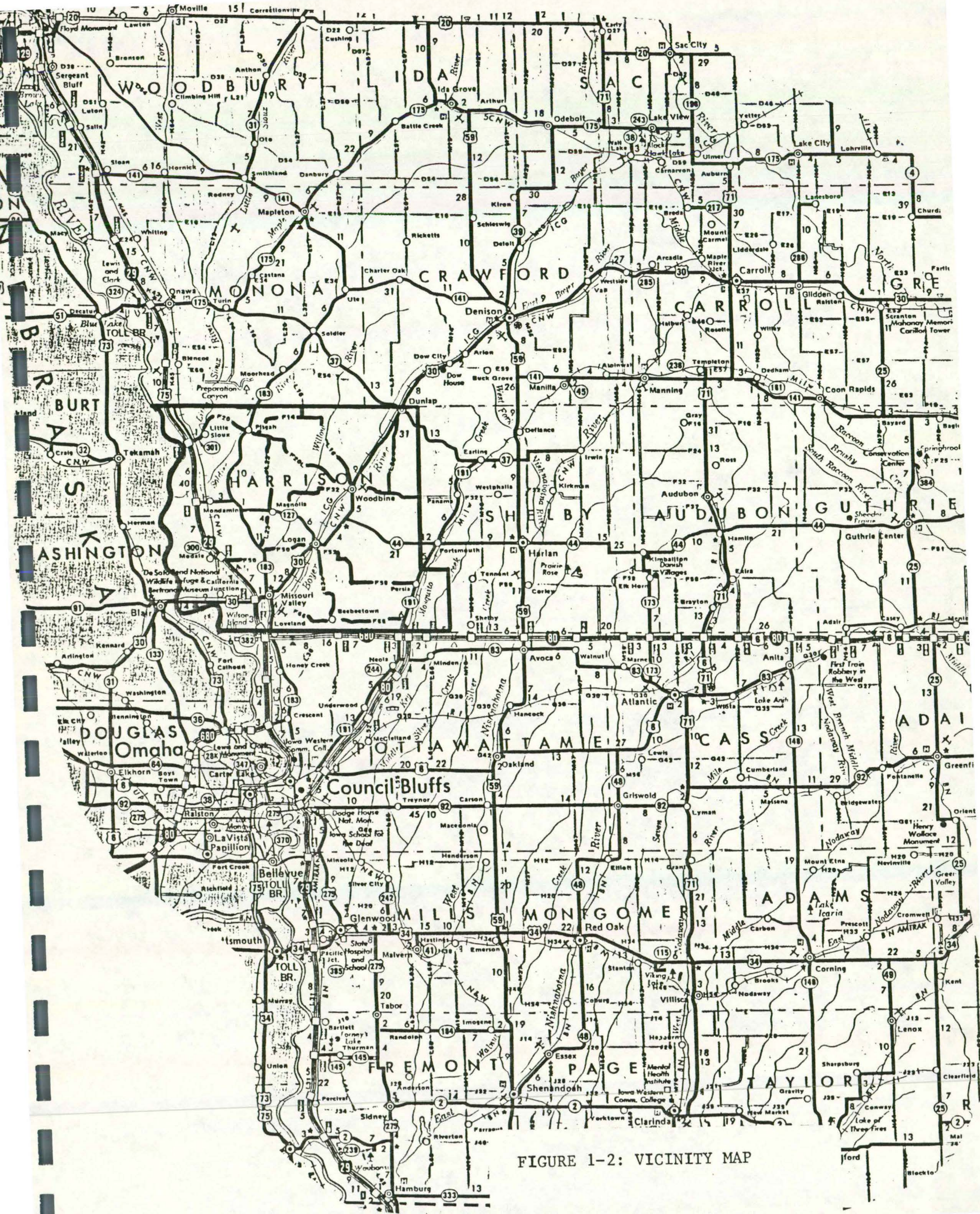


FIGURE 1-2: VICINITY MAP

Physical Setting

Harrison County is located approximately 115 miles west of Des Moines and 25 miles north of the Omaha, Council Bluffs metropolitan area. Harrison County is bounded on the west by the Missouri River and Washington County, Nebraska. The County is bounded on the north by Monona and Crawford Counties, to the west by Shelby County, and to the south by Pottawattamie County. The County covers an area of 690 square miles.

Unique topographic features are evident in Harrison County beginning with the Missouri River bottom lands which extend in width from 12 miles near Missouri Valley to 2.5 miles near the Sioux River. The bottom land area is nearly level except for a narrow band of hummocks and dunes. Numerous sloughs and channels are found, along with man-made drainage ditches.

The terrain rises rapidly from the bottom lands reaching 150 to 250 feet. Narrow ridgetops, long, steep sides, and deep gullies are characteristic of the hills which extend in width from one quarter to 2.5 miles along the Missouri River bottom lands.

The balance of the County consists of rolling uplands consisting of well rounded ridgetops, smooth side slopes, and wide valleys. The County is drained by numerous streams of which the Missouri River and its tributaries (Boyer River and Soldier Creek) are the more dominant.

Soils

Loess, wind deposited silt particles, is the most extensive parent material in Harrison County. Most of the upland soils were formed in the Wisconsin glacial period. Loess believed to have blown mainly from the flood plain of the Missouri River during the Wisconsin glacial period from about 25000 to 14000 years ago. The loess ranges in depth from 40 to 100 feet along the Missouri River bluffs (Hamburg soils).

Alluvium is deposited by streams and represents the second most extensive parent material and from which 30 or so soils series in the County were formed. The largest area of soils formed in alluvium is along the Missouri River. Soils formed in alluvium is widely varied in texture depending upon where it was derived and the manner in which deposited.

The third parent material, glacial till, is the least extensive and is the parent material of only one soil (Steinauer soil). A description of engineering properties and specific soils are discussed in Section V, Airport Site Selection. Reference may be made to Figure 1-3.

Climate

The present climate is classified as mid-continental, subhumid. Climatic conditions have an impact upon the need for and design of selected airport components. Wind conditions influence runway orientation and temperature is a factor in determining runway length.

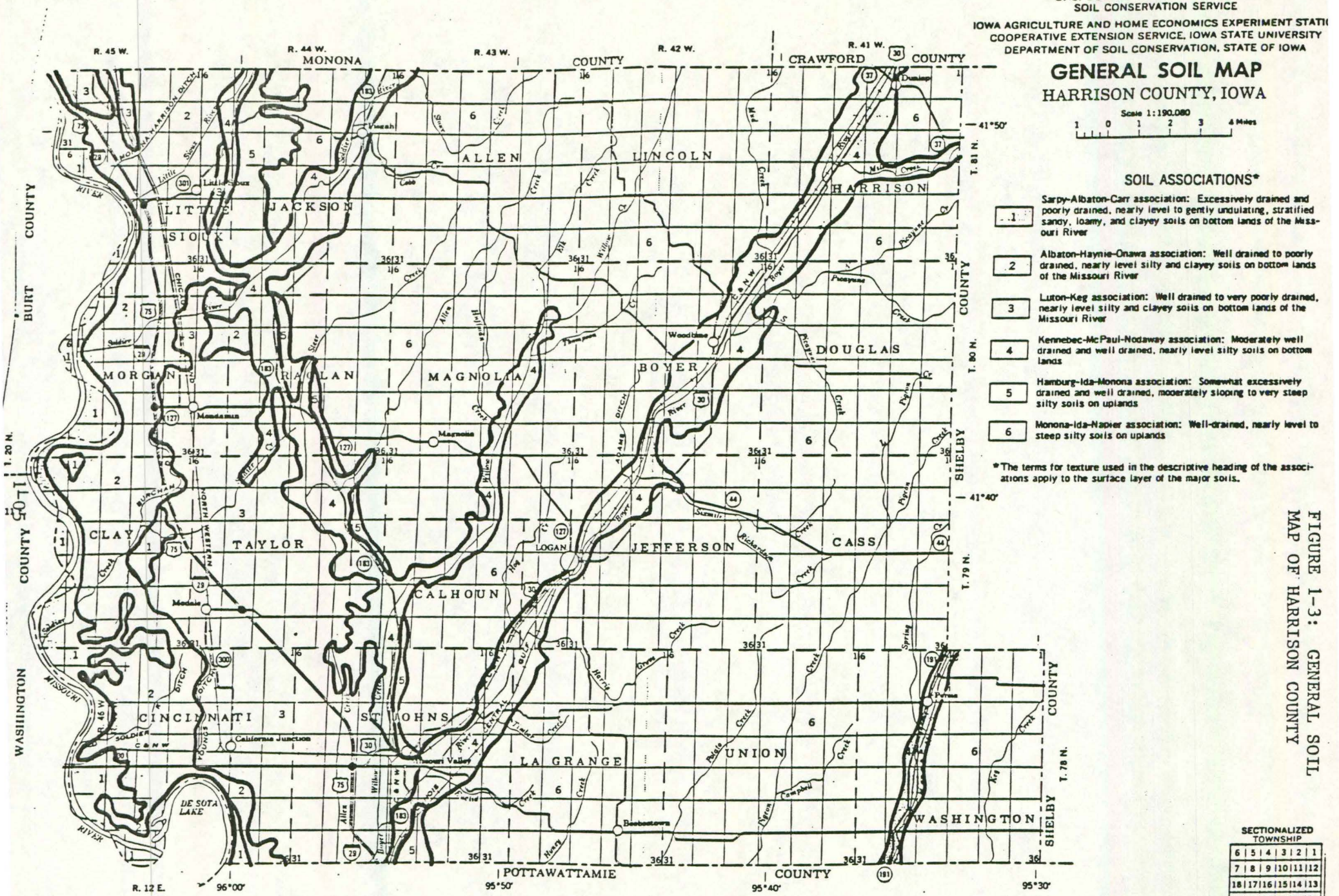


FIGURE 1-3: GENERAL SOIL MAP OF HARRISON COUNTY

TABLE 1-1: TEMPERATURE - LOGAN, IOWA

MONTH	AVG. DAILY MAX.	AVG. DAILY MIN.	AVG. HIGHEST
Jan.	31 degrees F	11 degrees F	50 degrees F
Feb.	35	15	56
Mar.	48	26	72
Apr.	63	38	85
May	74	49	90
June	83	59	95
July	88	63	97
Aug.	86	61	97
Sept.	78	53	91
Oct.	66	41	84
Nov.	48	27	68
Dec.	36	17	56

SOURCE: USDA, Soil Survey of Harrison County, Iowa, 1976

Transportation

Harrison County is well served with all modes of transportation to include barge, rail, and highway. Scheduled air service is available at Eppley Field, (25 miles from Missouri Valley). Barge service is available at terminals located along the Missouri River.

Interstate Highway 29 provides north-south travel from and to Sioux City and Omaha/Council Bluffs. Interstate Highway 680 provides access to Des Moines via I-80 and is located just south of the Harrison County line in Pottawattamie County. U.S. Highway 30 enters the County at Dunlap, intersecting I-29 near Missouri Valley. U.S. Highway 30 provides access to Blair, Nebraska and is one of two highways crossing the Missouri River between I-680 (Omaha) and Sioux City, Iowa.

Rail service is provided by the Chicago Central and Pacific and Chicago and North Western Transportation Company. The CNW line is the main east-west line from the coal fields in Wyoming to Chicago. The Illinois Central Gulf is currently in the process of being acquired. The nearest piggyback service is found at rail terminals in the Omaha/Council Bluffs metro area.

Motor carriers provide service to a number of Harrison County communities. Reference may be made to the following Table.

TABLE 1-2: MOTOR CARRIER SERVICE, HARRISON COUNTY

	NUMBER SERVING	LOCAL TERMINALS	INTRASTATE CARRIERS	INTERSTATE CARRIERS
Woodbine	8	0	8	2
Missouri Valley	3	1	1	2
Logan	12	0	4	8
Dunlap	5	0	1	4
Modale	3	0	1	2
Little Sioux	0	0	0	0
Persia	3	0	1	2
Mondamin	7	0	3	4
Pisgah	2	0	2	0

SOURCE: IOWA DEVELOPMENT COMMISSION, Quick Community Reference 1984-1985

Harrison County is well served by a diverse transportation system. The development of a general aviation airport to standard would complement the present transportation system. A public owned general aviation airport is operated by the City of Woodbine. A private airport serving general aviation aircraft is located at Missouri Valley. Commercial air service is available at Eppley Field (Omaha). Eppley Field serves western Iowa as well as Eastern Nebraska. Scheduled service is provided by the following air carriers: Continental, Republic, TWA, United, Ozark, Northwest Orient, Frontier, Eastern, Western, American, and Air Mid West. Eppley is located 20 miles southwest of Missouri Valley.

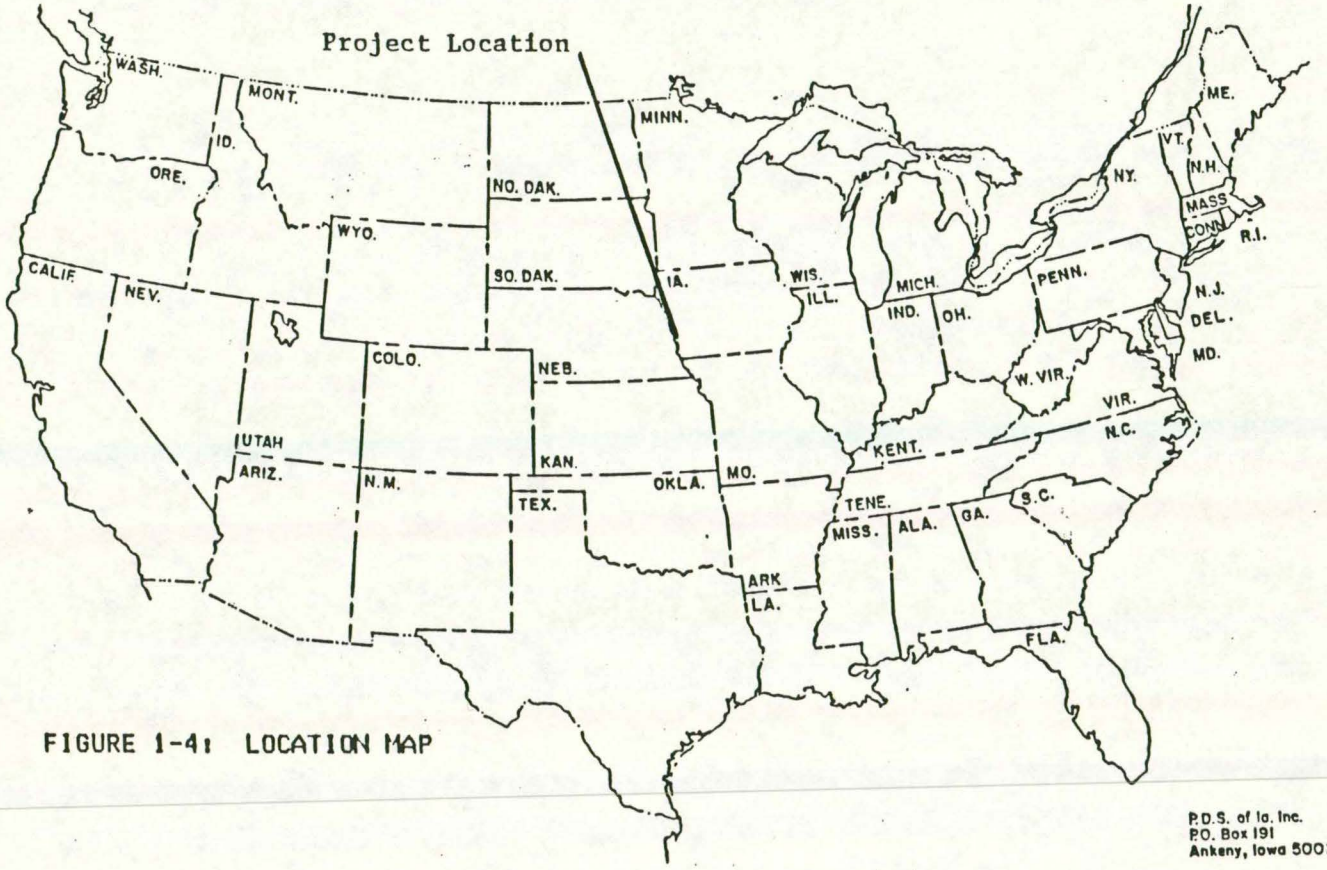


FIGURE 1-4: LOCATION MAP

P.D.S. of Ia. Inc.
P.O. Box 191
Ankeny, Iowa 50021

1985 Economic Conditions - Iowa

A brief overview of Iowa's economic condition in 1985 was summarized from a presentation given by Harvey Siegleman, Chief Economist, for the State of Iowa. As noted within this report, there appears to be a high degree of correlation between economic activity and aviation activity.

-The average value of the farmland in Iowa fell from $2,147 dollars per acre in 1981 to $1,357 dollars per acre in 1984 or by 37 percent.

-The average Iowa farmer has a debt to asset ratio of 35 percent in 1984 double the level six years ago.

-In a "normal" year about one half the farm products are intended for export.

-Farm prices are currently projected to grow less than one percent during 1986.

-Over the recession period 1979 - 1983 and the first year of the recovery, 1984, Iowa's total employment fell 69,000 of which 48,000 were in the manufacturing sector.

-By 1988 manufacturing jobs are projected to increase by 2,900 while nonmanufacturing jobs are projected to grow by 33,200 jobs.

-Trade employment will still be about 10,000 short of the 1979 peak by the end of 1988. The greatest growth areas appear to be in food stores and eating and drinking establishments. Clothing and general merchandise stores will still be sluggish for the next several years, and auto dealers and service stations will continue the decline from 1979 peak levels, although the worse is already behind them.

-Motor freight employment activity is expected to recover the ground lost as a result of the recessionary drop in business activity. Decontrol of the communication industry - with its cost cutting consequences - will keep the industry lean for the next several years.

-Growth in service jobs continued through the recession and will continue, although at a slower pace, for the next several years. There will be about 26,000 more jobs in this sector in 1988 than there were when the economy was at its peak level in 1979. The greatest growth will be in the area of business services.

-Industries strongly impacted by the movement of the national economy will see the greatest growth of jobs in Iowa will be in the consumer goods and services producting sectors - including insurance firms and printing and publishing companies. These industries continued to grow in Iowa even through the recessionary period.

-The construction industry and the industries which supply construction needs will still be sluggish through 1988.

SOURCE: Presentation by Harvey Siegleman
Fall Workshop, Iowa Area Community College Business Managers, September 19, 1985

The Des Moines Register (January 26, 1986) reported that manufacturing jobs in Iowa decreased significantly and at a rate well in excess of the national average.

-About 53,000 production line jobs disappeared with the number dropping 20 percent to 206,700 in 1985 from 259,800 in 1979.

-Jobs within the farm equipment industry decreased by 44 percent; 16,000 in 1985 compared to 28,800 in 1979.

-Meatpacking, grain products, and bakery product related jobs also experienced a decrease in the number of jobs.

Iowa continues to be an "export" state relying heavily on the purchase of products produced in the State by individuals and firms beyond the State. Interstate as well as international shipments of goods, people, etc. rely on a well developed transportation system.

The gross state product is a measure of aggregate economic activity in Iowa. Table 1-3 summarizes the Gross State Product (GSP) in current dollars and by constant 1972 dollars. Since 1978, the GSP in constant dollars has decreased coinciding with Iowa's current economic recession. A slight improvement was noted in 1984.

TABLE 1-3: GROSS STATE PRODUCT, IOWA, 1965 - 1984

YEAR	CURRENT $	CONSTANT 72 $	ANNUAL % CHANGE IN CONSTANT 72 $
1965	8.99	12.088	
1966	9.777	12.732	5.33
1967	10.051	12.714	-0.14
1968	10.647	12.9	1.46
1969	11.892	13.7	6.20
1970	12.252	13.4	-2.19
1971	12.887	13.422	0.16
1972	14.722	14.719	9.66
1973	17.913	16.934	15.05
1974	18.001	15.647	-7.60
1975	19.95	15.859	1.35
1976	21.339	16.126	1.68
1977	23.845	17.027	5.59
1978	27.464	18.261	7.25
1979	29.346	17.965	-1.62
1980	29.895	16.74	-6.82
1981	33.137	16.95	1.25
1982	34.0	16.4	-3.24
1983	N/A	15.59	-4.94
1984	36.41	16.3	4.55

NOTE: In billion dollars
SOURCE: UNIVERSITY OF IOWA, Iowa Economic Forecast
Office for Planning and Programming, 1984

It is interesting to note that the number of aircraft registered in Iowa experienced a trend similar to that of the gross state product (real dollars). As the economy of the State improves the number of registered aircraft is also expected to increase.

Area Population Change

Population change from 1970 to 1980 for a five county area in Iowa indicated a slight decrease of 1365 persons from 1970 to 1980. Of the five counties, Harrison County recorded a population increase of 0.7 percent while the remaining four experienced a population decrease ranging from 0.5 percent in Pottawattamie County to 3.1 percent in Monona County. Except for Pottawattamie, all four Iowa counties have experienced a continual population loss since 1930. Harrison County had 16.5 percent of the five county Iowa population in 1930 while Pottawattamie recorded 46.2 percent. In 1980, 11 percent of the five county population resided in Harrison County while 58.3 percent resided in Pottawattamie. While Harrison County like the other non metro counties experienced a population decrease since 1930, Harrison County was able to reverse the trend in 1980.

Washington County, Nebraska from 1970 to 1980 experienced a population increase of 16.5 percent. Of the 15,508 persons (1980), 9001 or 58 percent resided in unincorporated areas.

TABLE 1-4: POPULATION CHANGE, FIVE COUNTIES, 1930 - 1980

COUNTY	1980	1970	1960	1950	1940	1930	% CHANGE 1970-1980
IOWA							
Harrison	16348	16240	17600	19560	22767	24897	0.7
Crawford	18935	19116	18569	19741	20538	21028	-0.9
Monona	11692	12069	13916	16303	18238	18213	-3.1
Pottawattamie	86561	86991	83102	69682	66756	69888	-0.5
Shelby	15043	15528	15825	15942	16720	17131	-3.1
State-Iowa	148579	149944	149012	141228	145019	151157	-9.1
NEBRASKA							
Washington	15508	13310	12103	11511	11578	12095	16.5

SOURCE: U.S. CENSUS, Number of Inhabitants, 1980

The Omaha SMSA consisting of Pottawattamie County in Iowa and Douglas and Sarpy Counties in Nebraska had a 1980 population of 569,614 in 1980 compared with a 1960 population of 457,873. The City of Omaha increased in population from 301,598 in 1960 to 314,255 in 1980. Consequently, a large percentage of the population increase (111,741 persons) from 1960 to 1980 occurred outside the City of Omaha. Most of the increase (99084 persons) outside the City of Omaha, occured in Douglas and Sarpy Counties.

It is expected that most of the growth in population within the Omaha SMSA will take place west and south of the City of Omaha.

Nearly 72 percent of the 1980 Pottawattamie County population was classified as urban compared to 19 percent in Harrison County. Those persons in areas of 2500 population or more are considered as urban population while communities with populations under 2500 were classified as places. The rural character of Harrison County is evident in the table below.

TABLE 1-5: URBAN AND RURAL RESIDENCE, FIVE COUNTIES, 1970 - 1980

COUNTY	URBAN AS % OF TOTAL POPULATION	RURAL TOTAL	RURAL PLACES 1000-2500	RURAL PLACES LESS THAN 1000	RURAL OTHER RURAL
Crawford	35.3	12260	1020	4137	7103
Harrison	19.0	13241	4377	1916	6948
Monona	28.1	8409	1495	2394	4520
Pottawattamie	71.8	24388	3202	5615	15571
Shelby	35.6	9686	--	3493	6193
State-Iowa	58.6	--	--	--	--

SOURCE: U.S. CENSUS, Number of Inhabitants, 1980

Population change anticipated for the five county area through the year 2000 indicates a modest population increase of 7321 or 4.9 percent. Of the five counties, Pottawattamie and Crawford are expected to realize an increase while Shelby and Monona Counties are expected to experience a continual decrease. Harrison County, while experiencing a loss through 1995, is expected to record a modest increase by 2000. The estimated population for Harrison County in 1985 was 16,100 or 1.5 percent less than the 1980 population.

TABLE 1-6: POPULATION CHANGE, FIVE COUNTIES, 1980 - 2000

COUNTY	1980	1985	1990	1995	2000
Crawford	18935	19500	20100	20700	21200
Harrison	16348	16100	16000	15900	16000
Monona	11692	11300	11100	10900	10700
Pottawattamie	86561	88300	90100	91900	93700
Shelby	15043	14600	14400	14400	14300
Total	148579	149800	151700	153800	155900

SOURCE: IOWA CENSUS DATA CENTER, Iowa Population Projections, July 5, 1985

Population change can be attributed to fertility, mortality, and migration. The most significant factor impacting population change is migration. In those counties experiencing out-migration attributed to a loss of job opportunities, the loss can be even more salient since a majority of those persons are in or beginning the family formation years.

Consequently, the creation of new job opportunities and the preservation of existing jobs become a major factor in reversing continued population loss. The proximity of Harrison County to the Omaha - Council Bluffs metro area may allow for a more stable population base.

Agriculture - Regional

In 1980, there were 953 persons classified as farm operators or managers in Harrison County. An additional 262 persons were listed as farm workers. Those persons 16 years and over identified as having a farm related occupation made up 18.9 percent of the total number of employed persons. Agriculture, consequently, is an important component of the economic structure of Harrison County. The number of farms and average value of agricultural products sold is summarized in the following table.

TABLE 1-7: NUMBER OF FARMS, FIVE COUNTIES, 1978 - 1982

	NUMBER OF FARMS		AVERAGE PER FARM MARKET VALUE OF AG. PRODUCTS SOLD	
COUNTY	1978	1982	1978	1982
Crawford	1590	1511	66707	80453
Harrison	1278	1192	54023	71393
Monona	1058	933	76399	99338
Pottawattamie	1888	1828	103118	90684
Shelby	1368	1317	87468	70129
State-Iowa	121339	115413	67356	85163

SOURCE: ISU, Farms in Iowa Counties, 1978 & 1982, August 1984

The number of farms in Iowa declined by 4.9% between 1978 and 1982. In the same period, the average value of land and buildings increased by 10.3 percent to 471,011 dollars. The average market value of agricultural products sold also increased reaching 85,163 dollars per farm in 1982. The average number of acres per farm increased from 274 in 1978 to 283 in 1982. The average farm size in Harrison County was 343 acres (1982). Harrison County in the same period experienced a decrease of 86 farms or 6.7 percent. Harrison County also had an average per farm value and market value of products sold well below that of the State.

The dollar value of farmland in Harrison County as of November 1, 1985 was 748 dollars per acre down 26.4 percent from 1984. The Des Moines Register reported that farmland values in Iowa averaged 948 dollars per acre (1985) down 30 percent from the previous year and near what they were ten years ago when adjusted for inflation and expressed in real terms, farmland was equal to or slightly lower than 20 years ago.

Since the peak year of 1981 when the average acre in Iowa was valued at 2147 dollars, the value has declined by 55 percent. Farm income in Iowa has since 1929 increased in 28 years and decreased in 25 years. From 1979 to 1980, farm income decreased by 43 percent; it increased by 124 percent from 1980 to 1981, but again decreased by 36 percent from 1981 to 1982.

Wholesale Trade

In 1982, Iowa supported 7393 wholesale establishments with sales of 25,825,641,000 dollars. The number of wholesale establishments decreased slightly from 1977, but total sales increased by more than 5.7 billion dollars. More significant, the number of employees increased by 144 percent from 1977 to 1982.

Harrison County had 37 wholesale establishments in 1982 with total sales of 151 million dollars. While Monona County had 6 more firms than Harrison, total sales were only one half.

TABLE 1-8: WHOLESALE ESTABLISHMENTS, FIVE COUNTIES, 1982

COUNTY	ESTABLISHMENTS	SALES ($1000)	PERCENT OF TOTAL SALES	PAID EMPLOYEES
Crawford	45	347,967	28.2	857
Harrison	37	151,417	12.3	357
Monona	42	75,486	6.1	295
Pottawattamie	161	546,769	44.5	1384
Shelby	47	110,220	8.9	426
Total	332	1,231,859	100.0	3319

SOURCE: ISU Wholesale Trade In Iowa: 1977 & 1982, February, 1985

Missouri Valley supported 10 wholesale establishments with sales of 23.2 million dollars or approximately 15.3 percent of the County total. In 1977, Harrison County reported 49 wholesale establishments with 327 employees. While the number of establishments decreased from 1977 to 1982, the number of persons employed by wholesale establishments increased by 30 or 9.2 percent in Harrison County.

Service Establishments - Regional

Service firms include a variety of business establishments - lodging, personal, repair, amusement and entertainment, health, legal, education, automotive, and business services. Iowa had 14591 service establishments in 1982 with receipts of 3.3 billion dollars. The number of service establishments in Iowa increased by 58.4 percent from 1972 while receipts more than doubled. Employment within service establishments increased by 45.547 in Iowa from 1977 to 1982.

TABLE 1-9: SERVICE ESTABLISHMENTS, FIVE COUNTIES, 1982

ESTABLISHMENTS WITH PAYROLL ONLY - 1982

COUNTY	NUMBER	RECEIPTS ($1000)	PAID EMPLOYEES
Crawford	88	15,106	507
Harrison	48	7,462	393
Monona	54	7,225	307
Pottawattamie	356	69,712	2323
Shelby	61	7,801	309

SOURCE: ISU, Services Industries in Iowa: 1977 & 1982, February 1985

Harrison County reported 48 service establishments in 1982 with receipts of 7,462,000 dollars and 393 employees. In 1977, Harrison County had 36 establishments with a total employment of 118 persons. Employment within service business with payroll increased 200 percent from 1977 to 1982 for Harrison County.

Income - Regional

Table 1-10 summarizes income produced by employment as reported to Job Service of Iowa and covered by job insurance. Data for 1985 was available for the first quarter only and consequently viewed of little significance for purposes of the airport feasibility study. As might be expected, total annual wages were greatest in Pottawattamie County followed in turn by Crawford and Shelby Counties.

TABLE 1-10: TOTAL YEARLY WAGES, FIVE COUNTIES, 1984

COUNTY	TOTAL YEARLY WAGES (DOLLARS)	AVERAGE YEARLY WEEKLY WAGES (DOLLARS)
Crawford	90,253,381	279.99
Harrison	34,140,918	216.76
Monona	30,771,832	214.88
Pottawattamie	338,632,465	274.12
Shelby	47,370,039	224.15

SOURCE: JOB SERVICE, Job Insurance By Major Industry Group - Covered Total Yearly Wages, December, 1985

More important for comparative purposes was the average weekly wages where Pottawattamie County produced an average wage of $274.12 per week compared to an average weekly wage of $216.76 in Harrison County. Data is available for each major industry group but was not presented herein.

The per capita income for each of the five counties was below that of the State. Per capita income was the highest in Shelby County (of the five counties) at 10,409 dollars and lowest is Harrison County. Per capita income was less in 1982 than in 1981 in three of the five counties with the largest decrease found in Monona County.

TABLE 1-11: PER CAPITA INCOME, FIVE COUNTIES, 1980 - 1982

COUNTY	PER CAPITA INCOME (DOLLARS) 1980	1981	1982
Crawford	8835	10554	10166
Harrison	8342	9927	9585
Monona	8843	10605	10015
Pottawattamie	8791	9977	10294
Shelby	8730	10755	10409
State-Iowa	9335	10733	10754

SOURCE: U.S. DEPARTMENT OF COMMERCE,
Survey of Current Business, April, 1984

The effective buying income is a measure of personal income less personal tax and nontax payments while personal income is defined as the aggregate of wages and salaries, other labor income, proprietor's income, rental income, dividends, personal interest income, and transfer payments. The effective buying income for Harrison was well below the date average. Reference may be made to the following table.

TABLE 1-12: EFFECTIVE BUYING INCOME, FIVE COUNTIES, 1983

COUNTY	MEDIAN HOUSEHOLD EFFECTIVE BUYING INCOME (EBI)(DOLLARS) 1983
Crawford	18497
Harrison	17280
Monona	15741
Pottawattamie	24040
Shelby	19776
State-Iowa	22461

EBI = Personal income less personal tax and nontax payments

SOURCE: 1984 SURVEY OF BUYING POWER, Sales and Marketing Management, July 23, 1984

Retail Sales - Regional

The following table summarizes retail sales within the five county area for the years 1981 through 1985. From 1981 to 1985, retail sales for the area increased by 11.2 percent. Retail sales in Iowa for the same period increased from 13,092,629,773 dollars (1981) to 14,542,219,999 dollars (1985) or by 1.1 percent.

TABLE 1-13: TAXABLE RETAIL SALES BY COUNTY, 1981 - 1985

COUNTY	1981	1982	1983	1984	1985
Crawford	67,274,372	66,428,294	70,762,957	70,421,277	69,823,287
Harrison	49,021,284	45,940,579	48,788,061	49,030,864	46,742,500
Monona	43,537,104	42,516,324	43,369,407	43,139,123	38,952,880
Pottawattamie	289,491,516	302,821,220	327,569,409	345,159,918	352,289,722
Shelby	56,783,906	56,945,740	60,830,860	57,777,080	55,106,713
Total	506,108,182	514,652,157	551,320,694	565,528,262	562,915,102

SOURCE: IOWA DEPARTMENT OF REVENUE, Retail Sales and Use Tax Report, 1981-1985.

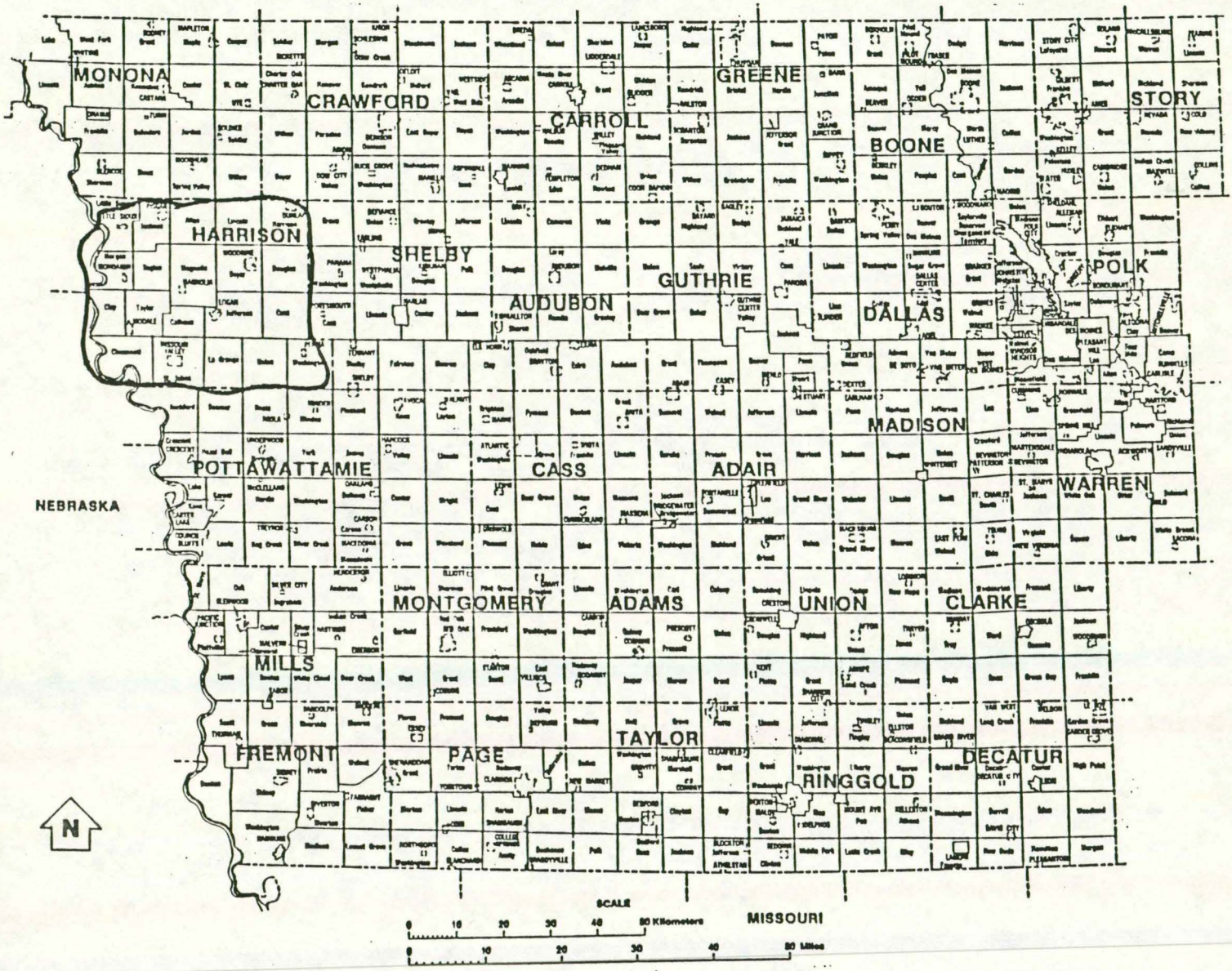
Pottawattamie County accounted for 57.2 percent of the retail sales in 1981 increasing to 62.6 percent in 1985 while Harrison County's share decreased from 9.7 percent of the total for the same period. Retail sales in four of the five counties decreased from 1984 to 1985 with Monona County experiencing the largest numerical decrease. Pottawattamie County in the same period recorded a rather significant increase of $7,129,804 or 2.1 percent. For the same period, Monona County experienced a 9.7 percent decrease while Crawford County recorded a decrease of less than one percent.

Within Harrison County, Missouri Valley captured 44.4 percent of the total retail sales in 1985.

Geographic Area

The Harrison County airport service area generally coincides with that of Harrison County assuming that the airport site was located near the geographic center of the County and accessible from all areas of the County. If the facility were located on the extreme edge of the County in any direction, then the service area would need to be adjusted based upon the fact that the area farthest away might be best served by an area airport facility. The service area may or may not extend into Washington County, Nebraska. Should a site be selected that is fairly accessible from Blair and assuming that the City of Blair makes no substantial improvements to the existing airport, then some activity may be generated from Washington County. Reference may be made to the following figure.

FIGURE 1-5: HARRISON COUNTY AIRPORT SERVICE AREA



Service Area Goals

The Harrison County Improvement Association conducted a "brainstorming session" on January 24, 1983 for the purpose of setting goals for Harrison County. Major priorities were noted as follows:

1. Business and industrial development
2. Leadership development
3. Improved communication and organization

Actions by the Harrison County Improvement Association in initiating the airport planning process would suggest that progress towards goal attainment is being made. The primary goal, in addition to those noted on page one, is to examine airport needs to include possible operation and maintenance from a multi-jurisdictional point of view.

Socioeconomic Characteristics

The service area includes 696 square miles and in 1980 had a population density of 23.5 persons per square mile. Table 1-14 summarizes population change within the service area by community and township for 1970 and 1980. Ten communities are located within the service area and had a 1980 population of 9400 persons. The remaining 6948 persons resided within the 20 townships making up the airport service area.

TABLE 1-14: HARRISON COUNTY AIRPORT SERVICE AREA POPULATION

COMMUNITY	1980	1970	PERCENT CHANGE
Modale	373	297	25.6
Little Sioux	251	239	5.0
Dunlap	1374	1292	6.3
Logan	1540	1526	0.9
Missouri Valley	3107	3519	-11.7
Woodbine	1463	1349	8.5
Mondamin	423	420	0.7
Persia	355	316	12.3
Pisgah	307	286	7.3
Magnolia	207	206	0.5
Subtotal	9400	9450	0.5

TABLE 1-14, CONT.

TOWNSHIP	1980	1970	PERCENT CHANGE
Allen	235	273	-13.9
Boyer	1904	1747	9.0
Calhoun	297	250	18.8
Cass	343	382	-10.2
Cincinnati	236	244	-3.3
Clay	148	186	-20.4
Douglas	310	411	-24.6
Harrison	1743	1680	3.8
Jackson	612	570	7.4
Jefferson	2115	2018	4.8
La Grange	346	303	14.2
Lincoln	292	288	1.4
Little Sioux	515	560	-8.0
Magnolia	661	766	-13.7
Morgan	531	566	-4.5
Raglan	248	218	13.8
St. Johns	4074	4128	-1.3
Taylor	567	516	9.9
Union	335	391	-14.3
Washington	836	753	11.0
Total	16348	16250	0.6

SOURCE: U.S. CENSUS OF POPULATION, Number of Inhabitants, 1980

The following table provides a summary of selected population and housing characteristics for Harrison County, Logan, Woodbine, and Missouri Valley.

TABLE 1-15: GENERAL POPULATION CHARACTERISTICS, POLITICAL SUBDIVISIONS, 1980

NUMBER OF PERSONS	HARRISON COUNTY	LOGAN	WOODBINE	MISSOURI VALLEY
Male	7941	684	650	1421
Female	8470	856	813	1686
Total	16348	1540	1463	3107
Age				
Under 5 years	---	111	89	210
5 - 17 years	4765	272	296	623
18 - 64 years	8767	756	655	632
65 and over	2816	198	413	632
Median	32.9	---	---	35.6
Persons per family	2.33	---	---	3.10
Housing units				
Total	6357	1540	608	1321
Owner occupied	4406	464	425	865

SOURCE: U.S. CENSUS, General Population Characteristics (PC80-1-B17)
Census of Housing (HC80-1-A17)

Ten of the 20 townships experienced a population decrease from 1970 to 1980. With the exception of Missouri Valley, the remaining nine communities in the County recorded a population increase. Modale increased in population by 25.6 percent followed in turn by Persia and Woodbine. Logan and Dunlap had population increases of 0.9 and 6.3 percent, respectively.

The airport service area population is expected to change little through 2005. Population projections prepared by the Iowa Census Data Center projected a decline in County population from 1980 through 1995 of 448 persons or 2.7 percent. From 1995 to 2000 the population was expected to increase slightly to 16,000.

Outside the airport service area and within the Omaha, Nebraska - Iowa Metropolitan Statistic Area (MSA) the population is expected to reach 640,613 persons in 2000. Washington County, Nebraska expected an increase in population from 15,508 (1980) to 19,097 (2000). The following table summarizes future population change for the airport service area, Iowa, and the Omaha, NE - IA SMA.

TABLE 1-16: AIRPORT SERVICE AREA POPULATION, 1980 - 2005

YEAR	SERVICE AREA	IOWA	OMAHA NE - IA METRO. STATISTICAL AREA*
1980	16348	2,913,803	585,122
1985	16100	2,905,400	602,355
1990	16000	2,913,500	617,351
1995	15900	2,931,000	631,158
2000	16000	2,965,000	640,613
2005	16000	---	---

SOURCE: JEROME A. DEICHERT, Nebraska Population Projections: 1980-2020, November, 1982
IOWA CENSUS DATA CENTER, Iowa Population Projections: 1980-2000, July, 1984
*Includes Washington County, Nebraska

Income

Table 1-17 summarizes income generated by employment as reported to Job Service of Iowa and covered by job insurance. Total private sector wages generated in 1984 within Harrison County increased by 1,434,611 dollars over 1983 while wages earned by the governmental sector decreased by 58,436 dollars. All groups of government employment decreased between 1983 and 1984.

TABLE 1-17: TOTAL YEARLY WAGES, HARRISON COUNTY, 1983 & 1984

INDUSTRY GROUP	WAGES (DOLLARS) 1983	WAGES (DOLLARS) 1984	EMPLOYMENT 1983	EMPLOYMENT 1984
Private Sector				
Agriculture-Mining	556,041	639,999	49	53
Construction	1,383,464	1,553,209	95	108
Manufacturing	1,813,315	2,379,117	122	132
Transportation	1,438,161	1,527,744	78	84
Trade	10,166,022	10,615,647	1118	1156
Finance	2,079,707	2,245,022	149	162
Service	4,916,038	4,826,621	587	577
Subtotal Private Sector	22,352,748	23,787,359	2201	2276
Government				
Federal	1,838,074	1,739,172	97	93
State	393,222	384,417	34	31
Local	8,180,699	8,229,970	639	629
Subtotal Government	10,411,995	10,353,559	770	753
Total County	32,764,743	34,140,918	2971	3029

SOURCE: JOB SERVICE, Job Insurance by Major Industry Group - Covered Total Yearly Wages, 1983 & 1984

It should be stressed that the above employment figures are those that are covered by job insurance. Trade as a generator of income and employment in Harrison County is quite evident with over one half of the total private sector employment. The service group followed trade with 577 employees. Government employment accounted for 25.9 percent of the total County employment.

Labor Force

The resident civilian labor force in Harrison County decreased from an average annual total of 7290 in 1980 to 7030 in 1985, while the unemployment rate increased from 3.7 percent in 1980 to 5.9 percent in 1985. The nonagricultural labor force wage and salary decreased by 5.3 percent between 1980 and 1985. In the same period, the agricultural labor force decreased 7.8 percent. The labor force data reflects the prolonged economic concerns of rural Iowa. All categories have experienced a downward trend in employment except for wholesale trade.

TABLE 1-18: EMPLOYMENT, HARRISON COUNTY, 1980 - 1985

	1980	1981	1982	1983	1984	1985
High Travel						
Manufacturing	150	150	130	120	130	140
Services and Mining	700	710	700	710	670	680
Public Administration	790	790	770	770	760	730
Subtotal	1640	1650	1600	1600	1560	1550
Medium Travel						
Construction	130	70	90	100	90	80
Finance, Insurance, and Real Estate	170	170	160	150	150	150
Wholesale Trade	370	370	370	370	390	390
Retail Trade	810	790	760	770	770	770
Subtotal	1480	1400	1380	1390	1400	1390
Low Travel						
Agriculture	1670	1640	1600	1570	1530	1540
Transportation, Communication, and Public Utilities	180	190	170	160	160	160
Subtotal	1850	1830	1770	1730	1690	1700
Total	4970	4880	4750	4720	4650	4640

SOURCE: IOWA DEPARTMENT OF JOB SERVICE,
Noncps Labor Force Summary, 1981 - 1985

The above table does not include unemployed persons, self employed, unpaid family, and domestic workers.

There is a relationship between economic variables that support the likelihood for the existence of another related variable. In this situation, the demand for air travel is often measured by the number of people employed by industry for that county or region. In the past, there has been a consistent correlation between the type of employment and to the demand for air travel. A research organization, the ENO Foundation, classified travel tendency by three general categories.

High Travel - Business and professional services, government, manufacturing, and mining.

Medium Travel - Construction, finance, insurance and real estate, wholesale and retail trade.

Low Travel - Agriculture, communication, and utilities.

Travel tendency as measured by employment within Harrison County was summarized in Table 1-18 for the years 1980 - 1985. The number of persons employed by industry having a low travel tendency decreased by 8.1 percent from 1980 - 1985, while employment with medium travel industries experienced a decrease of 6.1 percent. Employment with the high travel tendency decreased 5.5 percent.

By place of work, 72.8 percent of Harrison County residents were employed in Harrison County followed in turn by Douglas County, Nebraska with 9.5 percent. Reference may be made to Table 1-19 concerning place of work by Harrison County residents.

TABLE 1-19: PLACE OF WORK, HARRISON COUNTY RESIDENTS, 1980

COUNTY/STATE	NUMBER OF PERSONS	PERCENT OF TOTAL
Yavapai / Arizona	4	*
San Diego / California	10	*
Cass / Iowa	13	*
Crawford / Iowa	186	2.8
Fremont / Iowa	14	*
Harrison / Iowa	4760	72.8
Ida / Iowa	4	*
Mills / Iowa	6	*
Monona / Iowa	12	*
Polk / Iowa	7	*
Pottawattamie / Iowa	410	6.3
Shelby / Iowa	59	*
Dodge / Nebraska	21	*
Douglas / Nebraska	620	9.5
Hall / Nebraska	4	*
Saunders / Nebraska	10	*
Seward / Nebraska	6	*
Washington / Nebraska	90	1.4
Tulsa / Oklahoma	2	*
Clay / South Dakota	2	*
Yankton / South Dakota	6	*
Not Reported	290	4.4
All Workers	6536	100.0

* Less than 1%

SOURCE: 1980 CENSUS, BLS Special Tabulation

While a number of Harrison County worked elsewhere a number of persons residing in other counties were employed in Harrison County. Ninety-one percent of those persons employed in Harrison County also lived within the County. A comparison of the two tables reveal that Harrison County does export more of its labor force than imports. Pottawattamie and Crawford Counties reported the largest number of residents employed in Harrison County.

TABLE 1-20: LABOR PLACE OF RESIDENCE, HARRISON COUNTY, 1980

COUNTY / STATE	NUMBER OF PERSONS	PERCENT OF TOTAL
Clay / Iowa	1	*
Crawford / Iowa	107	2.1
Fremont / Iowa	10	*
Harrison / Iowa	4760	91.3
Monona / Iowa	69	1.3
Pottawattamie / Iowa	154	3.0
Shelby / Iowa	12	*
Trego / Kansas	3	*
Lyon / Minnesota	13	*
Douglas / Nebraska	52	1.0
Pierce / Nebraska	6	*
Washington / Nebraska	20	*
Union / Nebraska	2	*
Total	5209	100.0

* Less than 1%

SOURCE: 1980 CENSUS, BLS Special Tabulation

Table 1-21 summarizes from the community Quick Reference sheets, prepared by the Iowa Development Commission, major employers within Harrison County. The summary was based upon employment reported in 1985.

TABLE 1-21: MAJOR EMPLOYERS - HARRISON COUNTY

COMMUNITY	NAME	PRODUCT/ SERVICE	EMPLOYMENT
Logan	Perfection Press, Inc.	Printing	19
Logan	Perfection Form, Inc.	School Supplies	88
Logan	Capital Construction	Bridge Construction	30
Logan	Schimmer Quarry	Limestone Products	10
Logan	Clark Quarry	Limestone Products	12
Logan	Harrison County Offices	County Services	95
Logan	Harr-Mona	Fertilizer-Chemical	17
Missouri Valley	Community Memorial Hospital	Health Care Services	107
Missouri Valley	Gardner Implement Company	Farm Equipment	15
Missouri Valley	Longview Nursing Home	Health Care Services	57
Missouri Valley	Chicago Northwestern RR	Railroad Service	35
Missouri Valley	Ratigan Rhoden Motor Co.	Car Dealership	40
Missouri Valley	Anderson's Ford	Car Dealership	15
Missouri Valley	People's State Bank	Full Service Bank	15
Missouri Valley	First National Bank	Full Service Bank	10
Missouri Valley	Iowa Power	Gas/Electric Company	12
Missouri Valley	J.C. Penney Company	Retail Merchant	10
Pisgah	Eddie Johnson Ford	Car Dealership	8
Modale	Modale Co-op	Fertilizer, Petroleum, Grain Storage, Parts, Bean Cleaning	9
Woodbine	Woodbine Manufacturing	Tommy Lift-Gate, Ornamental Windmills	35
Woodbine	Hedstrom Concrete Products	Concrete Waterers and Feeders	12
Woodbine	Harrison County REC	Electrical Service	21
Mondamin	Mondamin Savings Bank	Full Service Bank	6
Mondamin	Farmers Co-op	Fertilizer, Petroleum, Grain Storage, Seed, Feed, Chemicals, Grain, Marketing	14
Mondamin	Mondamin Area Orchards	Apples and Other Products (seasonal)	150
Dunlap	Twin Valley Veterinary Clinic	Animal Health Care	10
Dunlap	Cogdill Farm Supply	Blended Feed and Fertilizer	17
Dunlap	Dunlap Care Center	Health Care Services	50
Dunlap	Dunlap Livestock Auction	Pork and Beef Sales	48
Dunlap	Dunlap Farmers Co-op	Fertilizers, Tank Wagon Service	10
Dunlap	Dunlap Fertilizer	Fertilizer Feed	15

SOURCE: IOWA DEVELOPMENT COMMISSION, Community Quick Reference

Retail Sales

Table 1-22 summarizes retail sales by community within the airport service area for the years 1981 through 1985. Missouri Valley captured 44.4 percent of the County's retail sales in 1985 followed in turn by Logan and Woodbine with 14.5 and 12.2 percent respectively. Dunlap captured 10.7 percent of the sales in 1985. By comparison, Missouri Valley reported 43.4 percent of the sales in 1981 while Logan and Woodbine captured 16.5 and 12.3 percent. Dunlap captured 12.7 percent of the sales in 1981.

TABLE 1-22: RETAIL SALES - HARRISON COUNTY, 1981 - 1985

COMMUNITY	1981	1982	1983	1984	1985
Dunlap	5,946,472	5,917,208	6,956,868	5,803,308	5,017,470
Logan	7,726,369	7,220,848	7,094,585	6,693,696	6,799,965
Missouri Valley	20,300,932	19,793,017	20,369,958	21,279,896	20,747,273
Woodbine	5,756,444	4,944,495	4,948,804	6,169,701	5,686,655
Mondamin	1,735,494	1,467,418	1,395,771	1,348,705	1,213,737
Persia	501,864	462,752	455,026	525,854	495,783
Pisgah	961,231	709,560	613,190	690,081	588,330
Magnolia	147,336	---	---	---	---
Non-Permit	69,761	21,164	51,966	26,582	82,104
Other	5,875,381	5,404,117	6,901,893	6,493,041	6,111,183
Total	49,021,284	45,940,579	48,788,061	49,030,864	46,742,500

SOURCE: IOWA DEPARTMENT OF REVENUE, Retail Sales and Use Tax Report, 1981 - 1985

Industrial sites available are found within Missouri Valley, Logan, Dunlap, and Woodbine. Reference may be made to the following table.

TABLE 1-23: HARRISON COUNTY INDUSTRIAL SITES

COMMUNITY	Missouri Valley	Logan	Dunlap	Woodbine
SITE NAME	G & G Property	Logan Industrial Park	McDonald Property	Site 1
RAIL	CNW, ICG	---	CNW	ICG
HIGHWAY	US 30, I-29	Hwy 127	Hwy 30	US 30 Lincoln
ELECTRICITY	13,200 Primary	---	13,200 Primary	4,160 Primary
WATER	6 inch Main	8 inch Main	8 inch Main	6 inch Main
GAS	2 inch Main	---	---	4 inch Main
SEWER	24 inch Main	10 inch Main	6 inch Main	8 inch Main
ACREAGE	17	12	8.9	20+

Iowa State Airport System Plan

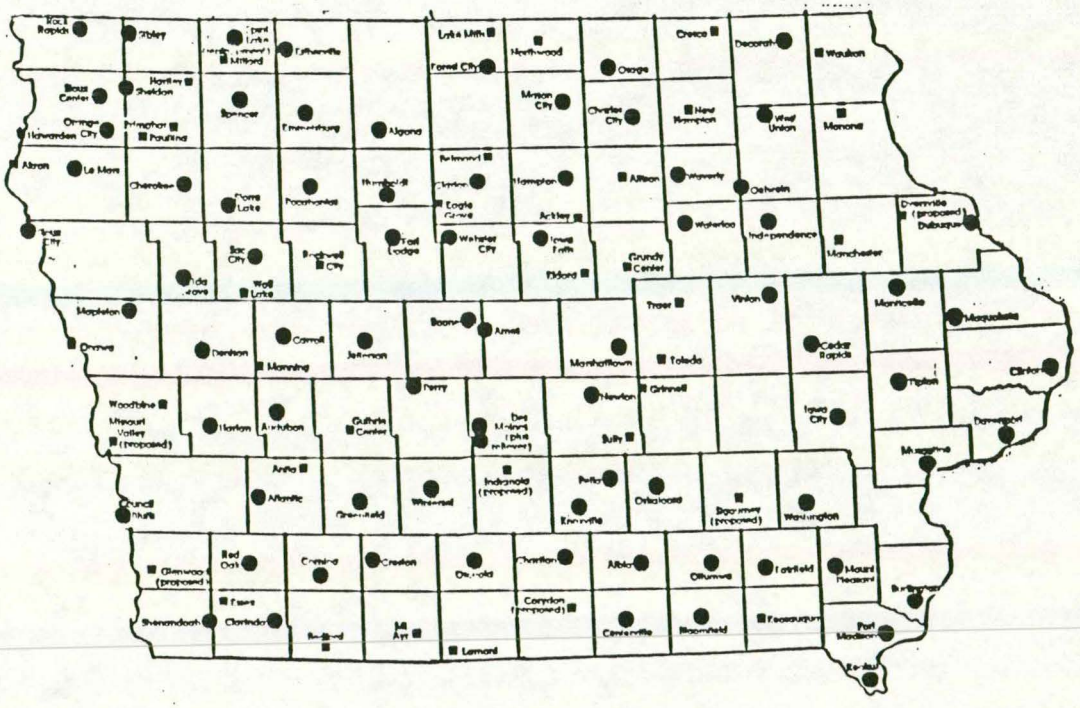
The 1982 Iowa Aviation System Plan identified 80 airports which were considered to serve the needs of the State. In addition, there were 41 publicly-owned airports classified as "local service airports". (Figure 1-6)

A local service airport was eligible for State planning safety project funding, but not development funding. These airports could, provided there was a substantial increase in activity, be placed in a higher category of development.

The state system is based upon hierarchy of airports each providing an increasing service capability.

Basic Utility (BU): * Stage I * Stage II	Those airports designed to accomodate 95 percent of all aircraft weighing 12,500 pounds or less.
General Utility (GU): * Stage I * Stage II	Those airports designed to accommodate 100 percent of all aircraft with a gross landing or take-off weight of 12,500 pounds or less.
Basic Transport (BT):	Those airports accommodating aircraft weighing 60,000 pounds or less and commuter airline service aircraft.
General Transport (GT):	General Transport airports will accommodate all aircraft weighing 150,000 pounds or less and major airline turbojet aircraft.

FIGURE 1-6: 1982 STATE AIRPORT SYSTEM



The 1985 Draft State Airport System Plan Update includes all public owned airports in Iowa. The Plan Update also placed each airport within a service classification defined as follows:

General Aviation III:	Provides access to Iowa communities supporting low activity levels.
General Aviation II:	Provides access to Iowa's market and population centers requiring service by limited numbers of business jets and single engine or light twin engine aircraft.
General Aviation I:	Provides access to Iowa's market and population centers requiring significant service by business jets and twin engine piston or turbo aircraft.
Commercial Service II:	Provides scheduled passenger service by commuter aircraft.
Commercial Service I:	Provides scheduled passenger services by transport aircraft and qualifies for Federal primary airport improvement funding.

The 1985 Draft State Airport System Plan classified the Woodbine Municipal Airport as a General Aviation III facility, along with Onawa. Harlan was classified as a General Aviation II category airport, while Council Bluffs was classified as a General Aviation I facility.

Airport development guides were also prepared for each service classification. Reference may be made to the following table.

TABLE 1-24: AIRPORT DEVELOPMENT GUIDES - GENERAL AVIATION AIRPORTS

Type Service	Commercial Service		General Aviation Airports				
Service Classification	Commercial Service	Commercial Service	General Aviation	General Aviation		General Aviation	
	I	II	I	II		III	
Primary Runway							
Length	Critical Aircraft	5,000	5,000	4,000	3,400	3,400	2,720
Width	150	100	100	75	60	60	120
Surface	Hard	Hard	Hard	Hard	Hard	Hard	Turf
Taxiway	Full Parallel	Full Parallel	Partial Parallel	Turnaround	Turnaround	Turnaround	None
Secondary Runway							
Length	Same as Primary	4,000	4,000	3,400	2,720	2,720	None
Width	150	75	75	150	120	120	—
Surface	Hard	Hard	Hard	Turf	Turf	Turf	—
Taxiway	Full Parallel	Turnaround	Turnaround	None	None	None	—
Primary Runway Lights							
Edge-Intensity	HIRL	MIRL	MIRL	MIRL	MIRL	MIRL	LIRL
End Identifier	Yes	Yes	Yes	Yes	[1]	[1]	—
VASI[2]	Yes	Yes	Yes	Yes	[2]	[2]	—
Approach	Yes	Yes	No	No	No	No	No
Navaids							
Beacon	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Seg. Circle	Yes	Yes	Yes	Yes	Yes	Yes	Yes
L. Wind Indicator	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NDB[4]	Yes	Yes	Yes	Yes	Yes	Yes	—
Land Title	420	300	300	170	120	120	80

**These guides were developed to assist in the financial planning of public airports by specifying general limits of state financial participation. Actual development requirements will be dependent on site specific conditions and critical aircraft considerations.*

SOURCE: 1985 Draft State Airport System Plan

The Federal Aviation Administration (FAA), recognizing the need to reduce overall airport development costs, developed the airplane design group concept linking airport requirements to using aircraft. Consequently, Change 6 to FAA AC 150-5300-4B presented new dimensional criteria by airplane design groups based upon aircraft approach speed and wingspan.

Airplane Design Group I: To service airplanes in Aircraft Approach Category A & B with wingspans up to, but not including, 49 feet.

Airplane Design Group II: To service airplanes in Aircraft Approach Category A & B with wingspans up to, but not including, 79 feet.

Airplane Design Group III: To service airplanes in Approach Category A with wingspans up to, but not including, 118 feet; and Category B aircraft with wingspans up to, but not including, 79 feet.

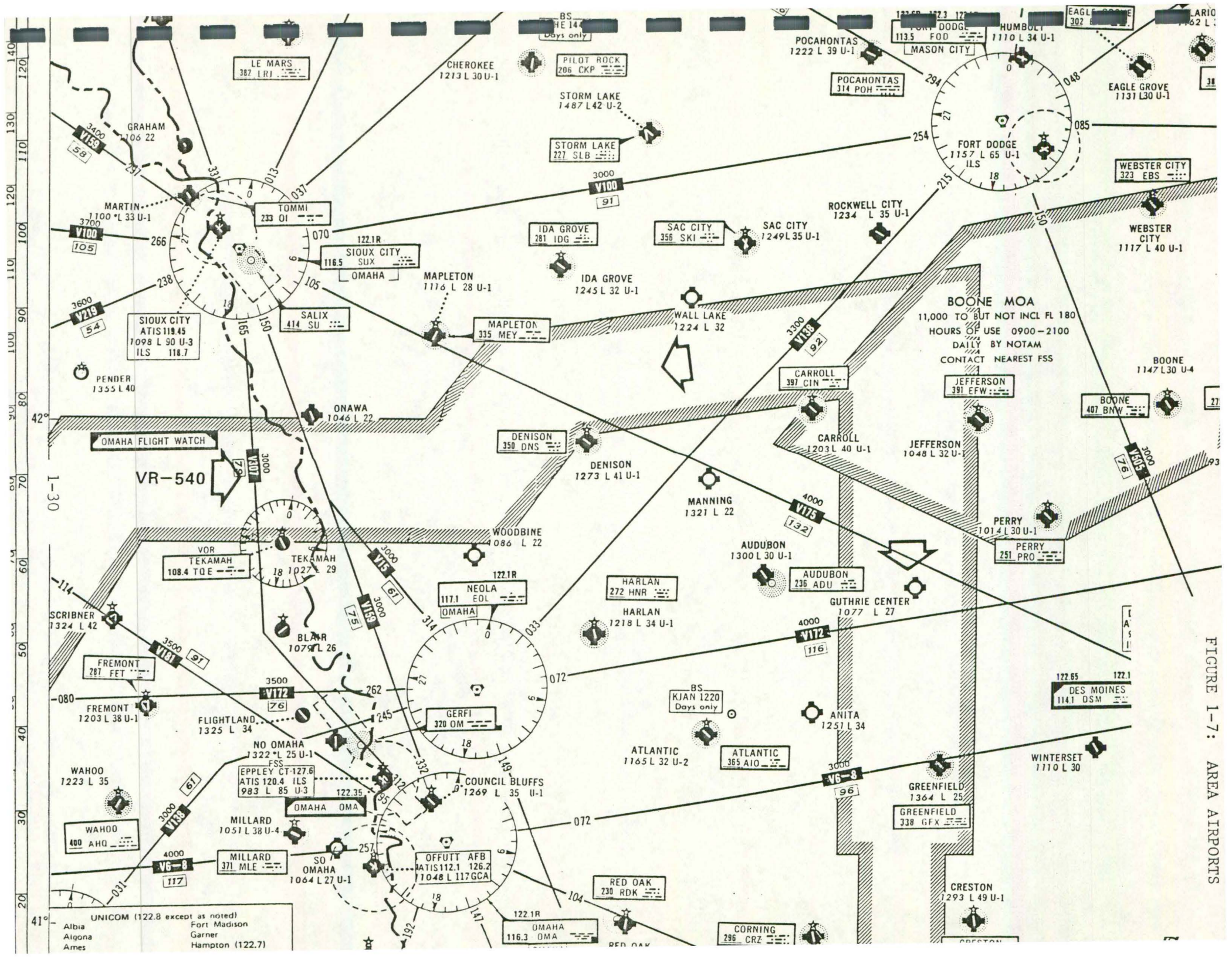


FIGURE 1-7: AREA AIRPORTS

Further breakdown separated utility (G-A) airports into basic and utility types. (FAA AC 150-5300-4B Chg. 7)

Basic Utility - Stage I:	Airplane Design Group I. Serves about 75 percent of the single-engine and small twin-engine airplanes used for personal and business purposes.
Basic Utility - Stage II:	Airplane Design Group I. Serves all the airplanes of Stage I, plus some small business and air taxi-type twin-engine airplanes.
General Utility - Stage I:	Airplane Design Group I. Serves all small airplanes.
General Utility - Stage II:	Airplane Design Groups I and II. Serves large airplanes in Aircraft Approach Category A & B and usually has the capability for precision approach operations. This airport is normally designed for airplanes of Airplane Design Groups I and II.

More specifically, the aircraft approach categories applicable are:

Category A: Speed less than 91 knots.
Category B: Speed 91 knots or more but less than 121 knots.

Aircraft grouped by approach speeds are further subdivided according to wingspan as previously noted.

The National Plan of Integrated Airport Systems (NPIAS) identifies, for the Congress and the public, the composition of a national system of airports, together with the airport development necessary to anticipate and meet the present and future needs of civil aeronautics, to meet requirements in support of the national defense, and to meet the special needs of the Postal Service. The Airport and Airway Improvement Act of 1982 (Public Law 97-248) requires the publication of the NPIAS every two years. Criteria for inclusion in the NPIAS was established as follows:

> "An existing airport that is included in an accepted SASP or RASP may be included in the Plan if it has at least 10 based aircraft and services a community located 30 minutes or more average ground travel time from the nearest existing or proposed Plan airport. Proposed airports to serve such communities will be included if there is clear evidence that at least 10 aircraft will be based at the airport within the first year of its operation."

SOURCE: FAA ORDER 5090.3B

<u>Nebraska State Airport System Plan</u>

The current Nebraska Airport System Plan was adopted in 1977 and is currently being updated. Public airports located in the immediate vicinity of Harrison County are found at Blair and Tekamah. Private facilities located near Omaha include Flightland and North Omaha.

STATE OF NEBRASKA

ROBERT KERREY • GOVERNOR • JOHN R. AUER • DIRECTOR

January 22, 1986

Jerry Searle
PDS
P.O. Box 191
Ankeny, Iowa 50021

Subject: Harrison County, Iowa
Airport Study

Dear Mr. Searle:

Per your phone request of January 21, we have enclosed copies of the 5010 forms for the Blair, Tekamah, North Omaha and Flightland Airports, and a list of aircraft owners in Washington County, Nebraska.

Regarding future development plans, Blair will be replacing the lights on Runway 1/19 and installing lights on the taxiway. Any major development at this site is precluded due to the terrain. Tekamah has a Preapplication on file with the FAA (Central Region). They would like to extend and widen the runway to ultimate dimensions of 75' x 4000', which would classify it as a General Utility airport. The preapplication was submitted two years ago and to date the FAA has taken no action on this proposed project. The other two airports are privately owned and this Department does not keep records on their development plans.

Please feel free to contact this office again if you need further information.

Sincerely,

DEPARTMENT OF AERONAUTICS

Henry W. Wulf

Henry W. Wulf, P.E.
State Airport Engineer

DJH/tk

Enclosures

DEPARTMENT OF AERONAUTICS

MAIN OFFICE:
General Aviation Building
Lincoln Municipal Airport
P.O. Box 82088
Lincoln, Nebraska 68501-2088
(402) 471-2371

NAV-AIDS OFFICE:
Kearney Municipal Airport
P.O. Box 397
Kearney, Nebraska 68847
(308) 234-8696

The Blair Municipal Airport would appear to have the most significant impact upon an airport facility constructed in Harrison County. The existing site does have site limitations which would preclude a major expansion. A master plan prepared for the Blair Municipal Airport recommended a new site. The Blair Municipal Airport was classified as a Basic Utility - Stage II airport.

A General Utility (GU) Airport is located at Tekamah. A preapplication is currently on file with the FAA to extend and widen the primary runway to a width of 75 feet and a length of 4000 feet. Tekamah is not accessible from Harrison County and consequently would have little impact upon airport development in Harrison County.

Eppley Field (Omaha) is the nearest air carrier airport facility and was classified as a General Transport - Trunk facility within the Nebraska State Airport System Plan (1977).

Area Airport Facilities

Area airport facilities are shown in Figure 1-7. In addition to public and private airports located in Nebraska, public airports in the immediate vicinity of Harrison County are found at Council Bluffs, Harlan, and Onawa. The airport at Woodbine is a public owned facility while the airport at Missouri Valley is privately owned. Tables 1-25, 1-26, and 1-27 summarizes selected-data for area airport facilities.

TABLE 1-25: AREA AIRPORT FACILITIES - IOWA

	HARLAN	ONAWA	COUNCIL BLUFFS
Ownership	Public	Public	Public
Elevation	1218	1046	1269
Longitude (Est.)	95-20-15W	96-06-30W	95-45-39W
Latitude	41-35-15N	42-00-35N	41-15-33N
Acreage	131	20	200
Runway	15/33	15/33	13/31
Length	3400	2845	4100
Width	60	50	75
Surface	Asph.	Asph.	Conc.
Gross Weight (1000)	28 sw	4 sw	28 sw
Lighting	MIRL	LIRL	MIRL
Marking	NPI	---	NPI
VASI/PAPI	---	---	---
REIL	---	---	---
Runway	6/24	---	17/35
Length	2000	---	3000
Width	60	---	200
Surface	Turf	---	Turf
Gross Weight	---	---	---
Lighting	---	---	---
Marking	---	---	---
Beacon	Yes	---	Yes
NDB	HNR	---	---
Wind Indicator	Yes	Yes	Yes
Based Aircraft	24	14	57
S.E.	23	13	53
M.E.	1	1	4

SOURCE: FAA FORM 5010, 1984

TABLE 1-26: AREA AIRPORT FACILITIES - NEBRASKA

	FLIGHTLAND	NORTH OMAHA	BLAIR	TEKAMAH
Ownership	Private	Private	Public	Public
Elevation	1325	1322	1079	1027 (E)
Longitude	96-06-48W	96-01-00W	96-10-00W	96-10-38W
Latitude	41-25-05N	41-22-00N	41-35-00N	41-45-50N
Acreage	71	100	117	277
Runway	13/31	17/35	1/19	14/32
Length	3450	2480	2600	2900
Width	50	40	50	50
Surface	Asph.	Conc.	Asph.	Conc.
Gross Weight (SW)	25000	28000	---	30000
Lighting	LIRL	LIRL	LIRL	LIRL
Marking	Basic	Basic	NSTD	Basic
VASI/PAPI	---	---	NSTD	---
REIL	---	---	---	---
Runway	18/36	8/26	15/33	None
Length	1300	1200	1650	---
Width	75	150	150	---
Surface	Turf	Turf	Turf	---
Gross Weight	---	---	---	---
Lighting	---	---	---	---
Marking	---	---	---	---
Beacon	---	---	Yes	---
NDB, TVOR	---	---	---	TVOR
Wind Indicator	Yes	Yes	Yes	Yes
Based Aircraft	41	51	12	17
S.E.	39	48	10	17
M.E.	2	3	2	---

* NSTD = Not to Standard

SOURCE: FAA FORM 5010, 1984

There were 31 aircraft registered (Dec. 1985) in Washington County, Nebraska of which 19 reported a Blair mailing address, 8 with a Ft. Calhoun address, and 3 with an Arlington, Nebraska address.

TABLE 1-27: HARRISON COUNTY AIRPORT FACILITIES

	WOODBINE	MISSOURI VALLEY
Ownership	Public	Private
Elevation	1268	1000
Longitude	95-41-00W	95-33-15N
Latitude	41-44-10N	41-32-25W
Acreage	80	70
Runway	17/35	16/34
Length	2220	2500
Width	115	30
Surface	Turf	Asph
Gross Weight	---	---
Lighting	LIRL	---
Marking	---	---
VASI/PAPI	---	---
REIL	---	---
Runway	None	---
Length	---	---
Width	---	---
Surface	---	---
Gross Weight	---	---
Lighting	---	---
Marking	---	---
Beacon	---	---
NDB, TVOR	---	---
Wind Indicator	Yes	Yes
Based Aircraft	5	10 (1984) 16 (1985)
S.E.	5	10 (1984) 16 (1985)
M.E.	---	---

SOURCE: FAA FORM 5010, 1984

SECTION TWO

FORECAST OF AVIATION DEMAND

Introduction

The forecast of aviation demand provides a basis by which to evaluate existing facility development against immediate and long range operational activity. The estimates of aviation activity presented herein are based upon potential levels found within a defined geographical area. National and State trends are summarized, followed by regional and airport service area trends.

In addition to the airport facility the more significant variables influencing future numbers of based aircraft and aircraft operations are as follows:

1. Based Aircraft
   - A. Population
     Size, change, and characteristics
   - B. Economic Base
     Industry, occupation
2. Aircraft Operations
   - A. Number of Airpersons
     Pilots
   - B. Economic Base
     Industry, occupation

Aircraft storage facilities and unit cost, together with services provided by a Fixed Base Operator (F.B.O.), also influence the level of activity. Touch and go operations generated by student traffic may be largely due in part to efforts by the local FBO or air taxi operator.

The decision to travel or transport an item from one point to another is based upon a number of factors to include those summarized below:

- Distance
- Accessibility
- Cost
- Purpose of trip
- Number of persons
- Type and value of cargo
- Availability of other modes
- Aviation interest

National Trends

The number of general aviation aircraft within the United States increased from 1979 to 1983. As of January 1, 1983 there were 209,779 active general aviation aircraft within the fleet representing an annual increase of 1.4 percent. The most significant change within the 5-year period was the number of ultralights acquired for recreational flying. An estimated 25,000 to 30,000 ultralights are currently in use.

Table 2-1 summarizes the historic changes within the general aviation fleet by aircraft type for the period 1979 through 1983. As of January 1, 1983, single engine piston powered aircraft made up 78.2 percent of the fleet down slightly from the 1979 share of the total.

TABLE 2-1: U.S. GENERAL AVIATION AIRCRAFT BY TYPE, 1979-1983 (in thousands)

AS OF JANUARY 1		FIXED WING				ROTORCRAFT		
		PISTON						BALLOONS/
		SINGLE	MULTI					DIRIGIBLES
HISTORICAL	TOTAL	ENGINE	ENGINE	TURBOPROP	TURBOJET	PISTON	TURBINE	GLIDERS
1979	198.8	160.7	23.2	3.1	2.5	2.8	2.5	4.0
1980	210.3	168.4	25.1	3.5	2.7	3.1	2.7	4.8
1981	211.0	168.4	24.6	4.1	3.0	2.8	3.2	4.9
1982	213.2	167.9	25.5	4.7	3.2	3.3	3.7	5.0
1983	209.8	164.2	25.0	5.2	4.0	2.4	3.7	5.2

SOURCE: FAA FAA Aviation Forecasts - FAA - APO - 84 - 1 Feb. 1984, (p. 51)

Active single-engine and multi-engine piston aircraft are expected to grow 2.4 percent per year while turbine powered aircraft are expected to grow at 5.8 percent. A seven percent annual rate of growth was estimated for turbine rotorcraft. Some 7,300 aircraft per year are expected to be added to the national general aviation fleet between 1984 and 1995.

TABLE 2-2: U.S. ACTIVE GENERAL AVIATION AIRCRAFT BY TYPE, 1984 - 1995 (in thousands)

		PISTON				ROTORCRAFT		
		SMALL	MULTI-					
YEAR	TOTAL	ENGINE	ENGINE	TURBOPROP	TURBOJET	PISTON	TURBINE	OTHERS
1984	207.0	160.6	24.7	5.5	4.2	2.4	4.3	5.3
1985	211.0	162.9	25.0	6.0	4.5	2.4	4.8	5.4
1986	216.9	166.7	25.6	6.6	4.9	2.3	5.2	5.6
1987	224.5	172.0	26.5	7.1	5.2	2.3	5.5	5.9
1988	233.6	178.7	27.5	7.6	5.5	2.3	5.8	6.2
1995	287.0	216.8	33.7	10.9	7.1	2.1	8.4	8.0

SOURCE: FAA FAA Aviation Forecasts - FAA - APO - 84 - 1 Feb., 1984 (p.51)

Historic general aviation sales followed changes in the Gross National Product (GNP) suggesting that sustained growth in the economy should have a positive impact upon general aviation aircraft sales.

Business and executive use has increased while personal and instructional flying has decreased. Eighty (80) to eighty-five (85) percent of the turboprop aircraft and sixty (60) to seventy (70) percent of the multi-engine aircraft are purchased for business use. Ninety (90) percent of all turbojet aircraft are sold for business purposes.

The number of hours flown by general aviation aircraft decreased from 1979 to 1983. In 1984, an estimated 37.6 million hours are expected to be flown by general aviation aircraft. A majority of the hours flown will be by single engine piston aircraft. The number of hours flown by general aviation aircraft is expected to increase from 37.6 million in 1984 to 58.4 million by 1995.

An overview of the most recent trends in general aviation were obtained from an FAA report entitled: General Aviation Activity and Avionics Survey - Annual Summary Report 1984 Data, (Report FAA-MS-85-5). The results of the annual survey are summarized as follows:

* An estimated 36.1 million hours of flying time were logged by the 220,943 active general aviation aircraft in the U.S. fleet during 1984. There was a 3.6 percent increase in the number of active aircraft from 1983 to 1984. The active aircraft had a mean flight time per aircraft of 158 hours and represented about 82.6 percent of the registered general aviation fleet.

* Turboprop and turbojet aircraft averaged a greater number of flight hours per aircraft than other aircraft types with 414 hours and 252 hours, respectively. Twin engine turboprops with 13 or more seats flew almost 1112 hours per aircraft. In contrast, single engine piston powered aircraft with fewer than four seats averaged approximately 140 hours.

* The most common primary use of general aviation aircraft was personal for an estimated 48 percent of the active fleet, followed by business for 21 percent of the fleet, and executive for 8 percent of the fleet.

* About 84 percent of the general aviation aircraft had two-way VHF communication equipment, about 64 percent were equipped with 4096-code transponders, about 56 percent had at least one component of an instrument landing system, and about 79 percent had some form of navigation equipment.

* An estimated 25.5 percent of general aviation aircraft had avionics equipment enabling them to fly above 18,000 feet in positive controlled airspace. Approximately 67.5 percent of the GA fleet could not fly above 12,500 feet due to avionics limitations alone.

* An estimated 41 percent of active general aviation fleet flew by instrument flight rules (IFR) at some time during 1984.

* About 77 percent of the total hours logged by the 1984 general aviation fleet were flown in visual meteorological (VM) conditions during the day. Aircraft flown in VM night, instrument meteorological (IM) day, and IM night conditions accounted for 11 percent, 9 percent, and 3.5 percent of the total hours flown, respectively.

* The general aviation aircraft fleet comsumed an estimated 1,201 million gallons of fuel during 1984: 462 million gallons of aviation gasoline and 739 million gallons of jet fuel.

* The general aviation aircraft fleet flew an estimated 4,393 billion air miles during 1984.

Statewide Trends

Table 2-3 summarizes the number of aircraft registered in the State of Iowa from 1974 through 1984. As noted, the number of aircraft experienced a continual increase to 1979 when 3,530 aircraft were registered in the State. Beginning in 1980, the number of aircraft registered has experienced a decrease with 3,079 aircraft registered in 1984.

TABLE 2-3: REGISTERED AIRCRAFT - IOWA, 1974 - 1984

YEAR	AIRCRAFT	YEAR	AIRCRAFT
1974	2,565	1980	3,492
1975	2,620	1981	3,417
1976	3,144	1982	3,335
1977	3,308	1983	3,099
1978	3,492	1984	3,079
1979	3,530		

SOURCE: IDOT, AERONAUTICS DIVISION, 1984

As previously noted in Section One, annual changes in aircraft ownership parallel economic changes. As the gross state product in real terms begins to grow in a positive direction; the number of aircraft will also increase. Statewide change in the number of registered aircraft is expected to increase within the period from 1986 to 1990 at a rate well below the national rate. The period, 1990 to 2005, is expected to produce a more dramatic increase.

An estimated 3,250 aircraft are expected to be registered in the State in 1990 increasing to 3,875 by 2000 and 4,200 in 2005. These estimates are well below the estimates presented in the 1982 State Aviation System Plan.

The ratio of aircraft to 10,000 population in Iowa experienced a decrease from 11.98 aircraft per 10,000 population in 1980 to an estimated 10.59 aircraft per 10,000 population in 1985. Based upon population trends in Iowa and future aircraft, the ratio of aircraft to population is expected to increase as the economy of the State improves. By 1990, the ratio of registered aircraft to population will increase to 11.15 reaching 12.1 by 1995 which is only a slight increase over the 1980 ratio of 11.98 aircraft per 10,000 population. An estimated 13.06 aircraft per 10,000 population will exist by 2000 increasing to 14 in 2005.

The ratio of registered aircraft to population within the Harrison County area was an estimated 13.8 aircraft per 10,000 population in 1985. This ratio is well above the State estimate 10.59 indicating a higher incidence of aircraft ownership within the Harrison County Airport Service Area.

As previously noted, population change within the airport service area is expected to decline through 1995 and stabilize. Consequently, the number of aircraft registered in the service area are also expected to remain stable with only a modest increase anticipated through 2005. Within the State, the number of registered aircraft is expected to increase by 5.58 percent within the period 1985 to 1990. From 1990 to 1995, the number of registered aircraft is expected to increase by 9.25 percent and within the period from 1995 to 2005, an 18.3 percent increase is expected.

TABLE 2-4: REGISTERED AIRCRAFT, IOWA, 1985 - 2005

YEAR	IOWA POPULATION	REGISTERED G/A AIRCRAFT	G/A AIRCRAFT PER 10,000 POPULATION
1980	2,913,808	3,492	11.98
1985	2,905,400	3,078	10.59
1990	2,913,500	3,250	11.15
1995	2,913,800	3,550	12.10
2005	2,998,576	4,200	14.00

SOURCE: IDOT, 1984
PDS, 1984

Regional Trends

A five county area was selected for a more indepth assessment than that provided by a review of statewide trends. Table 2-5 summarized registered aircraft by year for Monona, Crawford, Shelby, Pottawattamie, and Harrison Counties. The total number of aircraft registered in the five counties has varied considerably from year to year.

TABLE 2-5: REGISTERED AIRCRAFT, FIVE COUNTIES, 1976 - 1985

COUNTY	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Monona	39	42	37	39	36	31	49	--	31	24
Crawford	29	17	17	16	23	11	19	--	15	8
Shelby	28	24	28	32	37	32	29	--	25	20
Pottawattamie	62	44	44	44	66	56	58	--	62	40
Harrison	19	21	19	21	20	18	20	--	21	19
Total	177	148	145	152	182	148	175	N/A	154	111
Harrison as Percent of Total	10.7	14.2	13.1	13.8	11.0	12.2	11.4	--	13.6	17.1

SOURCE: FAA (As of December 31, 1976 - 1981)
IDOT (1982 - 1985 - Data not available for 1983)

From 1976 through 1978, the area experienced a decrease in the number of registered aircraft while experiencing an increase in 1979 and 1980. Since 1980, the number of registered aircraft experienced a downward trend. There were 182 aircraft registered within the five counties in 1980 compared to 111 in 1985. Within the five year period (1980 - 1985) the number of registered aircraft decreased by 71 or 39 percent.

Of the five counties, Harrison County realized relative stabilty. The most dramatic decrease was found in Crawford County which experienced a 46.7 percent decrease in registered aircraft from 1984 to 1985 compared to a 9.5 percent decrease in Harrison County for the same period.

Pottawattamie County experienced a 35.5 percent decrease followed in turn by Monona County and Shelby County with a 22.8 and 20.0 percent decrease, respectively, for the years 1984 and 1985. The five county average for the same period was 27.9 percent.

The number of based aircraft at public owned airports within the five county area were summarized in Table 2-6 for the period 1976 through 1984.

TABLE 2-6: BASED AIRCRAFT, PUBLIC AIRPORTS, 1976 - 1984

AIRPORT	1976	1977	1978	1979	1980	1981	1982	1983	1984
Mapleton	14	14	14	18	18	21	17	21	20
Onawa	16	16	16	16	16	14	13	14	14
Denison	23	23	23	23	27	27	28	21	22
Harlan	27	27	27	27	27	24	26	24	24
Council Bluffs	46	46	46	46	46	62	62	58	62
Woodbine	4	5	5	5	5	3	5	4	5
Total	130	131	131	135	139	151	151	142	147

SOURCE: IDOT

The five county area experienced an increase in the number of based aircraft from 1976 to 1982, followed in turn by a decrease in 1983 when 142 aircraft were based at public owned airports. This number increased to 147 in 1984; four less than the previous high of 151 in 1981 and 1982.

Table 2-7 summarized the relationship of leased aircraft to registered aircraft. An indicator of airport utilization was obtained by dividing the number of based aircraft by the number of registered aircraft. Where the ratio exceeds one (1.0) or 100 percent, the airport is considered more attractive to aircraft owners than those with a ratio of less than one. Denison Municipal (Crawford County) was able to attract a number of aircraft not registered in the County as did the Mapleton and Onawa airports. Council Bluffs recorded a ratio of 1.0 while Harlan and Woodbine experienced a loss of based aircraft. Whereas Woodbine was only able to capture 23.8 percent of the potential numbers of based aircraft, Harlan captured 96 percent. Part of Woodbines loss stem from the private airport at Missouri Valley.

TABLE 2-7: REGISTERED AND BASED AIRCRAFT, FIVE COUNTIES, 1984

	COUNTY REGISTERED AIRCRAFT		BASED AIRCRAFT PUBLIC FACILITIES		BASED AS PERCENT OF
COUNTY	NUMBER	PERCENT	NUMBER	PERCENT	REGISTERED
Monona	31	20.1	34	23.1	109.6
Crawford	15	9.7	22	15.0	146.7
Shelby	25	16.3	24	16.3	96.0
Pottawattamie	62	40.3	62	42.2	100.0
Harrison	21	13.6	5	3.4	23.8
Total	154	100.0	147	100.0	95.5

Note: Private facilities: Missouri Valley in Harrison County and Maynard in Monona County.

SOURCE: PDS

The five county area recorded 10.3 registered aircraft per 10,000 population in 1984. Harrison County recorded 13.1 registered aircraft per 10,000 population or 2.8 aircraft more than the five county average. However, the number of based aircraft per 10,000 population in Harrison County for the same year was considerably less, 3.1 based aircraft, compared to the area average of 9.8.

Monona County recorded the largest number of registered aircraft per 10,000 population (27.2) and based aircraft (29.8). Monona County was followed in turn by Shelby, Crawford, and Pottawattamie Counties. Pottawattamie County recorded 7.0 registered and based aircraft per 10,000 population. Crawford County reported 7.7 registered and 11.3 based aircraft per 10,000 population.

While aircraft ownership in Harrison County exceeded that of the five county area, the number of aircraft based at a public owned facility clearly indicates the need to provide a public owned facility capable of capturing a greater percentage of the market within Harrison County.

TABLE 2-8: REGISTERED AND BASED AIRCRAFT PER 10,000 POPULATION, 1984

COUNTY	1984 POPULATION (1)	REGISTERED AIRCRAFT PER 10,000 POPULATION	BASED AIRCRAFT PER 10,000 POPULATION (2)
Monona	11,400	27.2	29.8
Crawford	19,400	7.7	11.3
Shelby	14,800	16.9	16.2
Pottawattamie	88,000	7.0	7.0
Harrison	16,000	13.1	3.1
Total	149,600	10.3	9.8

SOURCE: (1) Iowa Census Data Center 1984 Estimates
(2) Based at public owned airports only

To facilitate understanding of the estimates for a specific airport location, reference is made to the 1978 SASP which concludes:

> "The choice of a site for basing an aircraft is not always directly related to the residence of the owner. The choice may be affected by such factors as hangar rental and maintenance free structure, availability of terminal services, availability of navigational aids, runway length and condition, etc. An aircraft may be based several miles from the owner's place of residence in order to have access to more attractive features. Current based aircraft figures would indicate that some airports which provide services desired by aircraft owners may attract a larger number of aircraft than are registered in the County, while in other areas the total aircraft based in the County is less than the total registered aircraft in the County."

SOURCE: SASP, 1978 (p. 38)

The preceeding will explain some of the annual variations of general aviation aircraft registered or based at one airport or another. Those airports which now enjoy numbers of based aircraft owned by persons from outside the community or airport service area, may in the future lose their historical dominance.

> "Ideally, as airport development improves the quality of airports throughout the State, the attractiveness of the airports will become more similar causing the number of aircraft based in a county to more nearly equal the number registered in that county."

SOURCE: SASP, 1978, (p. 39)

On a comparative basis with the region, Harrison County recorded 13.6 percent of the area total but captured only 3.4 percent of the based aircraft. Of the potential number of based aircraft in 1984, 76.2 percent of the registered aircraft were based at private facilities or outside the County. In 1985, there were 11.8 registered aircraft per 10,000 population down from the 1984 ratio of 13.1.

Harrison County Airport Service Area

As previously defined, the Harrison County Airport Service Area extends across Harrison County. The distribution of aircraft by ownership for 1984 and 1985 is summarized in Tables 2-9 and 2-10. Missouri Valley and Woodbine reported seven aircraft owners in 1985 or 73.6 percent of the County total. From 1984 to 1985, aircraft ownership in Missouri Valley decreased by two while increasing by one in Woodbine. Ownership remained unchanged in Dunlap and Modale but decreased by one in Mondamin.

TABLE 2-9: COMMUNITY DISTRIBUTION OF REGISTERED AIRCRAFT, 1984 & 1985

	1984		1985	
COMMUNITY	REGISTERED AIRCRAFT	PERCENT OF TOTAL	REGISTERED AIRCRAFT	PERCENT OF TOTAL
Missouri Valley	9	42.8	7	36.8
Woodbine	6	28.6	7	36.8
Dunlap	2	9.5	2	10.5
Modale	1	4.8	1	5.4
Mondamin	3	14.3	2	10.5
Total	21	100.0	19	100.0

SOURCE: PDS, 1986

Changes in aircraft ownership by aircraft make and model are evident from a review of Table 2-10.

TABLE 2-10: REGISTERED AIRCRAFT, HARRISON COUNTY, 1984 - 1985

1985 (19) COMMUNITY	ID NUMBER	MAKE	1984 (21) COMMUNITY	ID NUMBER
Missouri Valley (7)	2420 8	Cessna 182	Missouri Valley (9)	2420 8
Missouri Valley	2686 V	Cessna 170	Missouri Valley	2686 V
Missouri Valley	2830 C	Cessna 170B	Missouri Valley	2830 C
Missouri Valley	3289 C	Beech E35	Missouri Valley	3289 C
Missouri Valley	6618 M	Cessna 182	Missouri Valley	6618 M
Missouri Valley	6791 E	Cessna 175	Missouri Valley	6791 E
				8490 J
Missouri Valley	7961 H	Piper PA12	Missouri Valley	7961 H
				7627 T
Woodbine (7)	2639 C	Cessna R182	Woodbine (6)	2639 C
Woodbine	4748 Z	Piper PA22	Woodbine	4748 Z
Woodbine	4892 N	Cessna 182	Woodbine	--
				714E P
Woodbine	6035 Q	Mooney M20C	Woodbine	6035 Q
Woodbine	626 S	Beech V35	Woodbine	--
Woodbine	6956 Q	Beech A23	Woodbine	6959 Q
Woodbine	8600 G	Cessna 150	Woodbine	8600 G
Dunlap (2)	4233 C	PDQ "D"	Dunlap (2)	4233 C
Dunlap	555 DL	Piper PA32-300	Dunlap	555 DL
Modamin (2)	7356 W	Pipe PA28-180	Modamin (3)	7356 W
				1342 D
Modamin	9839 R	Beech M35	Modamin	9839 R
Modale (1)	3316 M	Piper PA12	Modale	3316 M

SOURCE: IOWA AERONAUTICS DIVISION, November, 1985 and May, 1984

A comparison of aircraft identification numbers reveal the change in ownership from 1984 to 1985. Two of the four registered aircraft in 1984 were replaced with different aircraft.

Table 2-11 summarizes anticipated change in the number of registered aircraft through 2005. The actual number is expected to follow a middle trend line. Should the economy of the area improve, the high estimate may be more realistic.

TABLE 2-11: REGISTERED AIRCRAFT, HARRISON COUNTY AIRPORT SERVICE AREA, 1985 - 2005

	LOW (1)		MIDDLE (2)		HIGH (3)	
YEAR	BASELINE	ANTICIPATED	BASELINE	ANTICIPATED	BASELINE	ANTICIPATED
1985	17	17	19	19	21	21
1990 (4)	16	17	19	20	21	22
1995 (5)	16	19	19	22	21	24
2005 (6)	16	22	19	26	21	28

(1) 10.3/10,000 - 1984 ratio, five counties
(2) 11.8/10,000 - 1985 ratio, Harrison
(3) 13.1/10,000 - 1984 ratio, Harrison
(4) 5.58% statewide increase
(5) 9.25% statewide increase
(6) 18.3% statewide increase

SOURCE: PDS, 1986

The number of aircraft based at public airport facilities within Harrison County is expected to increase rapidly should a facility meeting minimum standards and service level be constructed. Assuming that such facility improvements be made over the next five years (by 1990), 95 percent of the registered aircraft within the service area would be based at a public facility, (95% = 5 county ratio in 1984). This number is expected to approach 100 percent by 1995.

TABLE 2-12: BASED AIRCRAFT, PUBLIC AIRPORT, HARRISON COUNTY, 1985 - 2005

YEAR	LOW	MIDDLE	HIGH
1985	5	5	5
1990	16	19	21
1995	19	22	24
2005	22	26	28

SOURCE: PDS

As previously noted, area airport facilities compete for aircraft. An increase in the number of based aircraft beyond the estimates in Table 2-12 would be realized only if there was an increase in ownership above historic levels or the airport offered services at a competitive price that would attract area aircraft to the facility. Consequently, airport utilization would exceed 1.0.

The future mix of based aircraft is expected to consist of single and light twin engine aircraft having a gross landing or takeoff weight of 12,500 pounds or less. For planning purposes, the following assumptions were made:

Aircraft Approach Category
- Category A Aircraft
  - Speed less than ninety-one (91) knots

Airplane Design Group
- Design Group I
  - Wingspan up to, but not including, forty-nine (49) feet.

Reference may be made to Table 2-13 concerning a list of representative aircraft within Airplane Design Group One.

CURRENT AIRCRAFT ARRANGED BY AIRPLANE DESIGN GROUP

Aircraft	Appch Speed Knots	Wingspan Feet	Wingspan Meters	Length Feet	Length Meters	Tail Height Feet	Tail Height Meters	Maximum Takeoff Weight Lbs	Maximum Takeoff Weight Kg
AIRCRAFT APPROACH CATEGORY A AND B SMALL AIRPLANES IN AIRPLANE DESIGN GROUP I									
Beech Skipper 77	63	30.0	9.1	24.0	7.3	6.9	2.1	1,675	759
Foxjet 600	97	31.6	9.6	31.5	9.6	10.2	3.1	4,449	2,018
Beech Sierra C24R	70	32.8	9.9	25.8	7.8	8.1	2.4	2,750	1,247
Beech Sundowner C23	68	32.8	9.9	25.8	7.8	8.3	2.5	2,450	1,111
Cessna-150	55	33.3	10.1	24.1	7.3	8.5	2.6	1,670	757
Beech Bonanza V35B	70	33.5	10.2	26.4	8.0	7.6	2.3	3,400	1,542
Beech Bonanza F33A	70	33.5	10.2	26.7	8.1	8.3	2.5	3,400	1,542
Beech Bonanza A36	72	33.5	10.2	27.5	8.3	8.4	2.5	3,600	1,632
AJI Hustler	98	34.3	10.5	41.0	12.5	13.1	4.0	9,500	4,309
Cessna-177	64	35.5	10.8	27.2	8.3	8.6	2.6	2,500	1,134
Embraer-326	102	35.6	10.9	35.0	10.7	12.2	3.7	11,500	5,216
Piper Aerostar	94	36.7	11.2	34.8	10.6	12.1	3.7	6,000	2,722
Beech Bonanza B36TC	75	37.8	11.5	27.5	8.3	8.4	2.5	3,850	1,723
Beech Baron 58P	101	37.8	11.5	29.9	9.1	9.1	2.7	6,200	2,812
Beech Baron 58TC	101	37.8	11.5	29.9	9.1	9.1	2.7	6,200	2,812
Beech Baron E55	88	37.8	11.5	29.9	9.1	9.1	2.8	5,300	2,404
Beech Baron 58	96	37.8	11.5	29.9	9.1	9.5	2.8	5,400	2,449
Beech Baron B55	90	37.8	11.5	28.0	8.5	9.6	2.9	5,100	2,313
Beech Duchess 76	76	38.0	11.5	29.0	8.8	9.5	2.9	3,900	1,769
Mitsubishi Solitaire	87	39.1	11.9	33.2	10.1	12.9	3.9	10,470	4,749
Mitsubishi Marquise	88	39.1	11.9	39.4	12.0	13.6	4.1	11,575	5,250
Mitsubishi MU-2	119	39.1	11.9	39.5	12.0	13.6	4.1	10,800	4,899
Beech Duke B60	98	39.3	11.9	33.8	10.3	12.3	3.7	6,775	3,073
Partenavia 68B Victor	73	39.4	12.0	30.7	9.4	11.2	3.4	4,321	1,960
Learfan 2100	86	39.9	12.2	38.7	11.8	11.5	3.5	7,200	3,266
Embraer-820	74	40.7	12.4	34.6	10.5	13.0	4.0	7,000	3,175
Piper Navajo	100	40.7	12.4	32.6	9.9	13.0	4.0	6,500	2,948
Cessna-421	96	41.1	12.5	36.4	11.1	12.9	3.9	7,500	3,402
Piper Cheyenne	110	42.7	13.0	32.1	9.8	12.6	3.8	10,500	4,763
Cessna-402	95	44.1	13.4	36.3	11.1	11.4	3.5	6,850	3,107
Cessna-414	94	44.1	13.4	36.4	11.1	11.5	3.5	6,785	3,078
Beech C99 Airliner	107	45.9	13.9	44.5	13.5	14.4	4.3	11,300	5,125
Beech King Air F90	108	45.9	13.9	39.8	12.1	15.1	4.6	10,950	4,966
Beech King Air B100	111	45.9	13.9	39.9	12.1	15.4	4.6	11,800	5,352
Hamilton Westwind	96	46.0	14.0	45.0	13.7	9.2	2.8	12,495	5,666
Volpar Turbo 18	100	46.0	14.0	37.4	11.4	9.6	2.9	10,286	4,666
Cessna-404	92	46.3	14.1	39.5	12.0	13.3	4.1	8,450	3,833
Swearingen Merlin	105	46.3	14.1	42.2	12.9	16.8	5.1	12,500	5,670
Swearingen Metro	112	46.3	14.1	59.4	18.1	16.8	5.1	12,500	5,670
Rockwell 690	97	46.5	14.2	44.3	13.5	15.0	4.6	10,250	4,649
Cessna Citation I	108	47.1	14.4	43.5	13.3	14.3	4.4	11,850	5,375
Embraer-121	92	47.4	14.4	40.2	12.3	15.9	4.8	12,500	5,670
Lapan XT-400	75	47.9	14.6	33.5	10.2	14.1	4.3	5,555	2,520
DeH DHC-2	50	48.0	14.6	30.3	9.2	9.0	2.7	5,100	2,313
Piaggio P-166 Portofino	82	48.2	14.7	39.2	11.9	16.4	5.0	9,480	4,300
Learjet 28/29	120	42.2	12.9	45.0	13.7	12.6	3.8	15,000	6,804
SN-600 Corvette	118	42.2	12.9	45.4	13.8	13.9	4.2	14,550	6,600
Breguet FAL-10	104	42.9	13.1	45.5	13.9	15.1	4.6	18,740	8,500
Mitsubishi Diamond MU-300	100	43.3	13.2	48.3	14.7	13.7	4.2	13,890	6,300
Piaggio PD-808	117	43.3	13.2	42.2	12.9	15.8	4.8	18,300	8,301
Rockwell Sabre 40	120	44.4	13.5	43.8	13.4	16.0	4.9	18,650	8,459
AIRCRAFT APPROACH CATEGORY C AND D AIRPLANES IN AIRPLANE DESIGN GROUP I									
Learjet 24	128	35.6	10.9	43.2	13.2	12.6	3.8	13,500	6,123
Learjet 25	137	35.6	10.9	47.6	14.5	12.6	3.8	15,000	6,804
Learjet 35A/36A	143	39.6	12.1	48.6	14.8	12.6	3.8	18,000	8,165
Rockwell JC1121	130	43.3	13.2	50.4	15.4	15.8	4.8	16,800	7,620
Learjet 54-55-56	128	43.8	13.4	55.1	16.8	14.8	4.5	20,500	9,299
Rockwell Sabre 75A	137	44.7	13.6	47.2	14.4	17.2	5.2	23,000	10,433
IAI-1124 Westwind	129	44.8	13.7	52.3	15.9	15.8	4.8	23,650	10,727
HS-125-1/400	124	47.0	14.3	47.4	14.4	16.5	5.0	26,500	12,020
HS-125-600	125	47.0	14.3	50.5	15.4	17.3	5.3	25,000	11,340
HS-125-700	125	47.0	14.3	50.7	15.5	17.6	5.4	25,000	11,340
Hansa HAB-320	125	47.5	14.5	54.5	16.6	16.2	4.9	20,280	9,199

TABLE 2 - 13: AIRCRAFT BY AIRPLANE DESIGN GROUP

National and State Trends

The number of pilots per 10,000 population for the nation decreased from 33.94 pilots (1980) to an estimated 31.89 in 1985. The ratio of pilots to population is expected to increase from the estimated 31.89 in 1985 to 35.58 in 1990 and 38.15 pilots per 10,000 population by 1995.

The number of Iowa pilots also decreased from 40.26 in 1980 to 32.58 pilots per 10,000 population in 1984. While the decrease experienced by Iowa exceeded that of the nation, the number of registered pilots per 10,000 population was slightly greater than the U.S. ratio. The number of pilots in Iowa is expected to increase from 9,467 in 1985 to 13,413 in 2005. There were an estimated 32.58 Iowa pilots per 10,000 population in 1985.

Regional and Service Area Trends

In 1984, there were 375 registered pilots residing in the five county region. Of the 375 pilots, 9.8 percent resided in Harrison County. Pottawattamie, as could be expected, recorded the largest number with 178 or 47.5 percent of the region total. Monona County recorded the highest number of pilots, 49 per 10,000 population followed in turn by Shelby, (43); Harrison, (23); Crawford, (21); and Pottawattamie, (20).

The five county area average was 25.1 pilots per 10,000 population.

TABLE 2-14: PILOTS, FIVE COUNTIES, 1984

COUNTY	PILOTS(1)	PERCENT	1984 POPULATION(2)	PILOTS PER 10,000 POPULATION
Monona	56	14.9	11,400	49
Crawford	40	10.7	19,400	21
Shelby	64	17.1	14,800	43
Pottawattamie	178	47.5	88,000	20
Harrison	37	9.8	16,000	23
Total	375	100.0	149,600	25.1

SOURCE: (1) IDOT, 1984
(2) IOWA CENSUS DATA CENTER, 1984 Estimates of Population, April, 1985

Pilot trends within the Harrison County airport service area are summarized in Table 2-15. In 1984, there were 1.9 pilots for each registered aircraft within Harrison County compared to 2.4 pilots per aircraft for the five county area. The number of pilots is expected to increase from 37 in 1984/85 to 55 in the year 2005.

TABLE 2-15: PILOTS, HARRISON COUNTY, 1985 - 2005

YEAR	BASE (1)	TREND	ADJUSTED BASE LINE
1985	37	37	----
1990	37	42	3.76 pilots / 10,000 population
1995	37	46	2.62 pilots / 10,000 population
2005	37	55	5.76 pilots / 10,000 population

(1) 23 pilots / 10,000 population

Annual, Itinerant, and Local Operations

An aircraft operation is defined as the airbourne movement of aircraft in controlled and non-controlled airport terminal areas and about given enroute fixes or at other points where counts can be made. Each movement counts as an operation. A "touch and go", for example, counts as two operations.

Total annual aircraft operations are further broken down into local and itinerant operations. A local operation is defined as one by an aircraft that:

1. Operates within the local traffic pattern or within sight of the control tower;
2. is known to be departing for or arriving from local practice areas; or
3. executes simulated instrument approaches of low passes at the airport.

An itinerant aircraft operation is one that operates outside the local traffic pattern. A typical example of an itinerant operation is an air taxi operation. Aviation operations are most often discussed in terms of:

1. Total annual aircraft operations
   - Total annual local
   - Total annual itinerant
2. Peak day and peak hour operations

Aircraft operations are a function of the following elements:

1. Based Aircraft
2. Resident Pilots
3. Airport Facilities
4. Airport Management
5. Social and Economic Characteristics of the Airport Service Area
6. F.B.O. and Air Taxi Services

Without a daily log of operational activity, an estimate of total annual itinerant and local operations are most often derived from a random survey or local sources. A high degree or correlation has typically been found between aircraft operations and service area population, based aircraft, and registered pilots.

Total annual aircraft operations were computed utilizing the following equation:

Log (Total Annual Operations) = 2.614 + 0.501 Log (Based Aircraft x pilots)

The same variables were used to estimate itinerant operations:

Log (Total Itinerant Operations) = 1.865 + 0.605 Log (Based Aircraft x pilots)

The above models are obtained from the 1978 Iowa State Airport System Plan Update prepared by the Engineering Research Institute, Iowa State University. The models (equations) accounted for 88 and 95 percent of the variation, respectively.

Based upon the forecast of based aircraft and pilots within the Harrison County Airport Service area, an estimate of total annual aircraft operations was made for the period 1985 to 2005. As noted in Table 2-16, the number of aircraft operations are expected to record a modest increase throughout the twenty (20) year planning period reaching 15,661 by the year 2005.

TABLE 2-16: TOTAL ANNUAL OPERATIONS, 1985 - 2005

YEAR	ANNUAL OPERATIONS
1985	5,622
1990	11,692
1995	13,170
2005	15,661

SOURCE: PDS, 1985

Annual itinerant and local operations are summarized in Table 2-17. Local operations were obtained by subtracting annual itinerant operations from total annual operations presented in Table 2-16.

TABLE 2-17: ANNUAL ITINERANT AND LOCAL OPERATIONS, 1985 - 2005

YEAR	ANNUAL ITINERANT	ANNUAL LOCAL
1985	1724	3890
1990	4176	7516
1995	4821	8349
2005	5943	9718

SOURCE: PDS, 1985

The number of itinerant aircraft operations are expected to approach 5943 by the year 2005 while local operations may total 9718. Total operations at the public airport is expected to increase by 17.8 percent over the 20 year planning period provided the public facility is developed to standard.

The majority of aircraft operations are expected to be made by single engine and light twin engine aircraft with a gross land and takeoff weight under 12,500 pounds. For planning purposes, it is assumed that nearly all operations would be made by aircraft with an approach speed less than 91 knots and a wingspan up to, but not including, 49 feet. An airport designed to Airplane Design Group I standards is expected to satisfy future aviation demand activity.

No indepth assessment of peak day and peak hour operational activity was made. Reference to FAA AC 150/5060-5, Airport Capacity and Delay provides the following scenario concerning airport capacity.

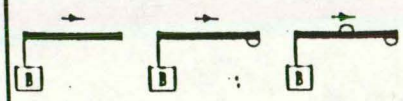
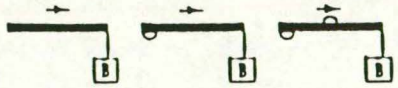
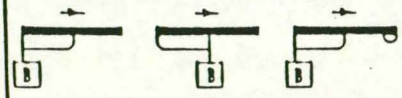
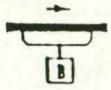
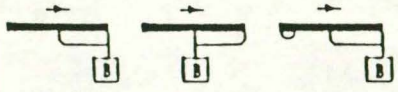
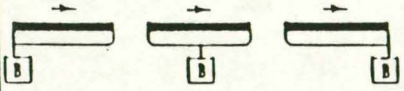
Conditions:

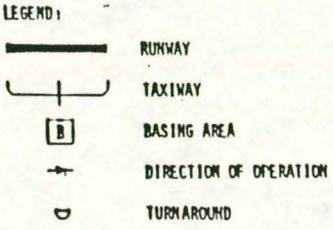
1. Class A and B Aircraft (See Table 2-13)
2. Approved approach procedure
3. Arrivals equal departures
4. There are no airspace limitations affecting runway use

Variables:

1. Airport configuration
2. Percent touch and go operations
   - 0 - 25 percent
   - 26 - 50 percent

Configurations one, two, and three as shown in Figure 2-1 are descriptive of the typical airport.

CONFIG. No.	AIRFIELD CONFIGURATION	HOURLY CAPACITY IN VFR PERCENT TOUCH-AND-GO		HOURLY CAPACITY IN IFR
		0 TO 25	26 TO 50	
		(OPERATIONS PER HOUR)		
1		54 TO 66	66 TO 85	20 TO 24
2		59 TO 72	72 TO 92	20 TO 24
3		40 TO 50	50 TO 67	20 TO 24
4		82 TO 97	97 TO 117	20 TO 24
5		71 TO 85	85 TO 106	20 TO 24
6		60 TO 72	72 TO 92	20 TO 24
7		SEE CHAPTER 3		



Hourly capacity of single runway airports, without radar coverage or ILS, serving small aircraft only.

FIGURE 2 - 1: HOURLY CAPACITY - SINGLE RUNWAY

Commuter Airline/Air Taxi

The Airline Deregulation Act of 1978 provided for the phase out of the Civil Aeronautics Board (CAB) control over pricing market entry and market exit. Consequently, there has been a pronounced effect upon air service in Iowa.

The Iowa DOT concluded in the 1982 state Airport Systems Plan that commuter air carrier service to Iowa communities, other than those with prior air carrier service, appears marginal.

> "Although commuter air service has been established in several very small markets in Iowa (Clinton, Marshalltown, and Spencer), the prospects for the expansion of such services in Iowa are limited."

SOURCE: IDOT, 1982 Iowa Aviation Systems Plan, (p. 27).

The nearest scheduled service is provided at Eppley Field (Omaha). Major carriers include American West, United Airlines, TWA, Republic, American, Eastern Air, Midwest, Frontier, and Ozark.

The most appropriate service level for the Harrison County Airport service area is the air taxi. Presently, there is no air taxi operator located on the facility, but service would be provided upon call to an area operator.

The Harrison County Airport may generate up to 4457 passenger enplanements and 17.8 tons of air freight by the year 2005. An increase in itinerant aircraft operations would contribute to future enplanements as well as air freight activity. Such may be induced in part by increased industrial activities and development of natural amenities inherent in Harrison County.

TABLE 2-18: AIR PASSENGERS AND FREIGHT, HARRISON COUNTY, 1985 - 2005

YEAR	PASSENGER ENPLANEMENTS	AIR FREIGHT (IN TONS)
1985	1293	5.2
1990	3132	12.2
1995	3616	14.5
2005	4457	17.8

SOURCE: PDS, 1985

The forecast of aviation activity represents a trend line along which actual occurrences are anticipated. Actual occurrences will fall above and below the trend line. In summary, future numbers of based and registered aircraft, together with operational activity, will experience a modest growth through the year 2005.

An airport facility developed to Basic Utility Stage II standards would accommodate anticipated aviation activity through the year 2005. Aircraft with gross weights in excess of 12,500 pounds would be expected to use area General Utility and Basic Transport category airports.

SECTION THREE

AIRPORT FACILITY REQUIREMENTS

Introduction

Section Three outlines those facilities required to meet and satisfy anticipated aviation activity through the year 2005. Facility requirements outlined herein are based upon FAA and IDOT guidelines. The Iowa Department of Transportation has taken exception to conformance with FAA guidelines in some cases. The most salient of these relate to the crosswind runway.

> "FAA standards suggest that crosswind runways at utility airports should be paved whereas the premise here is that these will remain unpaved."

SOURCE: 1978 IDOT SASP, p. 54

Such deviation by the IDOT is based upon the assessment of future levels of funding for airport improvements in the State of Iowa. Whereas the FAA guidelines represent the ultimate level of development, the IDOT maintains that such deviation from FAA guidelines is an appropriate subject for detailed review within the planning process.

The objective herein is to identify those facility components which will provide a satisfactory level of service over the twenty-year planning period. Section Three outlines each airport facility component in terms of a design standard or guideline against which existing airport site(s) are measured. Should the existing airport site(s) have limitations that would preclude implementation, an alternative site that would accommodate present and future facility requirements would be selected.

As noted in Section Two, the airport should ultimately be developed to Basic Utility - stage two standards and Airplane Design Group One. Should a new site be selected, land and site requirements that would allow expansion of the runway facilities to General Utility standards should be considered. While this land requirement may be beyond present needs it would provide the airport owner with some flexibility, should aviation levels exceed expectations.

Runway Alignment

Runway alignment is based upon the number of factors to include topography, cultural features, physical features, land ownerships, environmental and climatic conditions. Of these, wind coverage provided by an existing or proposed runway is a primary concern.

The optimum runway orientation is one which will provide the airport a 95 percent level of wind coverage at a crosswind component value not exceeding 12 m.p.h. (10.5 knots) for utility airports and 15 m.p.h. for larger than utility airports. It would be desirable to orientate a single runway so as to obtain the 95 percent wind coverage. In Iowa, the wind is so varied that a crosswind runway is required to supplement coverage obtained from the primary runway.

Since there is no wind data available for Harrison County, wind data tabulated at Eppley Field was selected as most representative for Harrison County. Reference may be made to Figure 3-1.

The IDOT, as a rule of thumb, recommends a minimum 60 degree separation between runway facilities. Although this is not a standard, it does minimize a duplication of wind coverage. Such consideration is relevant where funding is limited and a maximum return is expected from the investment in crosswind runway facilities.

In addition to wind coverage, topographic conditions will determine if the alignment selected represents a prudent choice. While the runway may be constructed, the cost may be such that an alternative alignment while sacrificing wind coverage may be the more prudent choice. Crop patterns and ownership should also be considered in identifying runway alignment alternatives.

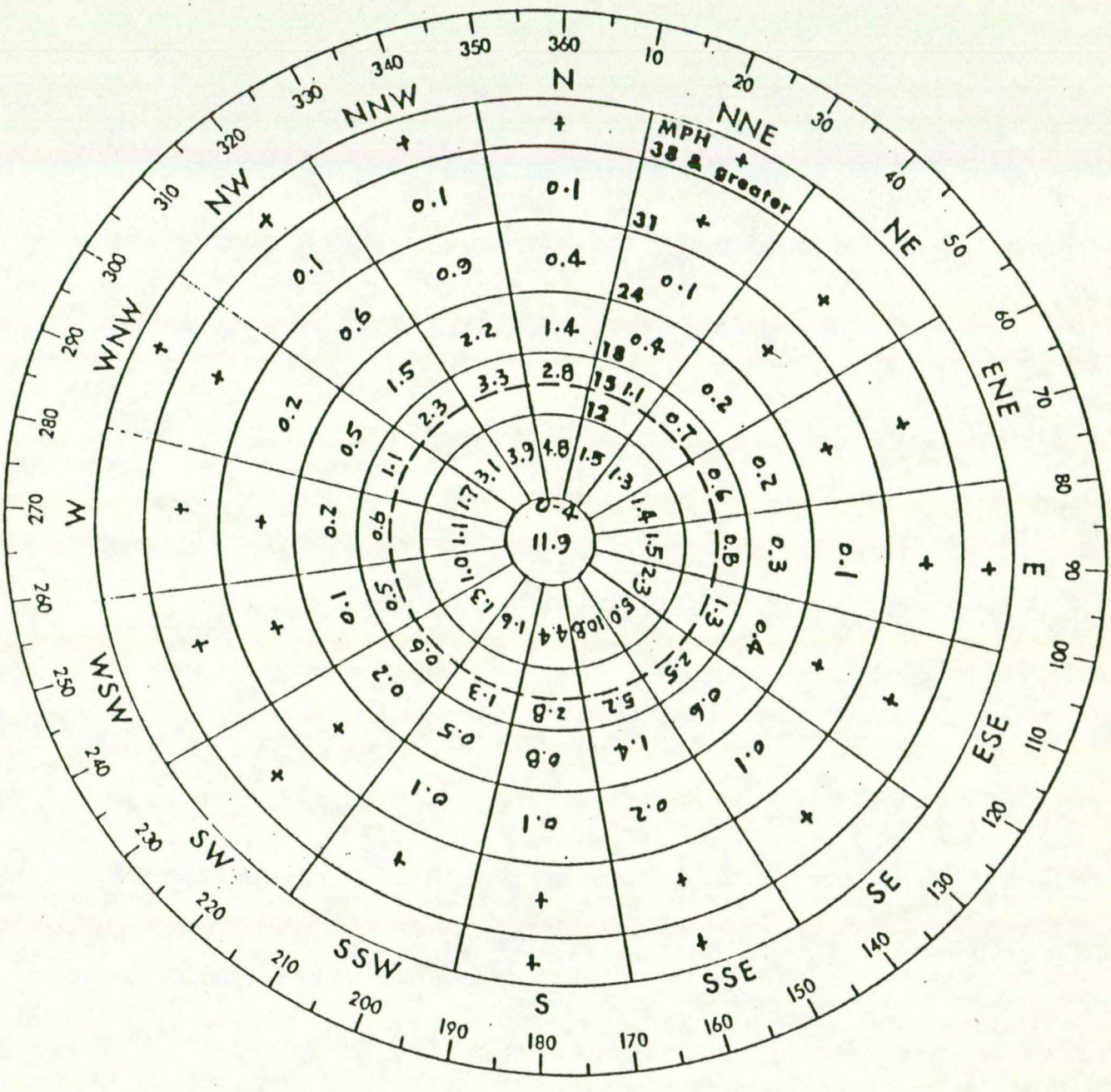
Consequently, the selection of a new airport site should be done with the objective of allowing optimum alignment of the runway. Physical features (topographic, geologic, etc.) combined with cultural features (land use, ownership, etc.) provide criteria against which site opportunities and constraints can be identified.

The primary runway will generally have an orientation of north to northwest. The crosswind should have an orientation which will provide the best supplemental coverage.

Runway Length and Width

The runway length requirement at a given airport facility is a function of the aircraft fleet using the facility. As previously noted, an airport developed to Basic Utility Standards would generally satisfy aviation demand over the twenty-year planning period. Basic transport category aircraft would be expected to utilize public airport facilities located at Denison, Omaha and/or Council Bluffs.

FIGURE 3-1: OMAHA WIND ROSE, RECORD OF PERIOD 1951 - 1960



Calms = 11.9%
Ceiling and visibility group:
Greater than 1000 ft and/or 3 miles = 96.2%
Less than 1000 ft and/or 3 miles = 3.8%

Runway length requirements were obtained from FAA AC 150/5300-4B, CHG. 6, page 13 reference herein as Figure 3-2. The runway length curves are based upon performance information from aircraft flight manuals and assumes the following:

-Zero headwind component.
-Maximum certified takeoff and landing weights.
-Relative humidity and runway gradient were accounted for by increasing the takeoff or landing distance of the groups most demanding aircraft by 10 percent.

The runway length curves present minimum length requirements to serve aircraft with an approach speed of 50 knots or more and less than ten (10) passenger seats.

Runway elevation and temperature (normal maximum in degrees Fahrenheit) are left as variables.

Given the following:

-Elevation: 1100 feet (ASL) (Estimated)
-Temperature: 87 degrees F.

The runway length requirement for Harrison County airport facility are as follows:

-Basic Utility - Stage II - 3400 feet
-General Utility - Stage I -4000 feet

Where it is not feasible to construct a runway to the desired length, no less than 80 percent of the desired length should be constructed. While the crosswind runway should be the same length as the primary runway, it should in no case be less that 2720 feet.

When selecting an airport site and runway alignment, consideration should be given to accommodating upwards of 4000 feet of runway. Based upon anticipated use, a runway 3400 feet in length would accommodate local and immediate demand. Should larger aircraft up to 12,500 pounds use the airport, the runway could be extended provided care was used in site selection and runway alignment.

The runway width should be no less than 60 feet for a basic utility runway (Airplane Design Group One with a non-precision approach). A turf runway should be no less than 120 feet in width.

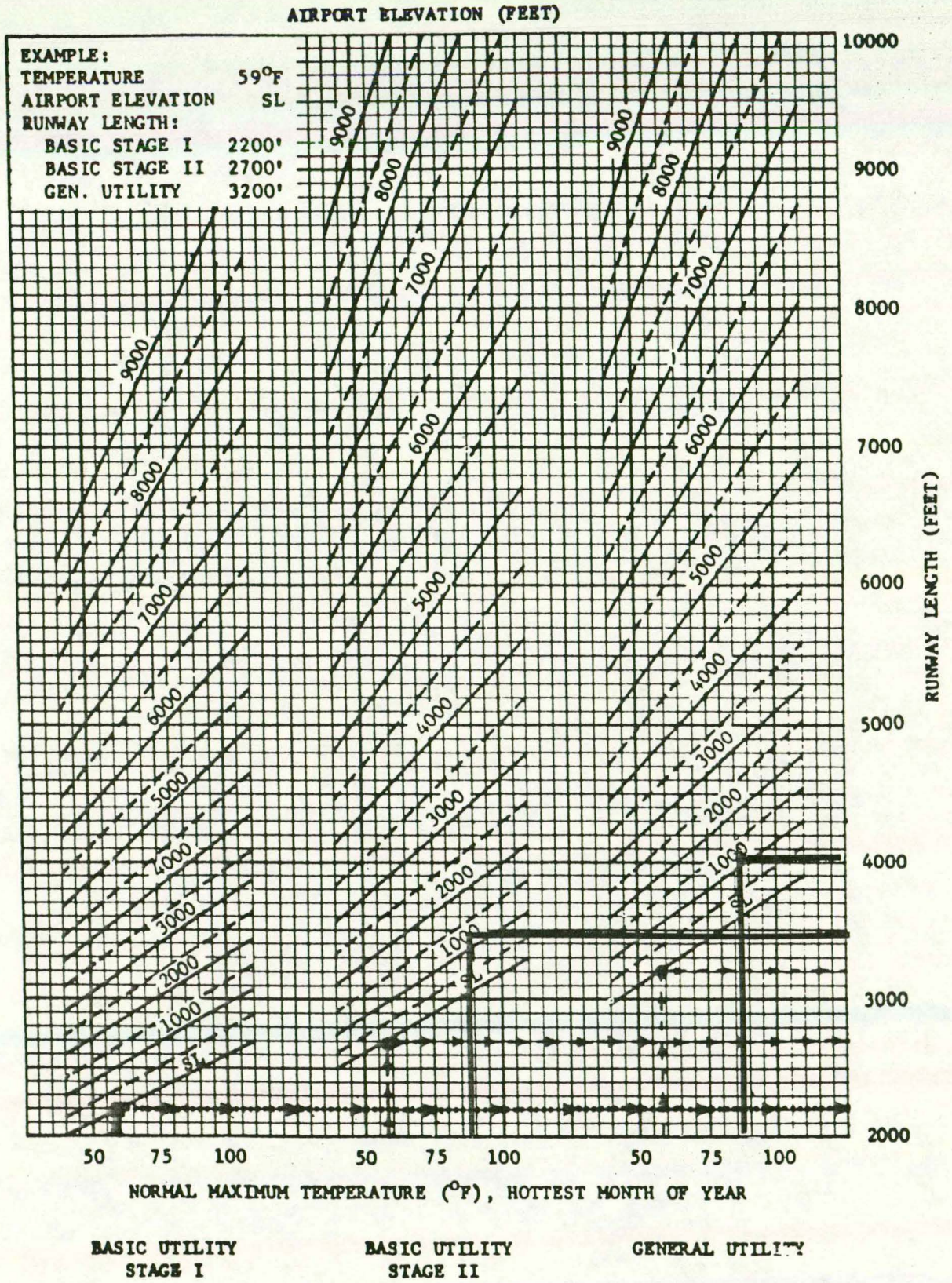
Taxiway

The IDOT finds justification for a parallel taxiway system when total annual operations are between 30,000 and 50,000. A full parallel system is justified when operations are in excess of 50,000 annually.

FIGURE 3-2: RUNWAY LENGTH

AC 150/5300-4B

6/24/75



Based upon the forecast of aviation demand and IDOT criteria, there would appear to be no justification for the construction of a parallel taxiway. The FAA finds justification for a parallel taxiway based upon the criteria of safety. For planning purposes, a full parallel taxiway would be expected to receive a low priority in terms of implementation.

The taxiway should be no less than 25 feet in width. Existing and future taxiways providing access to hangar facilities need not be more than 20 feet in width.

TABLE 3-1: RUNWAY AND TAXIWAY NEEDS

	RUNWAY		TAXIWAY*	
PERIOD	LENGTH	WIDTH	LENGTH	WIDTH
1986 - 1990	3400′	60′	Parallel	25′
1991 - 1995	3400′	60′	Parallel	25′
1996 - 2005	3400′	60′	Parallel	25′

* Low Priority

Holding Apron

Where a partial or full parallel taxiway is not recommended, an aircraft turnaround is recommended for each runway end. A typical turnaround is depicted in Figure 3-3.

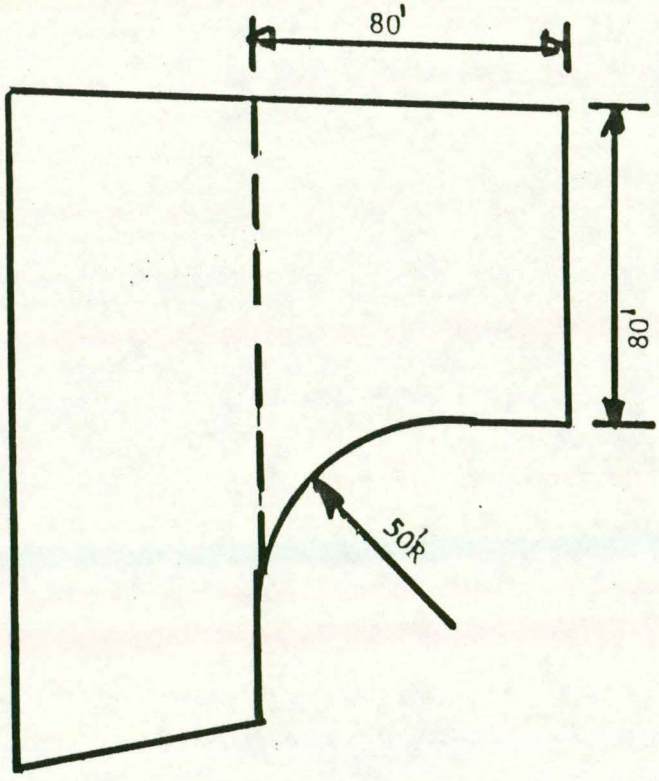


FIGURE 3-3:
HOLDING APRON

Runway Grade Change and Visibility

Consideration must also be given to runway grade changes, line of sight along and between runways as well as elimination of obstructions within the obstacle free zone (OFZ). The following line of sight criteria should be obtained:

-Runway grade changes should be such that any two points five feet above the runway centerline will be visible along the entire length of the runway where a full parallel taxiway does not exist. Where a full parallel taxiway does exist, the criteria may be reduced to one half the runway length rather than the entire runway length.

-Where intersecting runways exist, a runway visibility zone is created as depicted in the following figure.

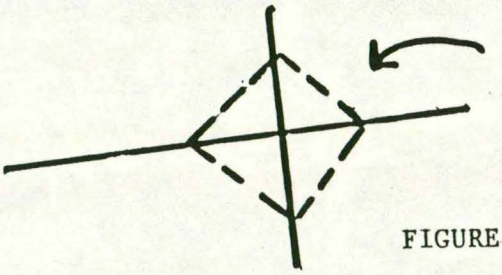


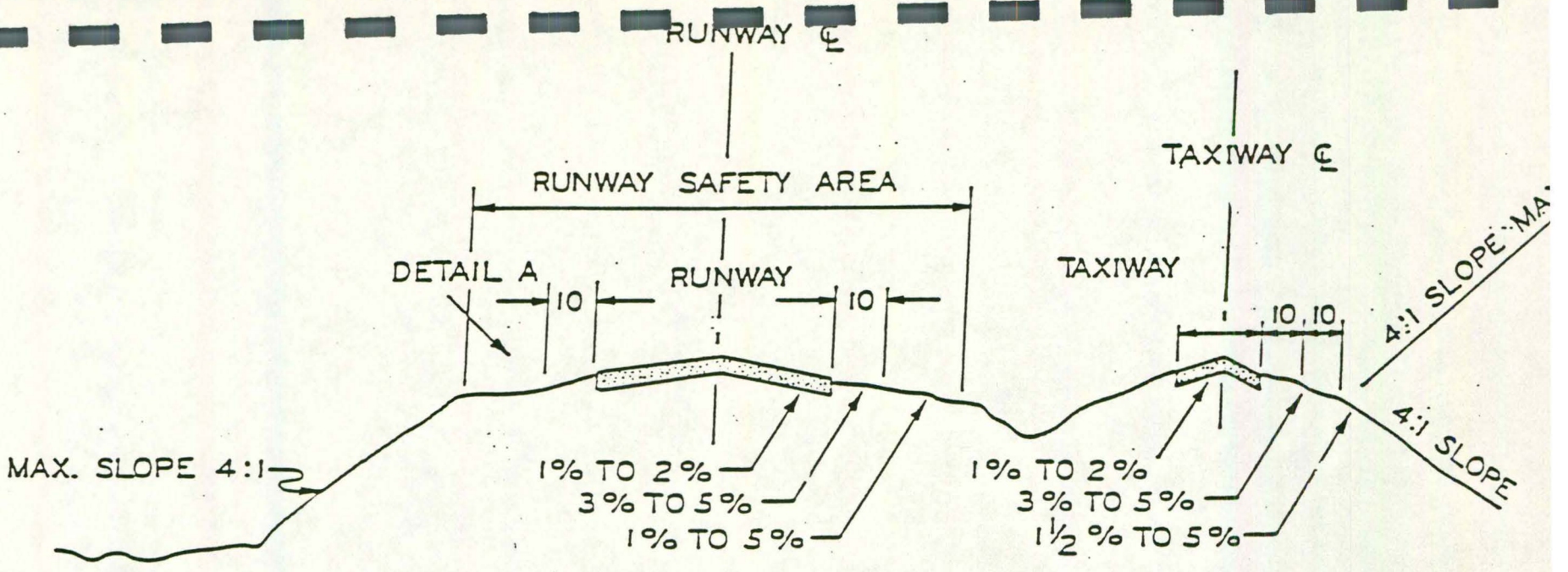
FIGURE 3-4: VISIBILITY ZONES

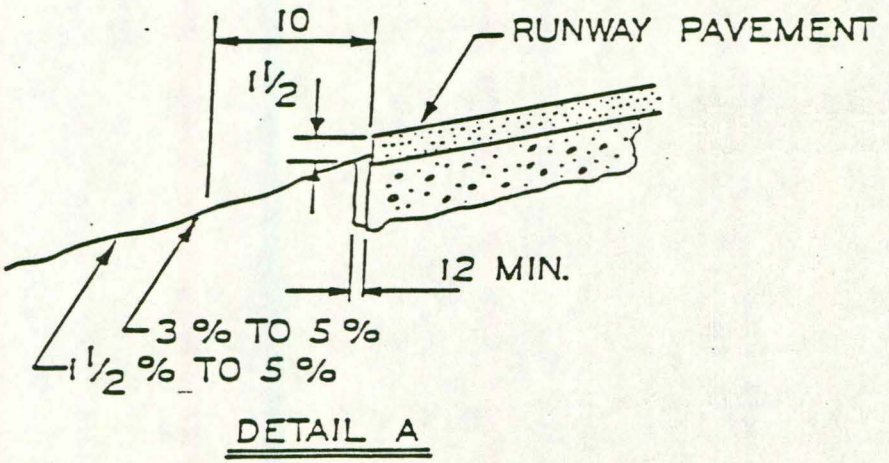
-Runway grades; terrain, etc. must be such that a line of sight is maintained within the visibility zone of the intersecting runways five feet above the centerlines. Reference may be made to FAA AC 150/5300-4B concerning the location of runway visibility points.

Maximum grade changes should not exceed two percent where vertical curves are required. The length of the vertical curve should not be less than 300 feet for each percent grade change. No vertical curves are required when the grade change is less than 0.4 percent.

Traverse grades on the runway should be at least one percent and no more than two percent. Within ten feet of the pavement edge, the grade should have a minimum slope of three percent and not to exceed five percent. Reference may be made to Figure 3-5 concerning a typical runway cross section. Beyond ten feet, turf areas should be sloped two percent.

A graded area beyond the runway surface is referred to as the runway safety area. The area, located symmetrically about the runway, extends outward from the runway centerline 60 feet and 240 feet beyond the runway ends. The primary function of the runway safety area is to provide a degree of safety should an aircraft veer off the runway. The traverse grade should not exceed five percent.





DETAIL A

TYPICAL CROSS SECTION

FIGURE 3 - 5: TYPICAL CROSS SECTION

Lateral Widths and Clearances

The following are criteria for separation of airport facilities that should be taken into consideration:

-Runway centerline to taxiway centerline	225′
-Runway centerline to building restriction line (BRL) and airplane tiedown area	250′ (Min. + 7:1)
-Runway centerline to property line (PL)	250′ (Min. + 7:1)
-Taxiway centerline to airplane tiedown area and to fixed or movable obstacle	50′
-Taxiway centerline to hangar structure (one way traffic)	37.5′ min.
-Runway safety area width	120′

Runway and Taxiway Paving

Airport pavement is intended to provide a smooth and safe all-weather surface free from particles and other debris that may be picked up by propeller wash. The pavement should be of sufficient thickness and strength to accommodate the anticipated loads without undue pavement stress. Pavement for the Harrison County Airport should be designed to accommodate aircraft up to a maximum gross weight of 12,500 pounds and a single wheel gear.

The various pavement courses are as follows:

SURFACE COURSE:	Includes Portland cement concrete, bituminous concrete, aggregate bituminous mixtures, or bituminous surface treatments.
BASE COURSE:	Consists of a variety of different materials which generally fall into two main classes, treated and untreated. The untreated bases consist of stone, gravel, limerock, sand-clay, or a variety of other materials. The treated bases normally consist of a crushed or uncrushed aggregate that has been mixed with cement or bitumen.
SUBBASE COURSE:	Consists of a granular material or a stabilized soil.

Rigid Pavement

A rigid pavement section for the Harrison County Airport would consist of a six inch thick Portland Cement Concrete surface course. The necessity of a base course, probably of crushed stone, is dependent on the bearing capacity of the soil on the selected site. A poor grade soil will require a minimum four inch thick subbase course.

Flexible Pavement

There are many combinations of flexible surface, base and subbase that could be required for the Harrison County Airport. Design parameters are outlined in FAA Advisory Circular 150/5320-6C. Of critical importance in the flexible pavement design process is the bearing capacity of the existing soil.

Drainage

An adequate drainage system is important for the safety of aircraft operations and for the longevity of the pavements. Improper drainage can result in the formation of puddles on pavements which are hazardous to aircraft landing or taking off. Improper drainage can also reduce the load bearing capacity of subgrades and the anticipated life of expensive pavement structures.

Surface drainage systems should be designed on a five year frequency of storm. Methods of computation are contained in FAA Advisory Circular 150/5300-5B Airport Drainage.

Subsurface drainage systems are desirable where water may rise to within one foot of the pavement section. Water in the subgrade contributes directly to frost boil and heaving action. Also, saturated subgrades exhibit a greatly reduced load bearing capacity. For these reasons, soil conditions and subsurface water conditions play an important part in site selection and airport design.

Pavement Markings

Non-precision instrument (NPI) markings are recommended on primary runway with installation of an NDB. A non-precision instrument runway is one to which a straight-in non-precision approach has been approved. NPI markings consist of basic runway markings in addition to threshold markings.

- -Centerline markings: The centerline markings consist of a broken line having 120 foot dashes and 80 foot blank spaces. The minimum width is 18 inches.

- -Designation markings: Each runway end is marked with designated numbers representing the magnetic azimuth, measured clockwise from north of the centerline from the approach end and recorded to the nearest 10 degrees with the last zero omitted.

- -Threshold markings: Threshold markings consist of eight 150′ x 12′ stripes. Each stripe is separated by three feet except the center where the separation is 16 feet. Where the runway is less than 150 feet, the width of the stripes and separation is reduced proportionally.

Taxiways are marked by a continuous stripe, six inches in width, along the taxiway centerline. Holding lines are located on the taxiway 100 feet from the runway edge. Additional information on pavement markings may be obtained from FAA AC150/5340-1D. Unpaved runways normally are defined by placing markers at the corners of the runway and at 400 feet intervals along the length of the runway.

Runway and Taxiway Lighting

A Medium Intensity Runway Light System (MIRL) should be installed on the primary runway. A Low Intensity Runway Light System (LIRL) may be installed on the crosswind runway.

Runway lights are used to outline the edges of the runway during periods of darkness or low visibility. Each runway edge light fixture emits a white light except on instrument runways where yellow is substituted for white on the last 2000 feet or one-half the runway length whichever is less. The yellow lights are located on the end opposite the landing threshold or instrument approach end. The edge light fixtures should be located no more than ten feet from the defined runway edge and spaced 200 feet on center. The runway light stake should be no less than 30 inches high due to snow removal and grass cutting. The lights, located on both sides of the runway should be directly across from each other and perpendicular to the runway centerline. Special requirements exist at runway intersections.

Two groups of threshold lights, the second part of a runway light system, are located symmetrically about the runway centerline. The threshold lights emit a 180 red light inward and 180 green light outward. The threshold lights should be located no closer than two feet and no more than ten feet from the runway threshold. The two groups of lights contain no less than three fixtures for a VFR runway and four fixtures for an IFR runway. The outer most light is located in line with the runway edge lights. The remaining lights are placed in ten foot centers towards the runway centerline extended. Consideration should also be given to the installation of an air-to-ground radio control for the runway light systems.

Taxiway edge lights should be located no more than ten feet from the taxiway edge on 200 foot centers. The taxiway edge light which emits a blue light define the lateral limits of the system. Reflectors may be used in lieu of taxiway lights where activity is minimal.

Reference may be made to the following FAA Advisory Circulars:

AC 150/5340-24	Runway and Taxiway Edge Lighting Systems
AC 150/5340-27	Air-To-Ground Radio Control of Airport Lighting Systems

Precision Approach Path Indicator, (PAPI)

The Precision Approach Path Indicator (PAPI) provides a visual aid to aircraft on approach. The color light beam enables the pilot to determine if his/her approach is high, on course, or low.

L-881 - System consisting of two light bars
L-880 - System consisting of two light units

The PAPI system should be located on the left side of the runway (approach end) and so sited and aimed that it defines an approach path with adequate clearance over obstacles and a minimum threshold crossing height. Reference may be made to FAA AC 150/5345-28D.

Runway End Identification Lights, (REIL)

Runway End Identification Lights (REIL'S) should be in operation on each runway end. REIL'S should be located in line with the threshold lights, 75 feet from the runway edge. IDOT recommends installation of a REIL system when the annual operations exceed 3,000. Reference may be made to FAA AC 150/5340-14B, AC 150/5300-2C, and AC 150/534025 concerning REIL design and siting requirements.

Rotating Beacon

An airport beacon light is recommended for installation. The beacon light, which emits alternating white and green flashes of light, should be located no closer than 750 feet to a runway centerline. Reference may be made to FAA AC 150/5340-21, 50/5300-2C and 150/5345-12.

Segmented Circle and Lighted Wind Indicator

The segmented circle consists of a 100 foot diameter circle with a minimum of 18 segments constructed around the surface wind indicator. The marking system may be used to convey traffic patterns. A lighted wind indicator should be installed at the center. Reference may be made to FAA AC 150/5340-5.

Nondirectional Beacon

A nondirectional beacon (NDB) is recommended for the airport. The NDB radiates a signal which can be used by pilots to provide electronic directional guidance to the airport. This consists of two 65 foot poles spaced approximately 350 feet with two wires strung between them. The NDB should be located on airport property but at least 100 feet away from any metal buildings, power lines, or metal fences. The ground should be smooth, level, and well drained. The location should take into account the obstruction standards described in this report.

Hangars

At most general aviation airports, prefabricated "T" type hangars are constructed to accommodate based aircraft. In addition, a fixed base operator (FBO) shop is also constructed. Corporate, conventional type hangars may also be found.

The terminal area should be designed to allow space for the construction of tee-hangars, conventional hangars, and a FBO shop. The FBO shop building often containing space for terminal building activities, should be located adjacent to the itinerant aircraft apron. The IDOT recommends a 60′ x 80′ structure be constructed for use as a FBO facility.

Tee-hangar dimensions vary with manufacturers and need. Critical dimensions would include those concerning clear door, depth, wing depth, and tail height. Space requirements using a nested tee-hangar concept are illustrated as follows:

NUMBER OF UNITS	STRUCTURE WIDTH	STRUCTURE LENGTH	CLEAR DOOR	DEPTH	WING DEPTH	TAIL WIDTH
6	52′	143′ 6"	40′ 6" x 12′	33	19′	20′ 1"
8	"	184′ 6"	"	"	"	"
10	"	225′ 6"	"	"	"	"

Hangar structures should be separated by a minimum of 75 feet. A taxiway, 20 feet in width should be constructed so as to provide access from the apron area to individual hangar stalls.

The number of units to be constructed depends upon demand. For planning purposes, it is assumed that all based aircraft will be placed in hangars. Reference to the forecast of aviation activity would suggest that the airport may need no less than 20 stalls by 2005.

PHASE ONE (1986 - 1990)

1. Construct one ten-unit tee-hangar

PHASE TWO (1991 - 1995)

1. Construct FBO shop 60′ x 80′
   A. Include space for terminal building activities
2. Construct one ten-unit tee-hangar

PHASE THREE (1996 - 2005)

1. Construct an additional 6 to 8 units should demand exist.

The demand for hangar space is influenced not only by the absolute number of aircraft, but by the cost, availability, and condition of the units as well. For planning purposes, it is assumed that all registered and based aircraft

would be kept in hangars. For reasons previously noted, a number of aircraft owners may choose to tie down their aircraft should hangar rental cost be beyond what the owner is willing to pay. The demand for hangar space may also be influenced by the cost of comparable space at area airport facilities.

Terminal Building

At many utility airports, terminal building functions are most often provided for within the FBO maintenance facility. The 1978 SASP recommends the following minimum space at general utility airports:

- A public waiting room and service area of 500 square feet.
- A pilot's briefing area of 180 square feet.
- An airport administrator's office of 180 square feet.
- If a new terminal building is to be constructed, it should provide a minimum of 1000 square feet.

Automobile Parking

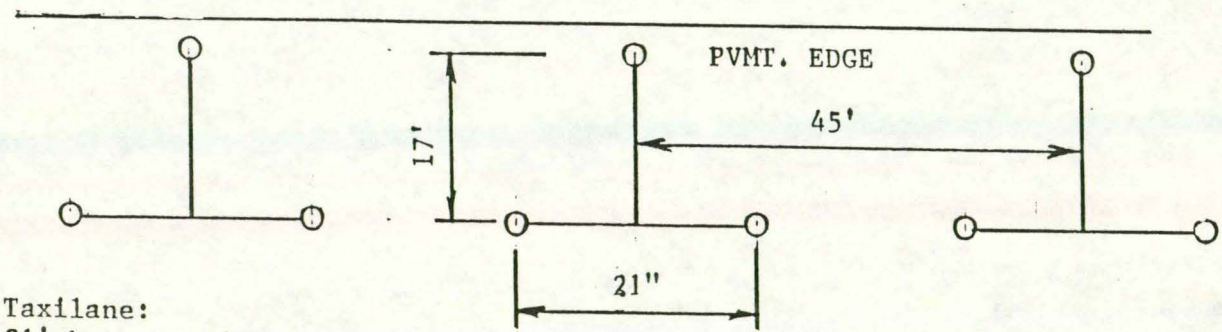
The IDOT recommends a hard surfaced area capable of accommodating a number of parking spaces equal to the number of based aircraft. Based upon the forecast of based aircraft, it would appear that an improved surface lot to accommodate upwards of 26 vehicles may be needed by the year 2005.

Apron Tiedowns

An apron area should be maintained to provide space for aircraft movements (queuing space) and improved surface tiedowns for itinerant aircraft. The queuing area provides space for aircraft access to the FBO shop, individual hangars, fuel pad, etc.

A typical tiedown area is illustrated in Figure 3-6.

FIGURE 3-6: TIEDOWN LAYOUTS



Taxilane:
81' between Tiedowns
Single lane taxiing

Since all based aircraft are expected to be in hangars, the primary concern is with itinerant aircraft. The following methodology was used to estimate the number of tiedowns required through the year 2005.

YEAR	ANNUAL ITINERANT OPERATIONS	AVG. DAY	TEN PERCENT INCREASE	FIFTY PERCENT ON GROUND AT ANY TIME
1985	1724	5	-	5
1990	4176	11	12	6
1995	4821	13	14	7
2005	5943	16	18	9

Six improved surface tiedowns should be constructed in Phase One with an additional three to four tiedowns added, should demand exist in Phase Three (1996 - 2005). Using 360 square yards per aircraft, 3,240 square yards of improved surface area should be constructed. A number of unimproved (turf) tiedowns may also be maintained.

Access Road

The 1978 SASP recommends that primary acccess road to the terminal area be hard surfaced. The width should be no less than 22 feet with provisions for shoulder and drainage.

Obstruction Standards

Part 77 of Volume XI, Federal Aviation Regulations, sets forth a number of standards to be used in identifying obstructions to air navigation. These standards are of considerable importance. The discussion herein is primarily extracted from Part 77. These standards may be used as a guide in the preparation of a zoning ordinance and the layout plan.

Standards for Determining Obstructions

1. A stationary or mobile object is defined as an obstruction to air navigation if it is of a greater height than any one of the following:

   A. A height of 500 feet above the ground at the site.
   B. A height of 200 feet above the ground or airport elevation, whichever is higher, within three nautical miles of the airport reference point.
   C. The surface of a takeoff or landing area of an airport or any imaginary surface.
   D. Traverse ways on or near an airport to be used for the passage of mobile objects.

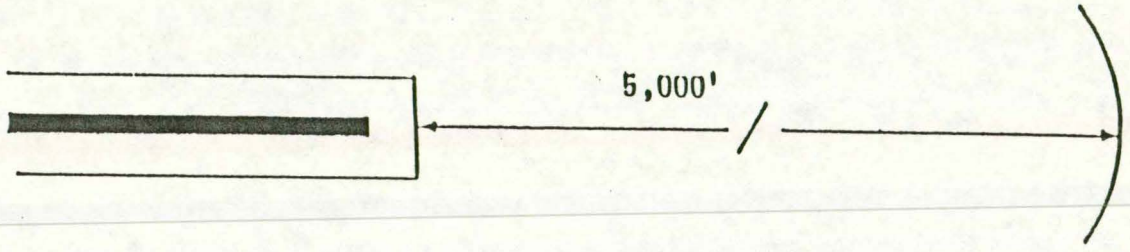
-Interstate Highway	17 feet
-Public Roadway	15 feet
-Private Road	10 feet or height of the highest mobile object
-Railroad	23 feet

Imaginary Surfaces

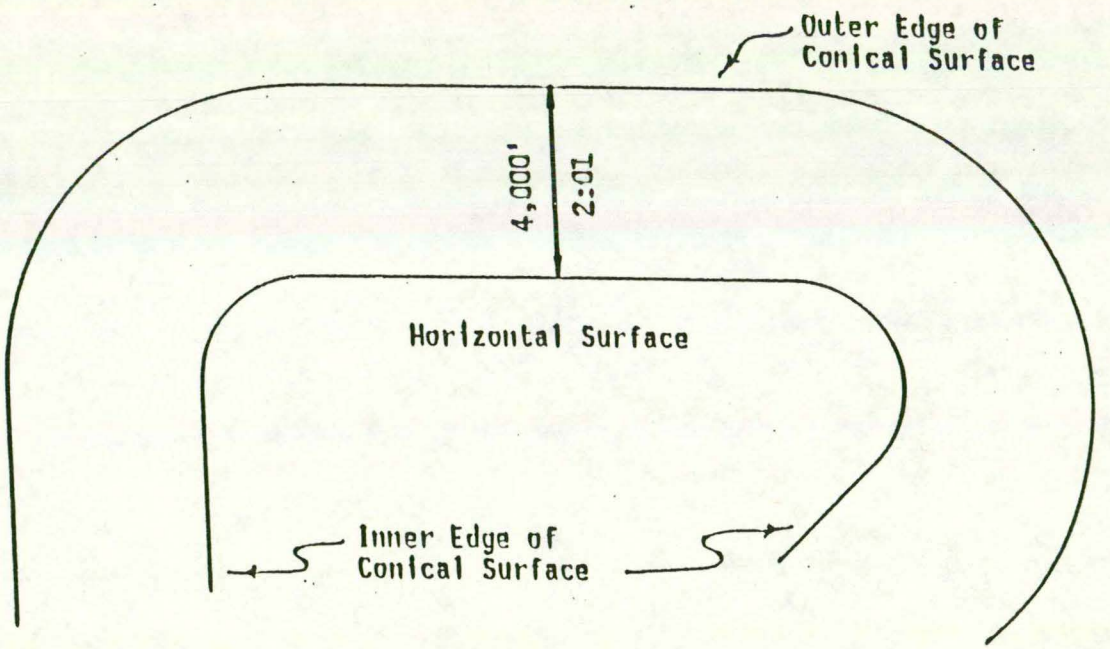
Imaginary surfaces establish areas where any object penetrating that surface would be considered an obstruction to air navigation. The imaginary surface establishes an imaginary line that separates ground activities from aircraft activities. In order to select the applicable imaginary surface, the type of approach to each runway must be considered.

A. Horizontal Surface: The horizontal surface is a plane 150 feet above the established airport elevation. It is constructed by swinging arcs of specific radii from the center of each end of the primary surface and by connecting the arcs by lines tangent to those arcs.

-Visual Radius of 5,000 feet
-NPI Radius of 10,000 feet (Runway larger than Utility)
-NPI Radius of 5,000 feet (Utility Runway)



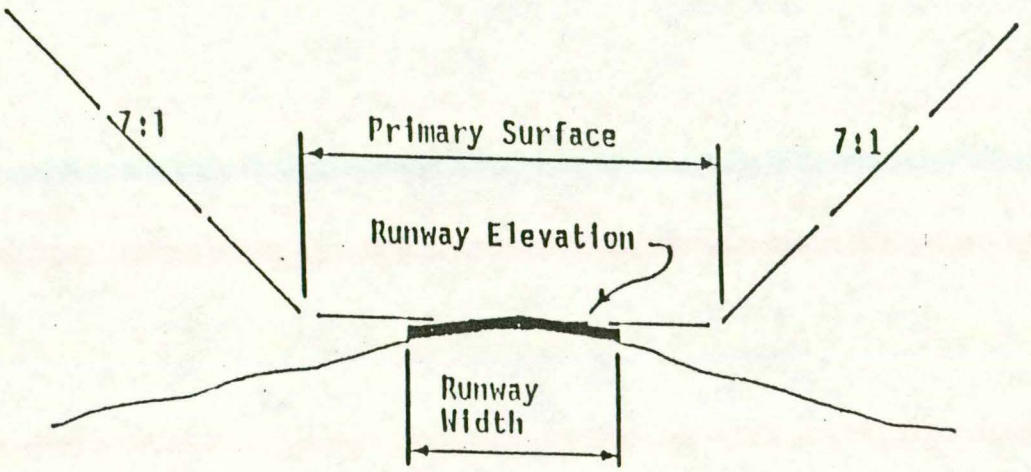
B. Conical Surface: The conical surface extends outward and upward from the periphery of the horizontal surface at a slope of 20:1 for a horizontal distance of 4,000 feet at the ends and 7:1 laterally.



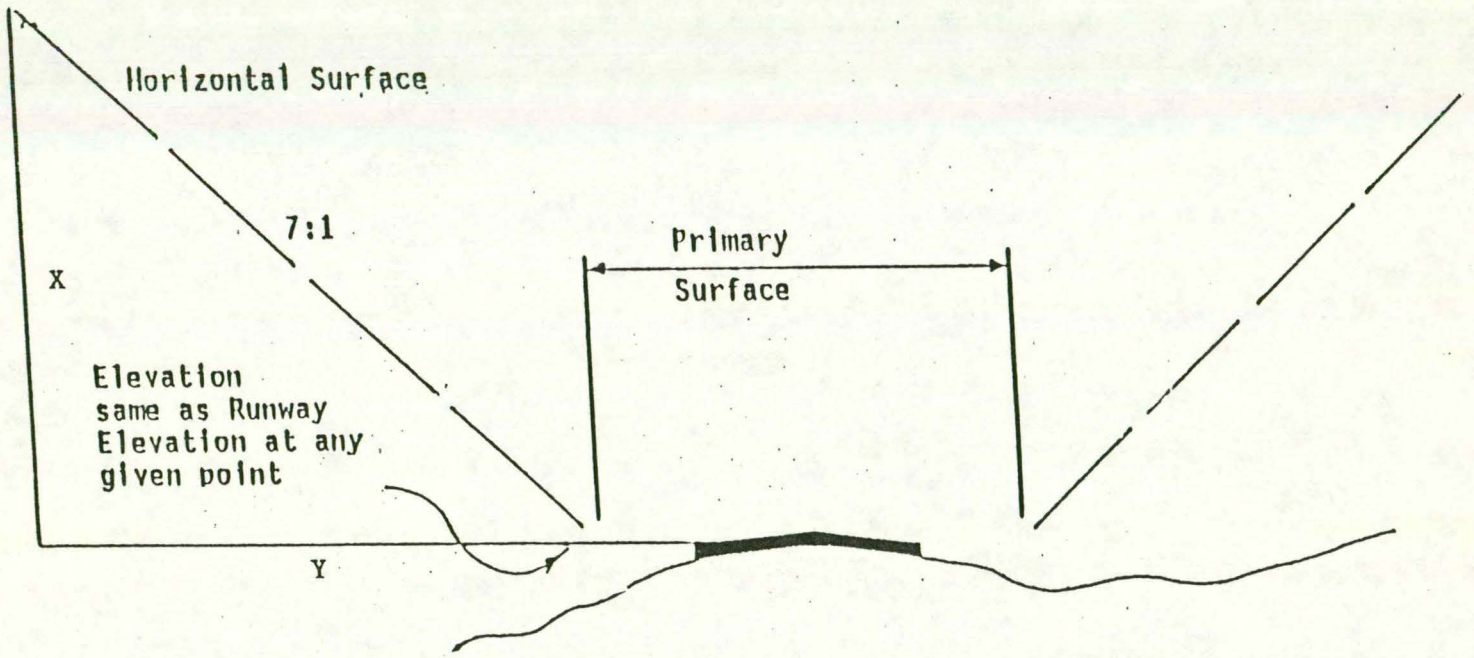
C. Primary Surface: The primary surface is longitudinally centered on the runway and extends 200 feet beyond the runway end in the case of a paved runway. The primary surface end coincides with the runway end in the case of a turf runway. The width of the primary surface varies with the approach.

	Width	End of Runway
Visual	250′	200′
NPI	500′	200′

The elevation of any point on the primary surface is the same as the elevation of the nearest point on the runway centerline.



D. Transitional Surface: The transitional surface extends upward at a slope of 7:1 from the edge of the primary surface and approach surfaces. They extend outward and upward from the runway centerline and runway centerline extended until they intersect with the horizontal surface.



X and y vary in dimension and are determined by the distance required for an imaginary line at 7:1 slope, to intersect with the horizontal surface.

E. Approach Surface: The approach surface is longitudinally centered on the extended runway centerline. The inner edge of the approach surface coincides with primary surface and expands uniformly outward to a width determined by the type of approach:

Visual:	250′ x 5,000 x 1,250′	
NPI:	500′ x 10,000 x 3,500′	(Runway larger than Utility with visibility minimum as low as 3/4 of a mile)
NPI:	500′ x 5,000 x 2,000′	(Utility runways)

The approach slope also varies:

Visual:	20:1
NPI:	34:1 (Larger than Utility)
NPI:	20:1 (Utility Runways)

Clear Zone

The clear zone represents that portion of the approach surface on the ground. The inner edge of the clear zone coincides with the primary surface. The clear zone extends outward uniformly to a width determined by a point which is 50 feet above the ground elevation or the runway end elevation. The trapezoidal shaped clear zone area should be under control of the airport onwer and maintained free of obstructions and concentrations of people. Reference may be made to FAA AC 150/5300-4, Chg. 6, Appendix 6 for applicable dimensions. Typical clear zone configurations are noted as follows:

Utility Runways:

-Visual Approach: 250′ x 1000′ x 450′ (8.035 acres)
-Non-precision Instrument Approach: 500′ x 1000′ x 800′ (14.922 acres)
-Visual Approach opposite Non-precision Instrument Approach: 500′ x 1000′ x 650′ (13.2 acres)

Obstacle Free Zone, (OFZ)

The obstacle free zone consists of the volume of space above the runway approach area and inner-transitional surface. The runway OFZ extends 200 feet beyond each end of the runway and to a width of 250 feet for non-precision instrument and visual runways.

The approach OFZ applies to runways with an approach light system. The inner-transitional surface OFZ applies only to precision instrument runways. The obstacle free zone is to be maintained free of all objects except frangible navigational aids.

Clearway

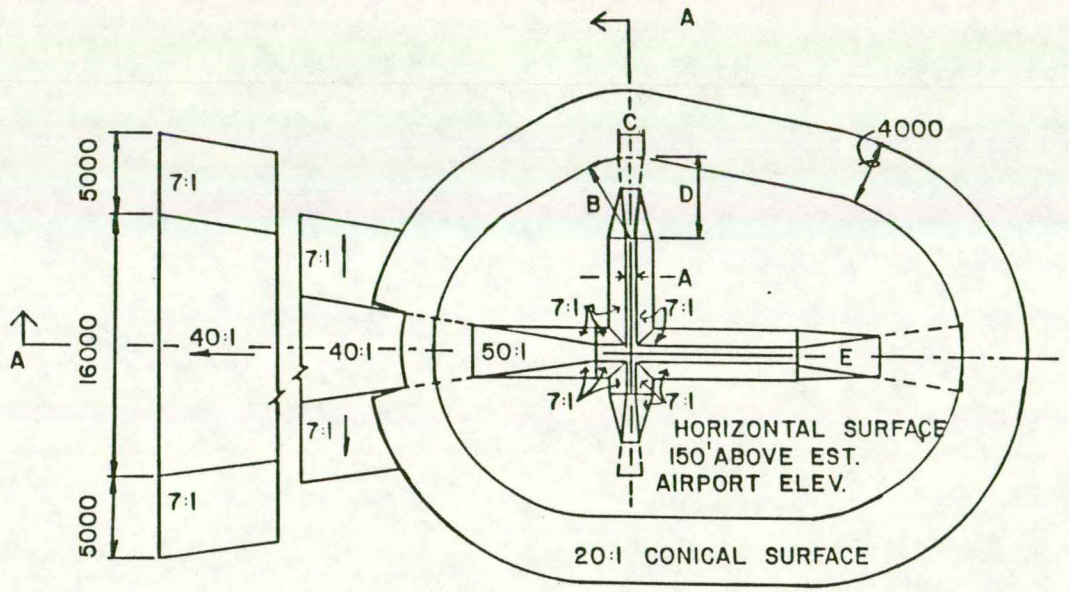
The clearway is an area 500 feet in width extending from the runway end outward and upward at a slope not exceeding 1.25% above which no objects or terrain may penetrate. The clearway should be under control of the airport owner and generally extends no more than 1000 feet from the runway end.

Hazard Determination

All objects which penetrate the imaginary surfaces of the airport are considered an obstruction and a hazard to air navigation unless a FAA aeronautic study should be made indicating that the obstruction does not have an adverse impact.

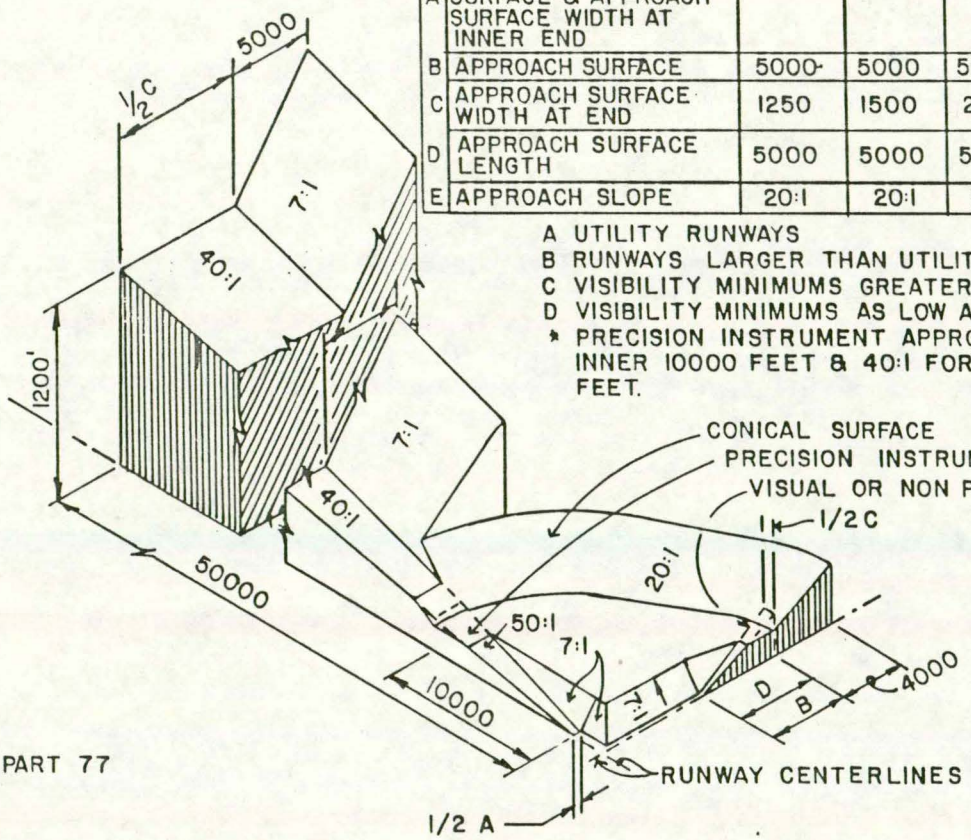
FAA AC 150/5300-4B, Chg. 8 summarizes minimum standards for identifying and preventing airport hazards on the airport. Hazards to air navigation are eliminated by either altering the object or adjusting the aviation operations to accommodate the object.

FIGURE 3-7: AIRPORT IMAGINARY SURFACE



	ITEM	DIMENSIONAL STANDARDS (in feet)					
		VISUAL RUNWAY		NON-PRECISION INSTRUMENT RUNWAY			PRECISION INSTRUMENT RUNWAY
		A	B	A	B		
					C	D	
A	WIDTH OF PRIMARY SURFACE & APPROACH SURFACE WIDTH AT INNER END	250	500	500	500	1000	1000
B	APPROACH SURFACE	5000	5000	5000	10000	10000	10000
C	APPROACH SURFACE WIDTH AT END	1250	1500	2000	3500	4000	16000
D	APPROACH SURFACE LENGTH	5000	5000	5000	10000	10000	*
E	APPROACH SLOPE	20:1	20:1	20:1	34:1	34:1	*

A UTILITY RUNWAYS
B RUNWAYS LARGER THAN UTILITY
C VISIBILITY MINIMUMS GREATER THAN 3/4 MILE
D VISIBILITY MINIMUMS AS LOW AS 3/4 MILE
* PRECISION INSTRUMENT APPROACH SLOPE IS 50:1 FOR INNER 10000 FEET & 40:1 FOR AN ADDITIONAL 40000 FEET.



Source: FAR PART 77

AIRPORT IMAGINARY SURFACE

-All objects which prevent operational clearance for terminal navigational facilities.

-All objects, including parked aircraft, within 7 feet plus 0.75 feet times the wingspan of the most demanding aircraft from the taxiway centerline, except for frangibly mounted NAVAIDS. For example:

King Air C90-1 (50.3 feet x 0.75 + 7 feet = 44.725′)

-All objects, including parked aircraft, within 7 feet plus 0.63 times the wingspan of the most demanding aircraft from a taxilane centerline.

Building restriction lines (BRL) extend outward beyond the runway 3000 feet or four times the separation distance between the runway centerline and the BRL. The building restriction line should be determined for each runway based upon the following:

1. Primary surface width
2. Terrain
3. Typical building heights

Land Use

Airport land use may be discussed in terms of the:

- -Impact of adjacent land uses on the airport
- -Impact of the airport on adjacent land uses

Each of the two general areas can further be broken down into specific impacts. The impacts may not all be negative as some impacts are quite positive in nature. The objective is to insure that the land use conflicts are reduced to a minimal level in view of the fact that it may not be possible to alleviate all problems. The following land use goals in the vicinity of the airport will provide a set of parameters upon which to design specific land use policies. These goals are not static nor is the list all inclusive. Throughout the planning period, goals are expected to change to meet unforeseen demand.

Goals

- -The airport and associated imaginary surfaces should be protected from encroachment of land uses that might impair operational capabilities of the facility.

- -Having identified the ultimate level of airport development, care should be exercised throughout the planning period to insure that future expansion of the facility is not compromised.

- -Adjacent airport environs should be protected against aircraft operations and noise.

- -Establish or organize land uses on the airport and off the airport that will complement each other.

Land Use Compatibility

Land use compatibility depends upon a number of factors. In other words to imply that an industrial activity is compatible depends upon the type to include processes. The latter is of concern where considerable amounts of heat is released.

The following adjacent land use activities, identified by the FAA, are potentially compatible. Potentially compatible may be defined as a land use that does not, for example, exceed Part 77 requirements, or has properly been designed so that noise is not a problem.

The compatibility of each of these land use activities depends upon the proximity of the specific land use to the airport; the level of sound proofing and the type, height, and location of building structures.

The land uses identified herein as being compatible are not all inclusive nor is the list intended to suggest that such community land uses be located in the vicinity of the airport. Such land uses, when incorporated into the comprehensive growth and management plan, should insure a degree of compatibility within the vicinity of the airport.

Land Area Requirements

An adequate amount of land should be made available to support airport functions and accommodate required facilities. Such land should be owned in fee simple title. Clear zone and aviation easements should also be acquired.

Natural Corridors

Rivers
Lakes
Streams
Canals
Drainage Basins
Flood Plain Areas
Natural Buffer Area
Forest Reserves
Land Reserves and Vacant Land

Open Space Areas

Memorial Parks and Pet Cemeteries
Water & Sewage Treatment Plants
Water Conservation Areas
Marinas & Tennis Courts
Golf Courses
Park & Picnic Areas
Botanical Gardens
Bowling Alleys
Landscape Nurseries
Archery Ranges
Golf Driving Ranges
Go-Cart Tracks
Skating Rinks
Passive Recreation Areas
Reservation/Conservation Areas
Sod and Seed Farming
Tree and Crop Farming
Truck Farming

Industrial and Transportation Facilities

Textile & Garment Industries
Fabricated Metal Products Industries
Brick Processing Industries
Clay, Glass, and Stone Industries
Chemical Industries
Tire Processing Companies
Food Processing Plants
Paper Printing & Publishing Industries
Public Workshops
Research Labs
Wholesale Distributors
Bus, Taxi, and Trucking Terminals
Foundaries
Saw Mills
Machine Shops
Office Parks
Industrial Parks
Public Buildings
Auto Storage
Parking Lots and Gas Stations
Railroad Yards
Warehouse & Storage Buildings
Freight Terminals

Airport and Aviation Oriented Facilities

Airparks
Banks
Hotels
Motels
Restaurants
Aerial Survey Labs
Aircraft Repair Shops
Aircraft Factories
Aviation Schools
Employee Parking Lots
Aerospace Industries
Airfreight Terminals
Aviation Research & Testing Labs
Aircraft and Aircraft Parts
Manufacturers

Commercial Facilities

Retail Business
Shopping Centers
Parking Garages
Finance & Insurance Companies
Professional Services
Gas Stations
Real Estate Firms
Wholesale Firms

SECTION FOUR

SITE SELECTION

Introduction

The airport development planning process from Phase One through Phase Two identified the need for an airport to serve Harrison County while Phase Three set forth basic facility needs that would be required to satisfy anticipated aviation activity. Consequently, the physical dimensions of the airport site must be able to accommodate long term facility development as outlined in Phase Three. While it is not an absolute criteria in the case of FAA funding, the airport must be a public owned facility in order to receive state funding assistance. There are other factors as well to be considered when evaluating the merit of public investment in an airport. These factors fall under the realm of environmental considerations. Finally, the benefit/cost of an alternative airport site must be considered. This assessment is crucial where there is a substantial investment in runway and hangar facilities at an existing airport.

Site Selection Criteria

The process by which to evaluate each candidate airport site is outlined as follows:

A. Accommodate facility components
   1. Runway facilities (3400 - 4000'+ feet) (Alignment)
   2. Clear zone protection
   3. Terminal area

B. Accessibility
   1. Airport service area
   2. From hard surface highway/road, other modes
   3. User, Industrial

C. Environmental
   1. Land use (on-site) (off-site)
   2. Prime agricultural land
   3. Topography
   4. Soil/geological
   5. Wetlands/flood plain
   6. Flora/fauna
   7. Noise; air and water quality
   8. Historical/archaeological sites
   9. Utilities (water, solid waste)

D. Other
    1. Ownership, availability
    2. Socioeconomic considerations
    3. Obstructions/air space

The airport site should be able to accommodate a primary runway within a north-northwesterly orientation. The site should require minimal grading and be able to accommodate a runway up to 4000 feet in length and as well as 240 foot overrun off each runway end. Consequently, an unobstructed length up to 4,480 feet should be available. Beyond each runway end, terrain and cultural features must be such that provisions can be made for a clear zone. The clear zone begins 200 feet beyond the threshold and extends outward 1000 feet. The total linear distance that may ultimately be needed for airport development is 6200 feet.

The same linear dimension should be sought in the site selection process for the crosswind runway as that required for the primary runway. A crosswind runway alignment with an east-northeasterly orientation extending over a linear distance of 6200 feet should be obtained. In addition to accommodating the runway facilities, the site must also be able to support terminal area development. Application of the above criteria would eliminate most sites having considerable relief from consideration. Key factors are:

A. Topography
B. Power lines, farmsteads, concentrations of people

Accessibility of the site to the user is a second key factor in the identification of candidate airport sites. Where possible, the site should be located near a public roadway. Ideally, the road should be hard surfaced. Two considerations should be noted here. The first concerns the user not only within the immediate airport service area, but the user from Pottawattamie and Washington Counties as well. The second concerns the construction of an access road to the facility. The cost of a hard surface road could be a significant part of the airport development cost and one that could be eliminated by selecting a site adjacent to a road where such improvements have already been made. Key factors are:

A. User/Population Distribution within airport service area
B. Accessibility from I-29 and U.S. Highway 30
C. Proximity to Washington County, Nebraska and Pottawattamie County, Iowa

The third broad category of site selection factors were grouped under environmental concerns. Cultural factors to be considered include existing land uses and future development patterns. Also included are historic and archaeological sites. Since the airport candidate sites would most likely be located away from population centers, many potential problem areas would be minimized. Of these potential problem areas are noise, land use conflicts, and obstruction conflicts. Known historic and archaeological sites were identified and considered in the identification of candidate sites.

The second category of environmental factors concern physical features (topography, wetlands, flood plain areas, and soils), flora, and fauna. Possible sites which may impact unique habitats of flora and fauna should be avoided. Where land has been used for cropping, this concern is minimal. However, approach zone and traffic patterns located beyond the airport site may impact such areas.

Sites having considerable relief should be avoided in favor of sites that are relatively level. The terrain should be uniform for a minimum distance of 4500 feet along the proposed runway alignment.

The preservation of prime farmland is not only a local objective, but a national one as well. Ideally, an airport would be constructed on land having a lesser value for agricultural production. Where no alternative exists but the use of prime agricultural land, every effort should be made to minimize the number of acres removed from production.

The level characteristic of flood plain areas make such locations ideal for airport sites. While the level characteristic is an attribute, such site locations are not without constraints. The primary constraint is the potential for flooding. In addition, the proposed construction cannot obstruct flood water flows or cause an overall increase of such flows.

Airport development costs will vary with each site. Land acquisition and runway construction costs represent those components most influenced by site characteristic. The cost of other airport components (for example, beacon light, etc.) would not vary greatly.

Land acquisition costs are a negotiable item and could vary greatly from site to site. Runway, taxiway, and apron costs may also vary depending upon topography, soil conditions, and drainage.

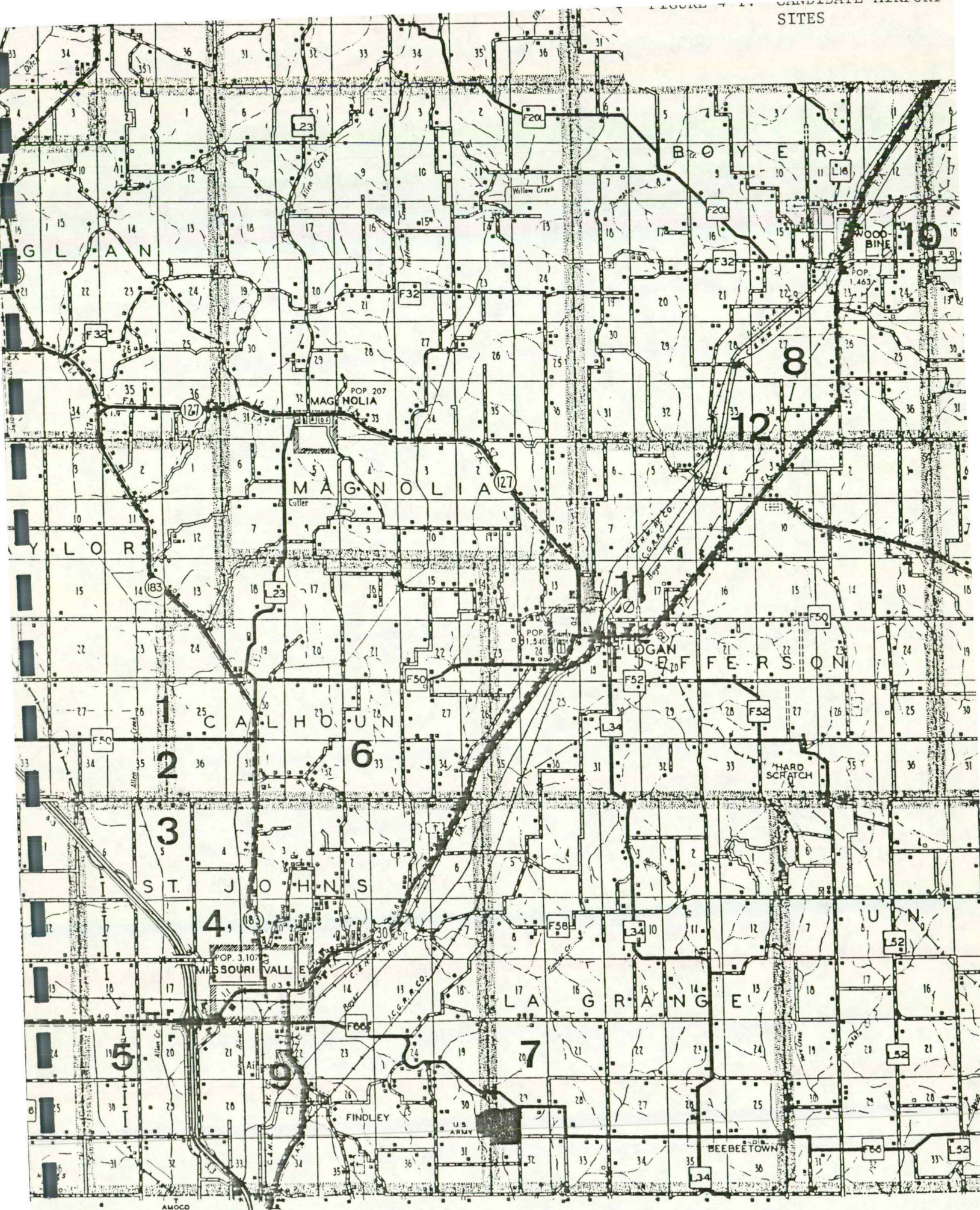
Candidate Airport Sites

Eleven candidate sites were initially identified as having development potential. Three of the candidate sites were existing sites. The remaining nine sites were selected based upon the criteria previously discussed. Within the review process a 12th site was identified for evaluation by members of the site selction committee. The twelve sites are as follows:

Site Number	Township	Section(s)
One	Calhoun/Taylor	25, 26
Two	"	35, 36
Three	St. Johns	5, 6
Four	"	9
Five	"	19
Six	Calhoun	28, 33
Seven	La Grange	20, 28
Eight	Boyer	26, 27
Nine	St. Johns	22-private existing
Ten	Boyer	13-public existing
Eleven	Jefferson	18-private existing
Twelve	Boyer, Jefferson	33, 34, 3, 4

Reference may be made to Figure 4-1 which depicts the location of each of the twelve candidate sites. Figures 4-2 through 4-13 depict a typical airport configuration over a 7 1/2 min. U.S.G.S. Quad map. The airport configurations are conceptual in nature with more than one configuration or alternative being available. The conceptual illustrations are intended to serve as a basis by which to evaluate the sites ability to accommodate long term airport development and the relationship of the site to adjacent land uses, etc.

FIGURE 4-1. CANDIDATE AIRPORT SITES



R-44W R-43W R-42

The Industrial Development Committee of the Harrison County Improvement Association met June 18, 1986 to review the eleven candidate airport sites. The Industrial Development Committee selected three sites for further consideration.

Site Eight	Boyer Township	Sec. 26 and 27
Site One	Calhoun Township	Sec. 25 and 26
Site Two	Calhoun Township	Sec. 35 and 36

In addition to the three sites noted above, a fourth site located south of Site Eight was recommended for additional consideration. This site was added to the initial list of eleven and is referenced as Site Twelve.

Sites Nine, Ten, and Eleven were elimiated from further consideration due to limitations (physical) inherent in each site that would preclude the development of an airport to standards set forth in Section III, Facility Requirements.

Site Five was eliminated due to close proximity of this site to DeSoto Bend. Site Four was eliminated due to site limitations imposed in part by terrain and the proximity to Missouri Valley. Site Three was found to be less desireable than Sites One and Two. Drainage patterns, existing farmsteads and site access were less desireable than conditions found on Sites One and Two. Site Six was eliminated due to topographic factors. Site Six represented an optimum location. However, the Loess Hills and associated relief would represent a higher overall development cost due to increased grading. Extension of the runway much beyond 3,400 feet would be questionable. Site Seven was eliminated due to the distance from U.S. Highway 30 and/or I-29 as well as topographic constraints. The remaining three sites, One, Two, and Eight were left as sites for further consideration. In addition to these three sites, a fourth site was added for consideration.

Possible airport sites were generally confined to the valley floors of the Missouri and Boyer Rivers. Topographic changes within the Loess Hills area eliminated much of the Loess Hills area from consideration. Site constraints within the Boyer River Valley between the communities of Missouri Valley and Logan also precluded that area as a source of candidate sites. The narrow valley floor combined with the location of U.S. Highway 30, rail lines, and the river were the major site limitations. Terrain east of the Boyer River, like the Loess Hills to the west, offered only one site that could accommodate facility needs. The remaining candidate sites were located within Boyer Valley between Logan and Woodbine and north and west of Missouri Valley. Site locations beyond the Modale area and Woodbine were considered too far removed from the primary service area.

In essence, there are two general areas to be considered of which each area contains more than one airport site. Sites One and Two and Eight and Twelve are in close proximity to each other. On each site there are development alternatives to be considered to include runway alignment and terminal area location.

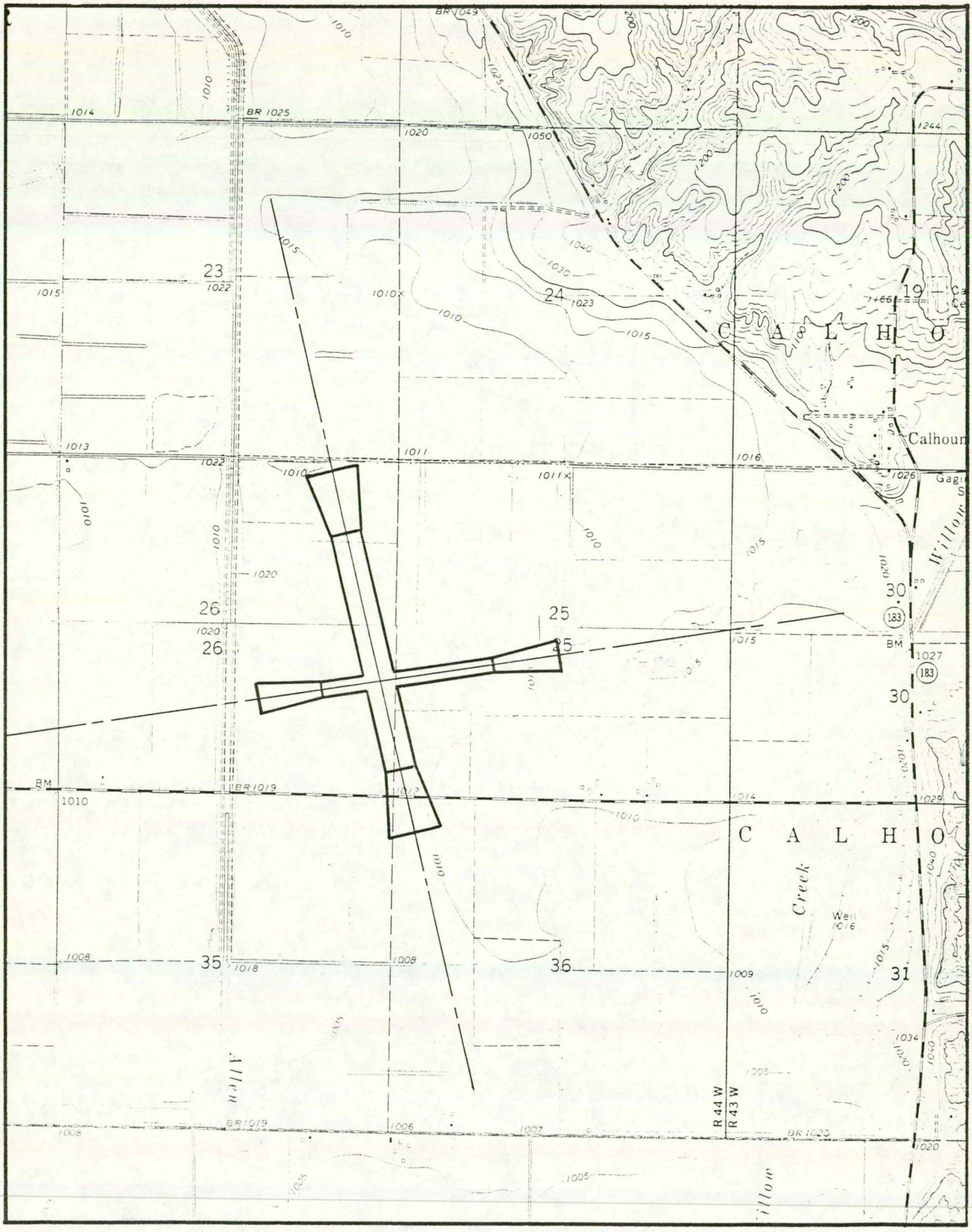


FIGURE 4-2

SITE ONE

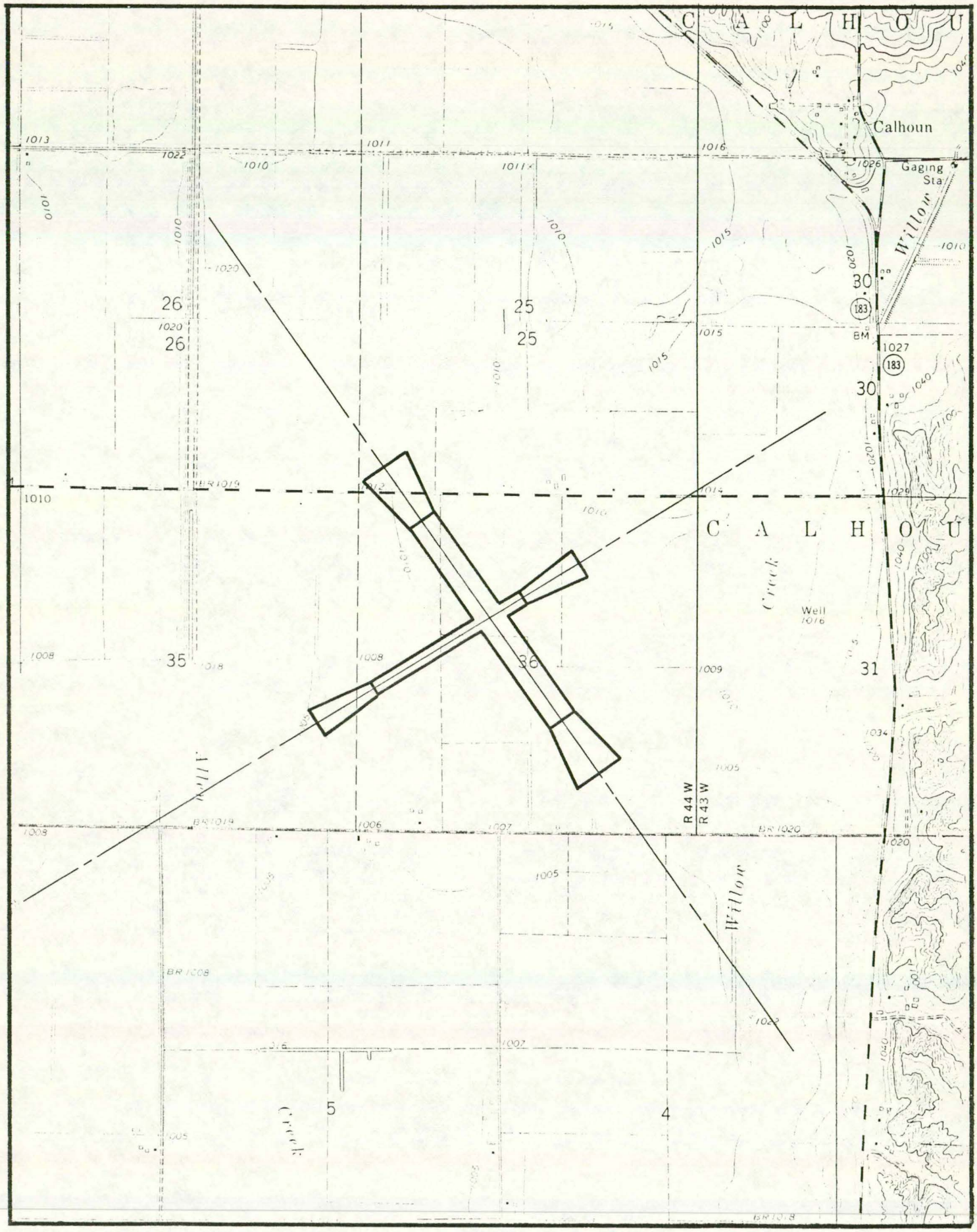


FIGURE 4-3

SITE TWO

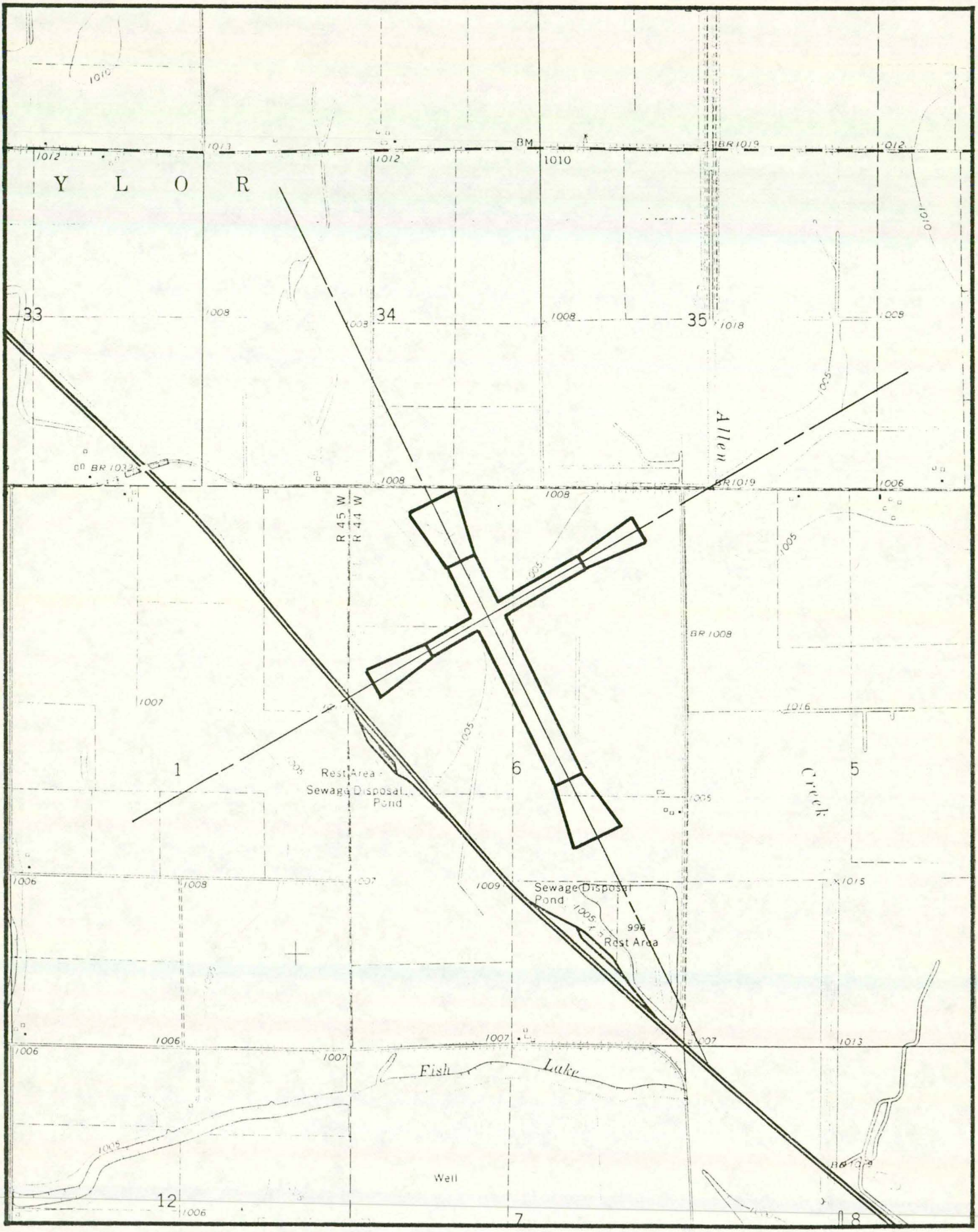


FIGURE 4-4

SITE THREE

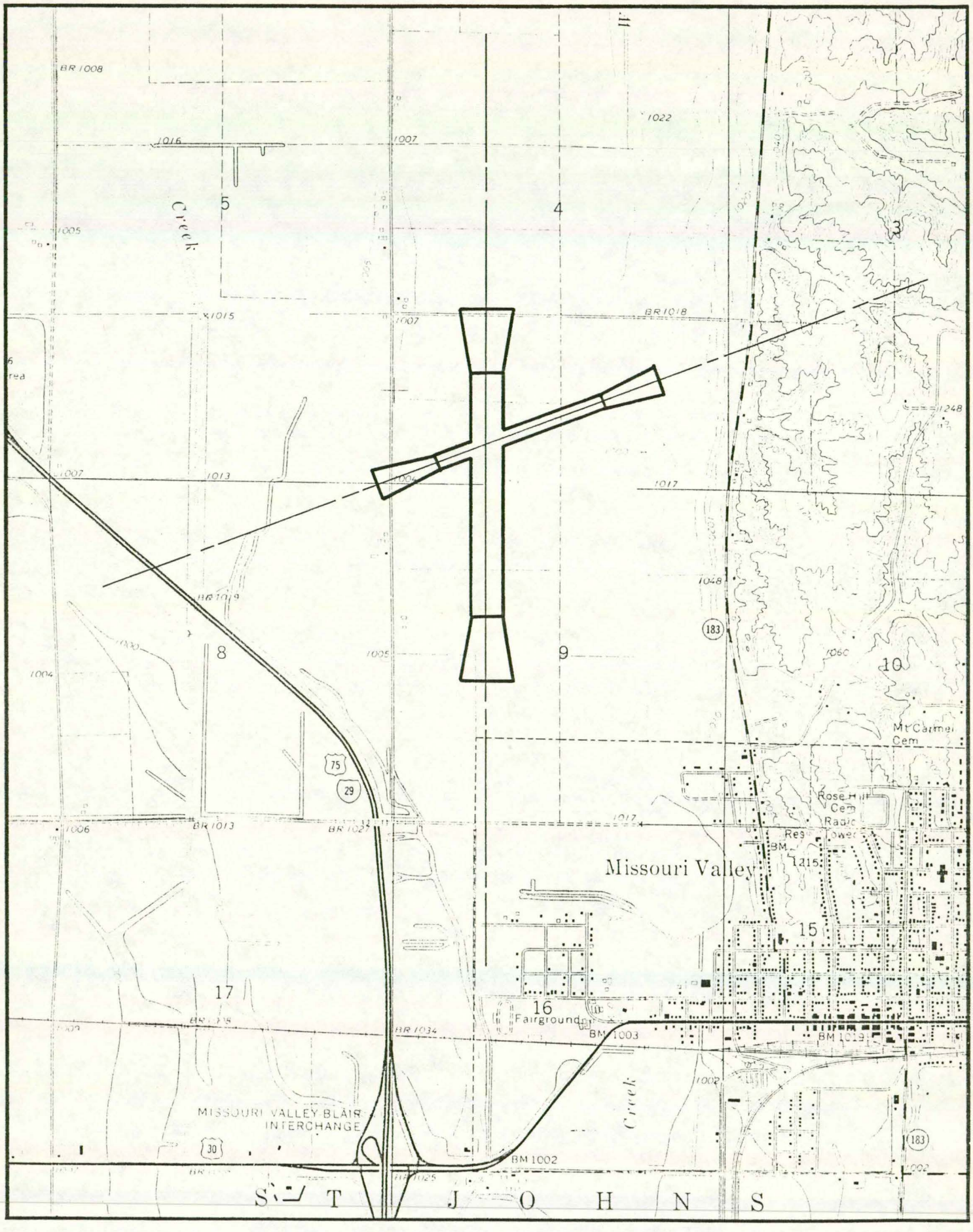


FIGURE 4-5

SITE FOUR

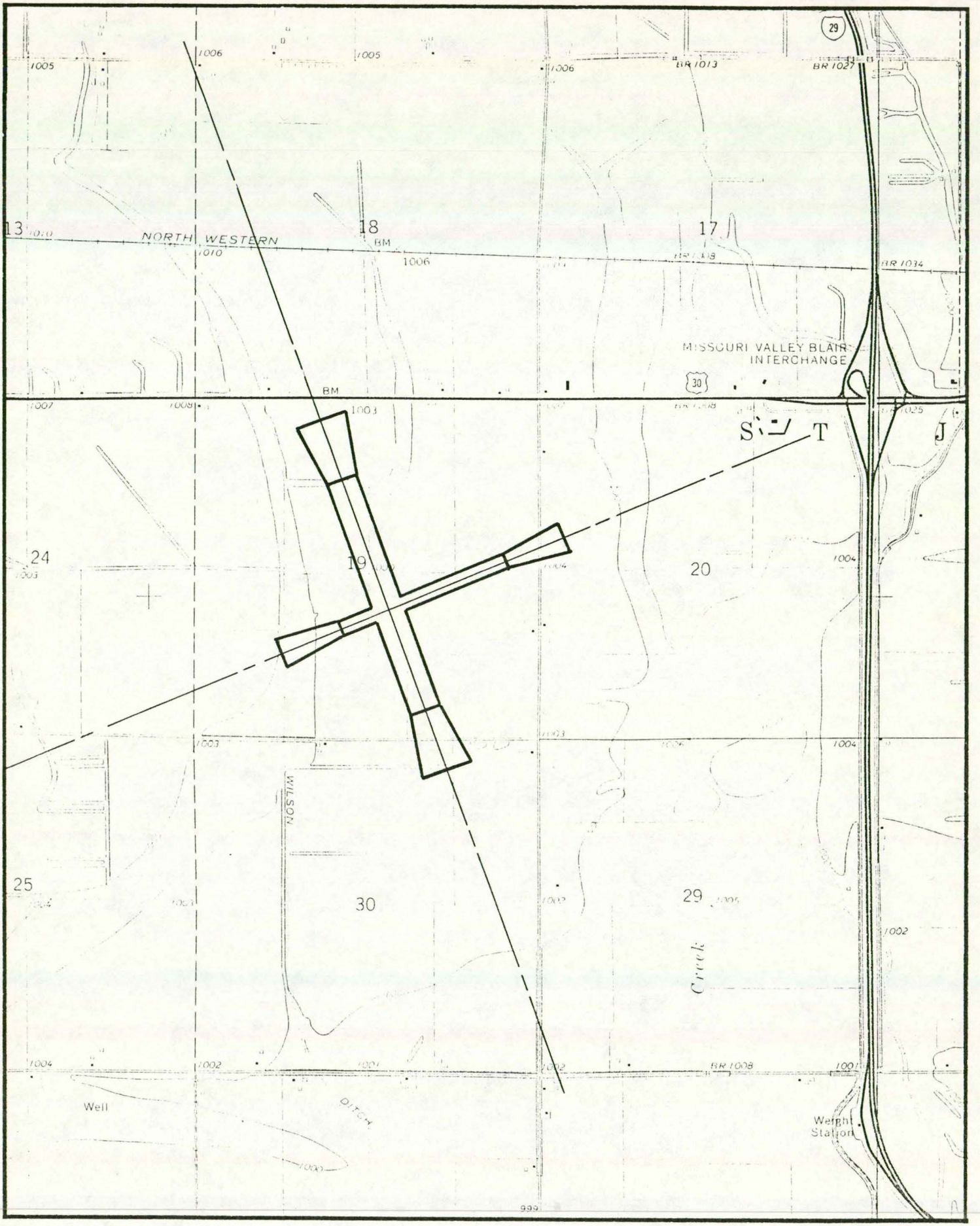


FIGURE 4-6

SITE FIVE

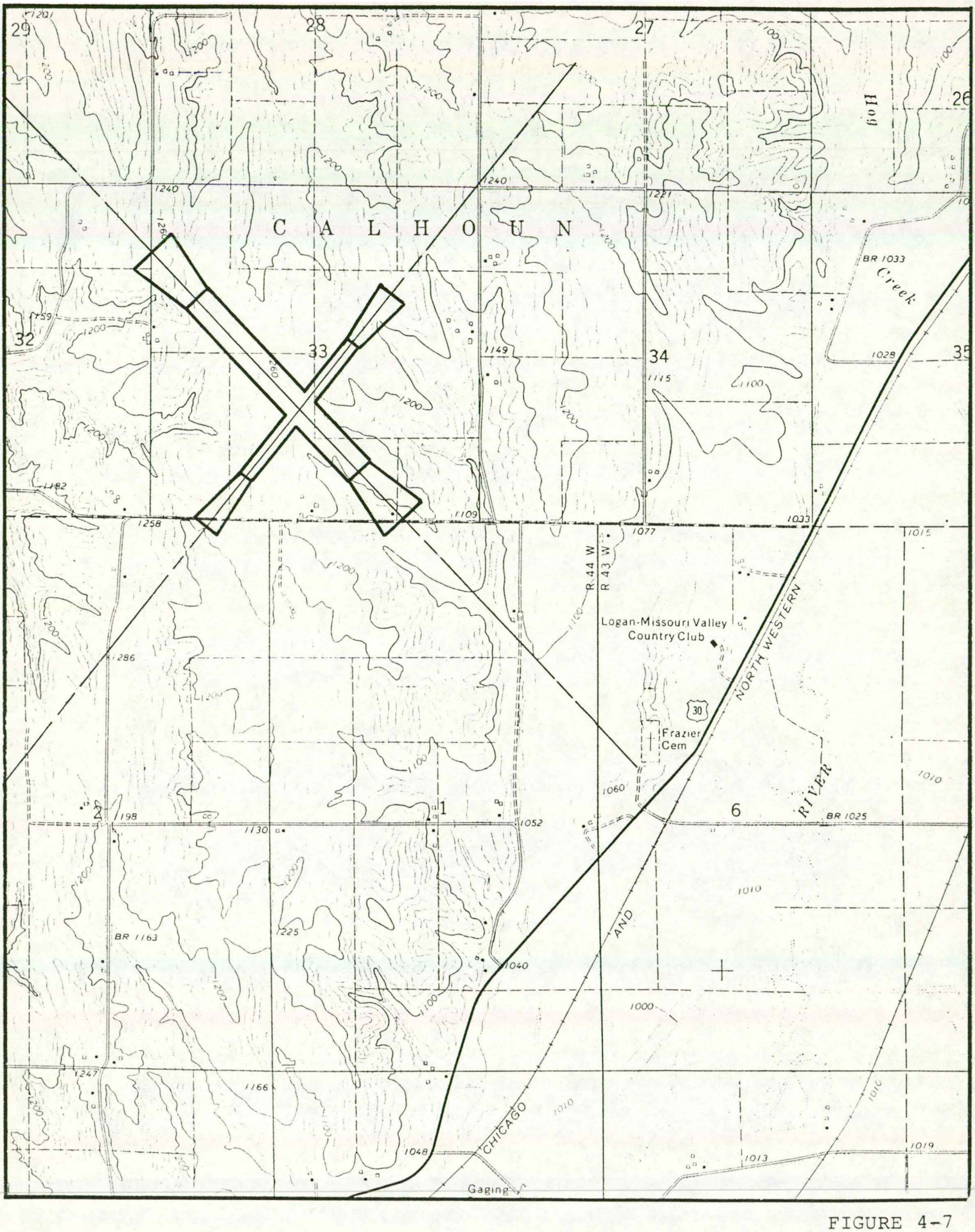


FIGURE 4-7

SITE SIX

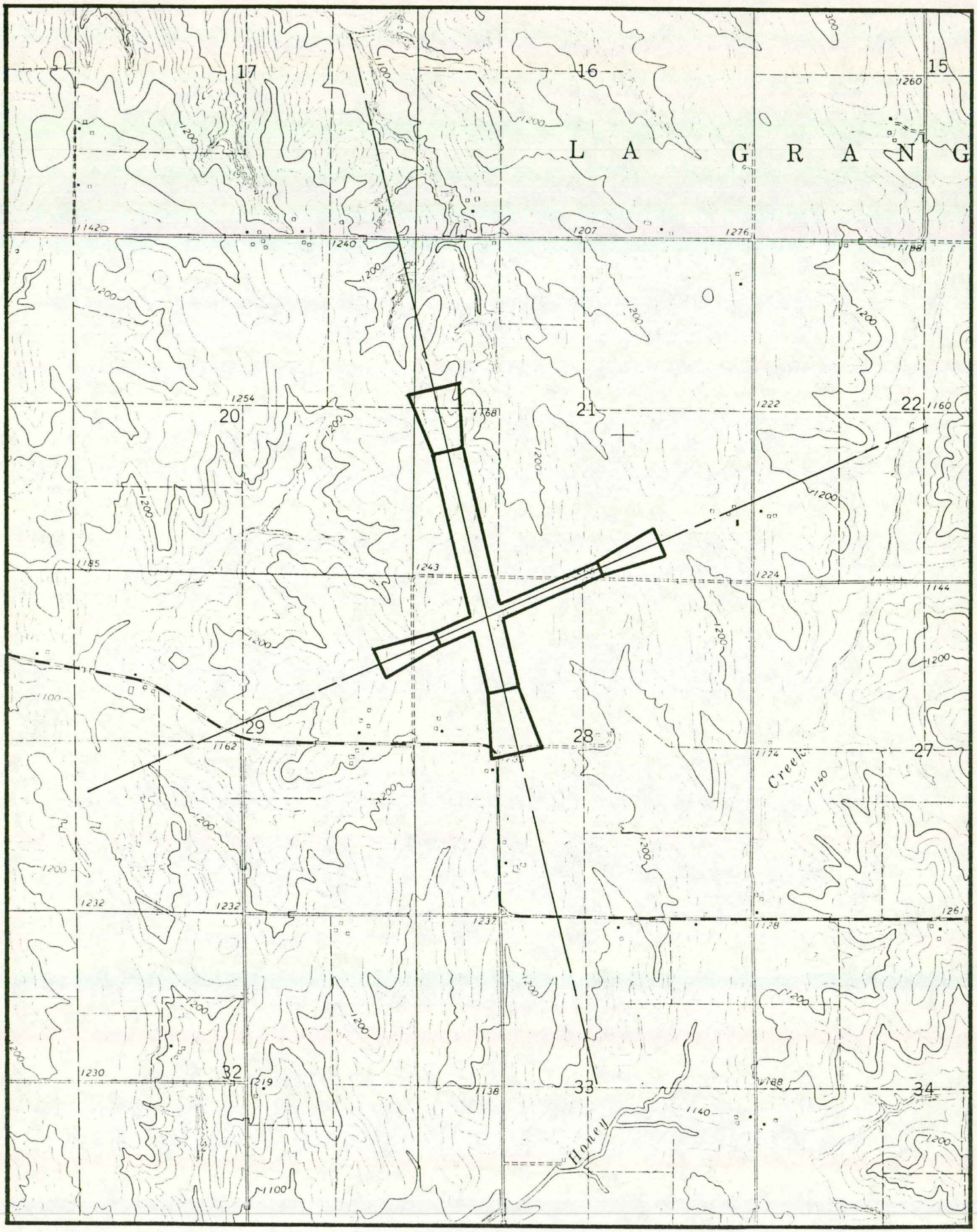


FIGURE 4-8

SITE SEVEN

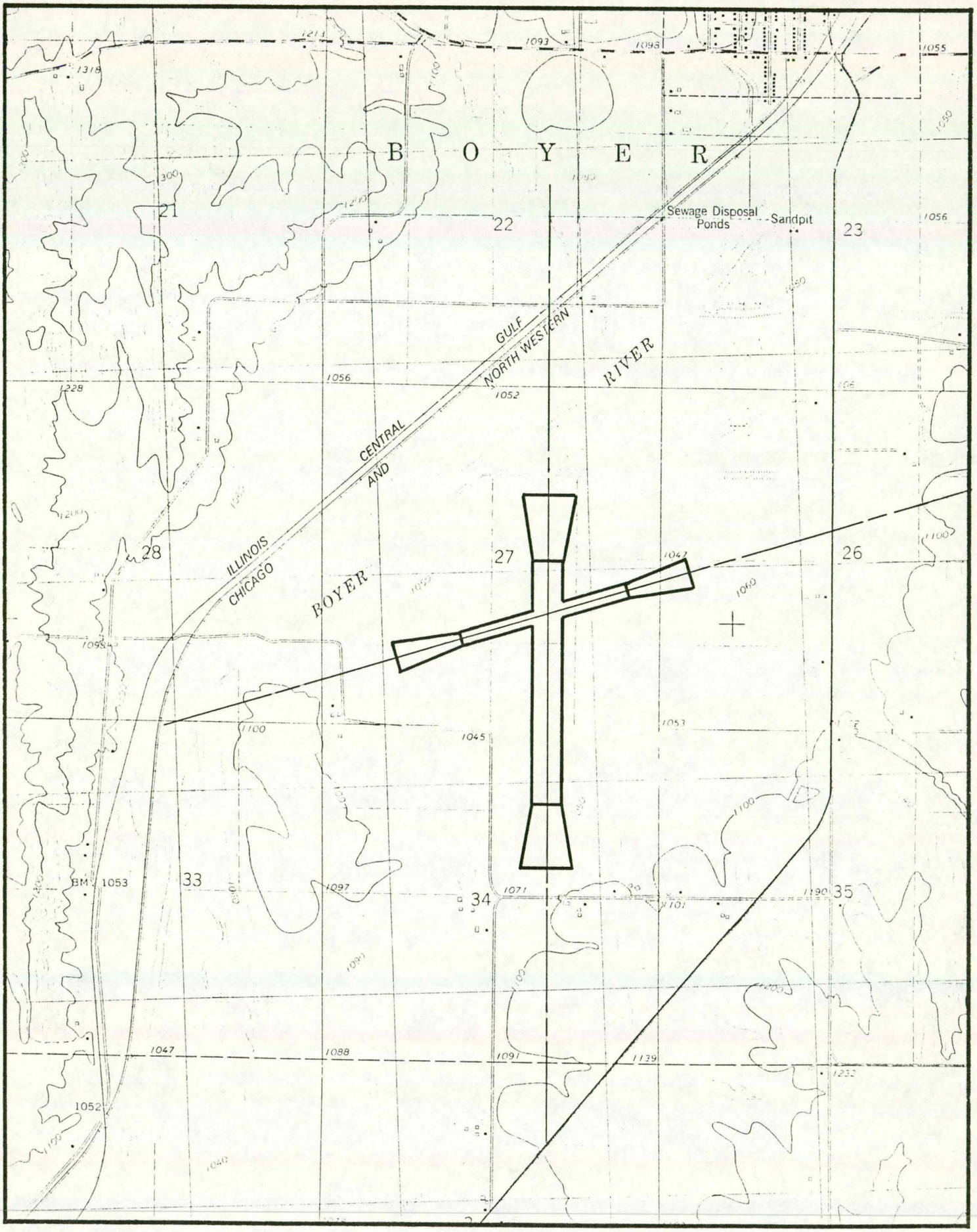


FIGURE 4-9

SITE EIGHT

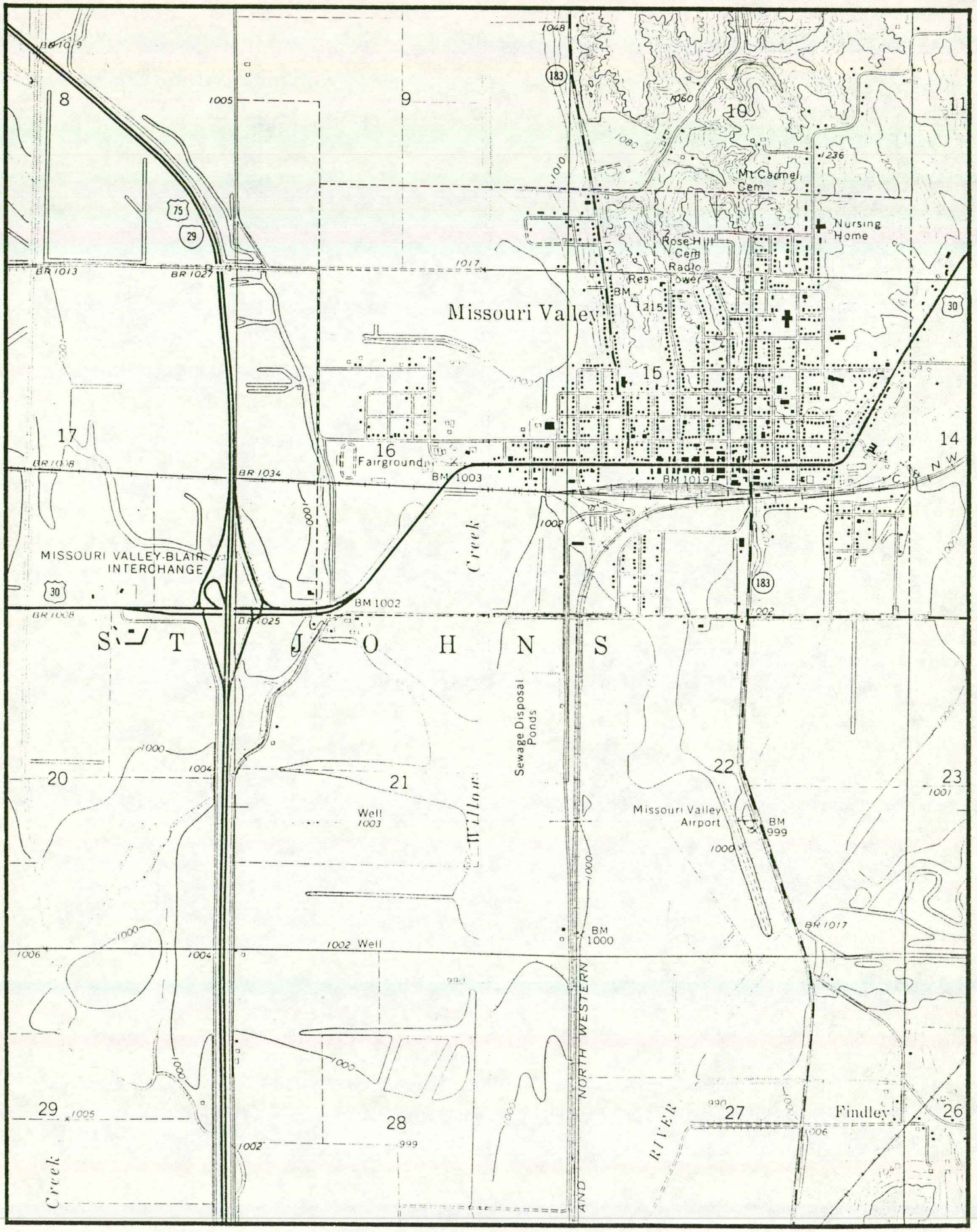


FIGURE 4-10

SITE NINE

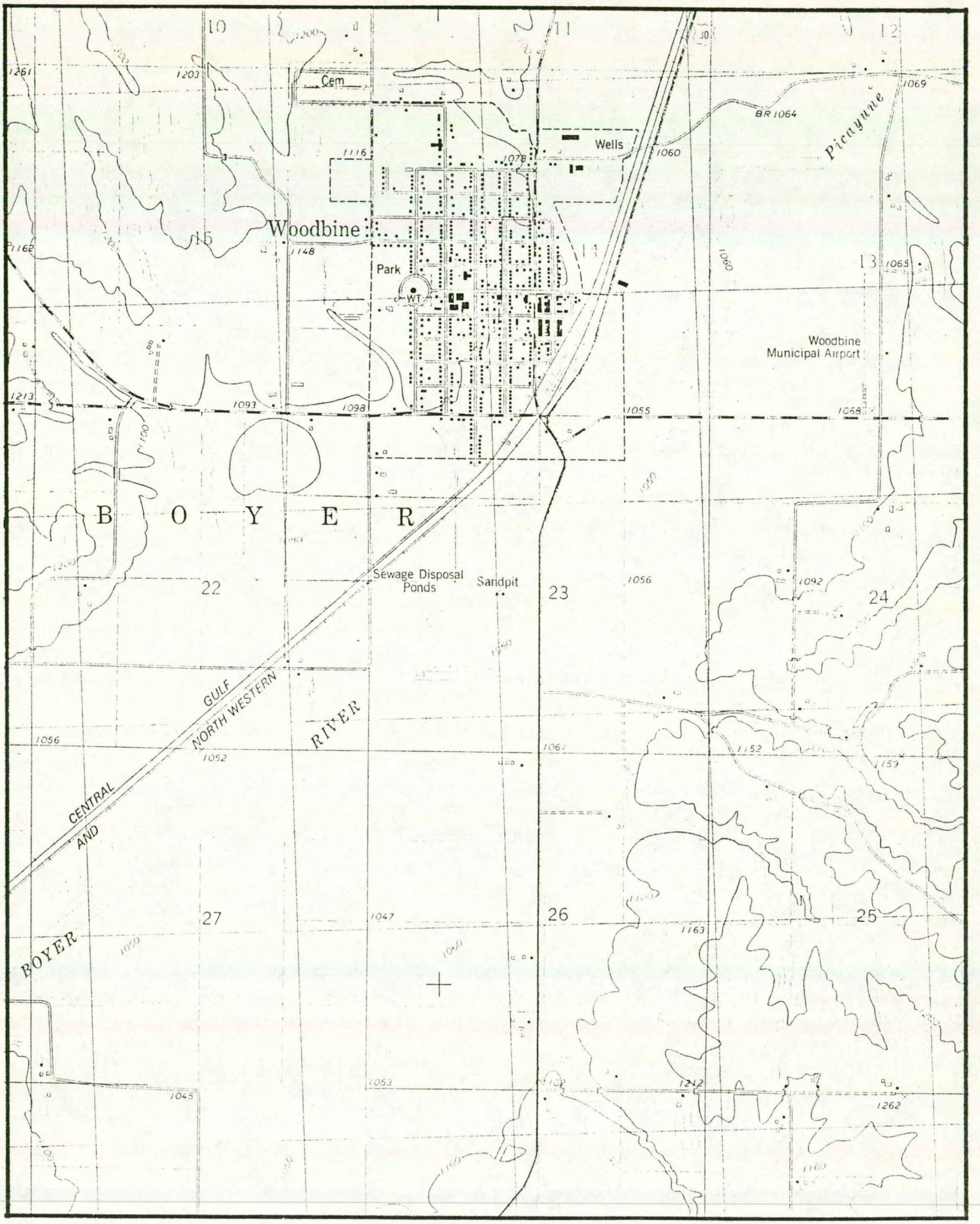
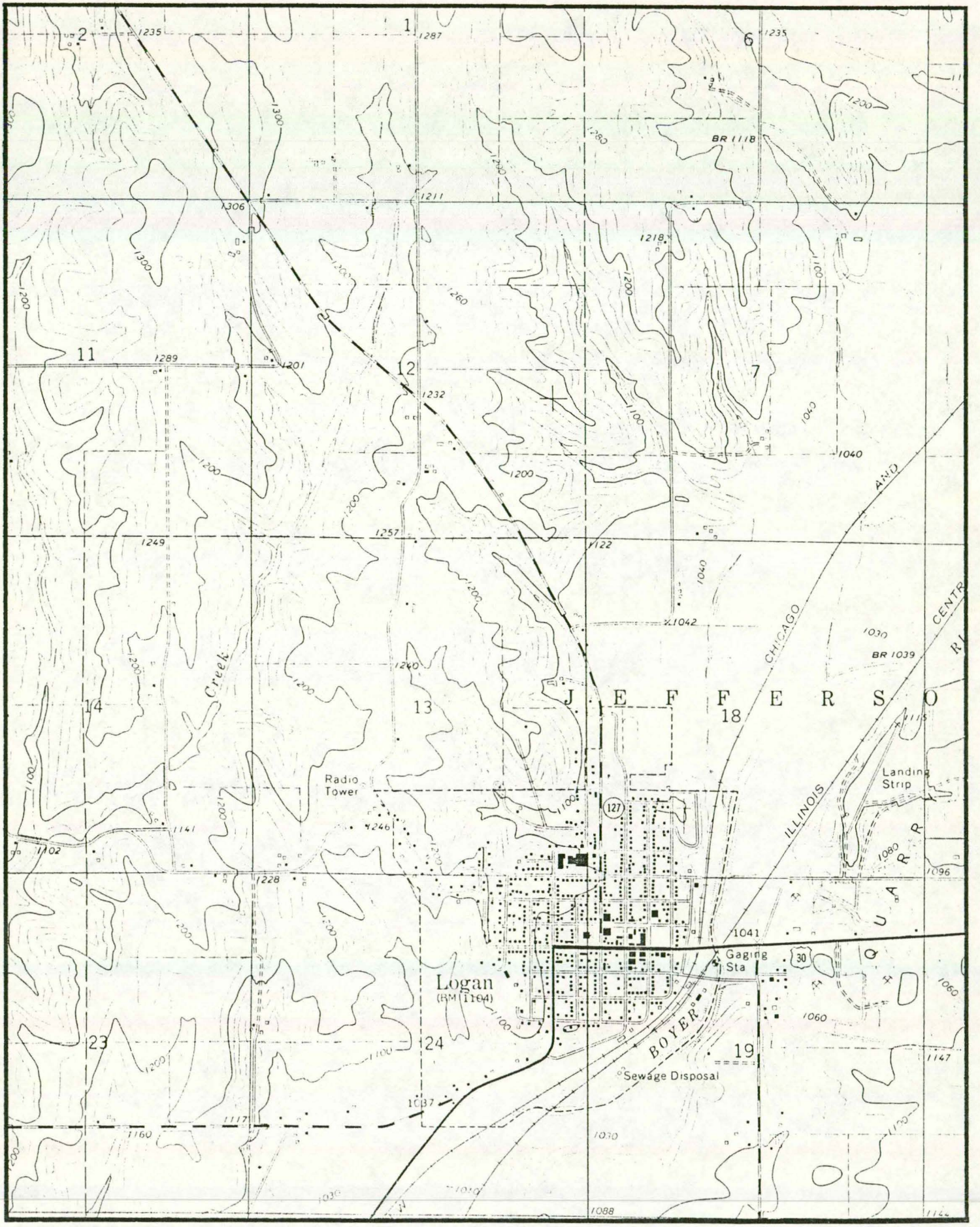


FIGURE 4-11

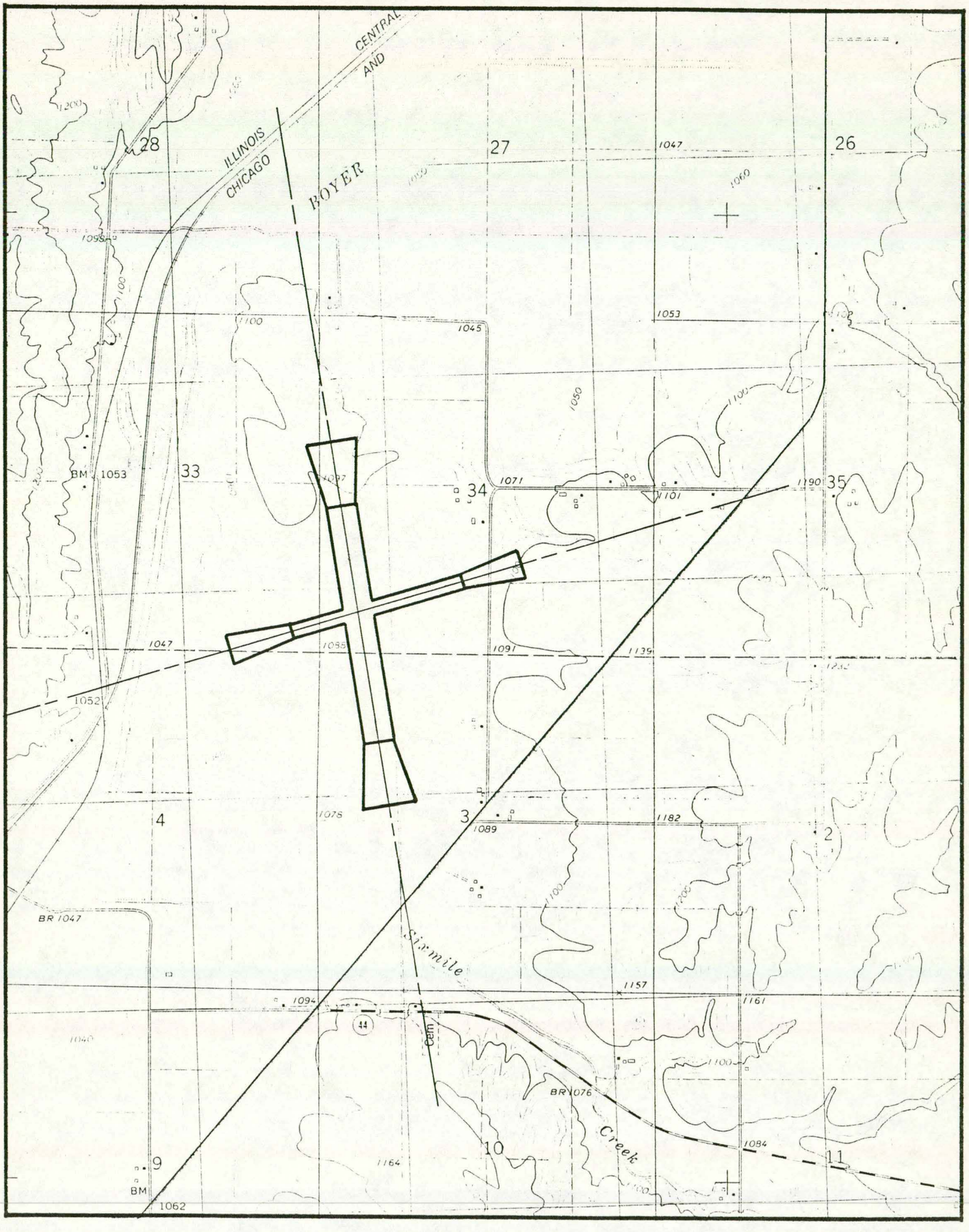
SITE TEN



4-12

FIGURE 4-12

SITE ELEVEN



4-17

FIGURE 4-13

SITE TWELVE

Keg Series

The Keg series consists of nearly level, well drained, and moderately well drained soils formed in alluvium and found within the bottom lands of the Missouri River Valley. Keg soils have moderate organic-matter content, high available water capacity, and moderate permeability. As a source of road fill, Keg soil is rated as fair to poor.

-fair to poor bearing capacity
-depth to seasonal high water table: greater than 5 feet
-moderate shrink-swell potential
-AASHO classification: A-6

Keg silt loam - map symbol 46
These soils are found on Site 5

Salix Series

The Salix series is found within the Missouri River bottom lands. Available water capacity is high; permeability is moderate. These soils formed in alluvium are nearly level and tend to be on the higher elevations within bottom lands. As a source of road fill, the Salix soils are rated fair to poor.

-nearly level topographic
-fair to poor bearing capacity
-moderate to high shrink-swell potential
-AASHO classification: A 2-4 or A-3
-depth to seasonal high water table: 3-5 feet

Salix silty clay loam (0-2 percent slopes) - map symbol 36
These soils are found on sites 5 and 4

Luton Series

The Luton series consists of nearly level, very poorly drained and poorly drained soils in the central and eastern parts on the Missouri River bottom lands. The soils were formed in alluvium. Some of these soils are subject to flooding. As a source of road fill, the soils are rated as fair to poor.

-fair to poor bearing capacity
-nearly level topographic
-subject to flooding
-AASHO classification: A-6, A-7-5, A-7-6
-depth to seasonal high water table: (66+ = 1-3 feet; 66,866 = 0-3 feet)

Luton silt loam, overwash - map symbol 66+
Luton silty clay, thin surface - map symbol 866
Luton silt loam - map symbol 66
These soils are found on Sites 5, 4, 3, 1, and 2.

Monona Series

The Monona series consists of well drained soils on crests and side ridges and some high benches. Slopes range from 0 to 40 percent. The Monona series formed in thick loess. As a source of road fill, these soils are rated as fair.

- -fair to poor bearing capacity and shear strength
- -moderate shrink-swell potential
- -nearly level to steep slopes
- -eroded in gutters and on exposed slopes
- -AASHO classification:
  - 0-15 inches: A-7-6
  - 15-30 inches: A-7-6
  - 30-60 inches: A-6 or A-7-6
- -depth to seasonal high water table: more than 5 feet

Monona silt loam (2 to 5 percent slope)-map symbol 10B
Monona silt loam (5 to 9 percent slope)-map symbol 10C
Monona silt loam (5 to 9 percent slope) (moderately eroded)-map symbol 10C2
Monona silt loam (9 to 14 percent slope)-map symbol 10D
Monona silt loam (9 to 14 percent slope) (moderately eroded)-map symbol 10D2
These soils are found on Sites 6 and 7.

The Monona silt loam benches 0-2 percent slopes (T10) on broad, high, loess-covered benches near the Boyer, Soldier, and Willow Rivers. These sites are surrounded by Monona silt loam, 2 to 5 percent slope, T10B. These soils include small depressions that are typically wet for short periods of time. These soils are found on Site 12.

McPaul Series

The McPaul series consists of stratified, nearly level, well drained, and moderately well drained soils at the extreme eastern edge of the Missouri River bottom lands where it parallels the uplands. These soils are formed in alluvium washed from nearby uplands. As a source of road fill, these soils are rated fair to poor. The soils have a moderate shrink-swell potential.

- -fair to poor bearing capacity
- -nearly level topography, subject to flooding
- -seasonal high water table, 3 to 5 feet
- -AASHO classification: 0-22 inches A-4 or A-6 - map symbol 70

These soils are found on Site 2.

Kennebec Series

The Kennebec series consists of moderately well drained soils on bottom lands. In many places these soils are subject to flooding and to the deposition of sediment. The Kennebec series formed in alluvium. As a source of road fill, these soils are rated as poor.

-shrink-swell potential - high
-poor bearing capacity
-high compressiblity
-depth to seasonal high water table - 3 to 5 feet
-AASHO classification: 0-60 inches, A-7-6

Kennebec silt loam (0 to 2 percent slopes)-map symbol 212
Kennebec silt loam, overwash (0 to 2 percent slopes)-map symbol 212+
These soils are found on Sites 10, 12, and 8.

Burcham Series

The Burcham series consists of nearly level, moderately well drained soils. These soils are formed in alluvium.

As a source of road fill, these soils are rated as very poor.

-seasonal high water table: 3-5 feet depth from surface
-shrink-swell potential: 0-25 inches = low---25-60 inches = high
-AASHO classification: 0-25 inches, A-2-4 or A-3
25-60 inches = A-7-6

Burcham silt loam (0 to 2 percent slopes)-map symbol 446
These soils are found on Site 8.

The above soils are not all inclusive, but represent major soil areas associated with the candidate sites. Reference may be made to Figure 4-14.

Moville Series

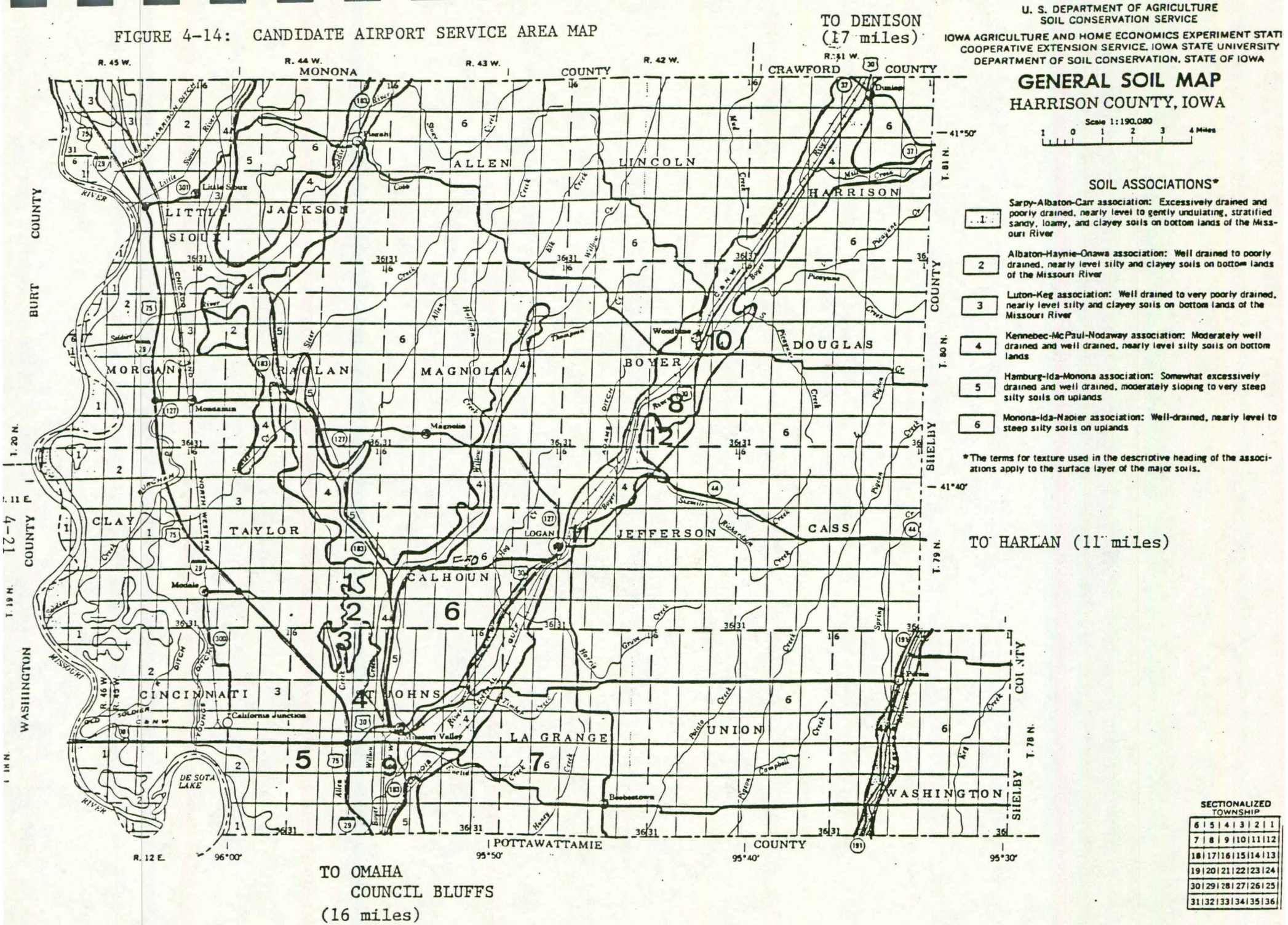
The Moville series consists of moderately well drained and somewhat poorly drained soils formed in recently deposited alluvium. Permeability is moderate in the upper part of the soil and very slow in the underlying silty clay.

As a source of road fill, these soils are rated as fair to poor to a depth of two feet +/- and very poor at depths greater than two feet.

-shrink-swell potential - high
-poor bearing capacity
-high compressibility
-depth to seasonal high water table - 1-3 feet
(subject to flooding)
-AASHO classification: 0-27 inches, A-4 or A-6
30-60 inches, A-7-6

Moville - map symbol 275
These soils are found on Site One and Two.

FIGURE 4-14: CANDIDATE AIRPORT SERVICE AREA MAP



HISTORIC / ARCHAEOLOGICAL SITES

Known Sites

Historic sites in Harrison County as of October 30, 1985 placed upon the National Register are as follows:

1.	Harrison County Courthouse	Logan
2.	Harrison County Jail	Logan
3.	Old Harrison County Courthouse	Magnolia
4.	State Savings Bank	Logan

None of the candidate airport sites would impact those historic sites on the National Register. Known archaeological sites identified by Range, Township, and Section are summarized below. None of the candidate airport sites would be located within a section identified as having a known archaeological site. These sites are noted as follows:

Site	Range	Twp.	Sec.	Site	Range	Twp.	Sec.
1	42w	81N	3	22	45W	79N	9
2	44	80	14	23	45	79	9
3	41	79	28	24	45	79	9
4	42	79	24	25	45	79	9
5	42	80	12	26	43	79	18
6	42	80	12	27	44	81	8
7	41	81	23 & 26	28	44	81	8
8	41	78	16	29	43	79	18
9	41	81	8	30	42	80	23
10	41	80	17	31	45	79	12
11	41	80	28	32	45	79	1
12	41	81	8	33	44	80	6
13	45	79	15	401	44	80	25
14	45	79	15	402	43	80	23
15	45	79	15				
16	45	79	16				
17	45	79	16				
18	45	79	16				
19	45	79	16				
20	45	79	9				
21	45	79	9				

SOURCE: IOWA STATE HISTORIC DEPT.
June 17, 1986

DeSoto National Wildlife Refuge

The DeSoto National Wildlife Refuge is located south of U.S. Highway 30 adjacent to the Missouri River. The refuge consists of 7,823 acres of which 3000 are in crops as a food supplement to natural foods. The primary role of the refuge is to provide a stopover for migrating ducks and geese. A quarter million mallards and snow geese have used the DeSoto Bend Refuge as a staging area for feeding. Bald eagles are typically found in numbers approaching 120 during the period mid-October through early April.

Of the candidate sites identified, Site Five is located within two miles of the refuge. The potential conflict with waterfowl would suggest that this site would be eliminated from consideration. Reference may be made to the United State Department of the Interior letter dated June 20, 1986. It would appear that those sites east of Interstate Highway 29 would be more compatible with the wildlife refuge.

Loess Hills - Pioneer Forest

The proposed 17,190 acre Loess Hills Pioneer State Forest area is located north of Highway 127 in Harrison and Monona Counties. The forest will be comprised of four units within an area approximately seven by fourteen miles. None of the candidate airport sites are located within close proximity of the proposed forest area.

Loess Hills

The Loess Hills are an unique natural feature consisting of ground silt windblown from deposits of retreating glaciers. While windblown silt is found throughout Iowa, these deposits reach depths of 200 feet. The hills support rare animal and plant communities.

With the exception of Site Six, none of the candidate airport sites are located within the hills. The variation in terrain and topographic features within the Loess Hills generally prohibit the development of an airport facility. Site Six, due to site constraints, should be eliminated from further consideration.

Flora and Fauna

The candidate airport sites are presently being cultivated. However, on or near the airport sites are environments which may support unique species of flora and fauna. Aside from Site Five, it would not appear necessary to eliminate any of the remaining sites since airport construction would take place on land that is under cultivation. As part of the NEPA review process, a more thorough investigation would be conducted.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
DESOTO NATIONAL WILDLIFE REFUGE
RR 1, BOX 114
MISSOURI VALLEY, IOWA 51555
(712) 642-4121

June 20, 1986

Mr. Jerry Searle
Professional Design Services of Iowa, Inc.
P.O. Box 191
Ankey, Iowa 50021

Dear Sir:

As per our discussion the other day, I am writing to verify my concerns with siting of the proposed Harrison County Airport.

As I explained any location within close proximity will be a problem for both the refuge and the pilots. There is an advisory in effect for flights over national wildlife refuges, and with due cause. This refuge receives heavy concentrations of waterfowl from October into December and lesser concentrations throughout the late winter and early spring. Up to a quarter million mallards and an equal number of snow geese have used DeSoto as a sanctuary and staging area for feeding flights throughout the valley.

In addition, there are concentrations of up to 120 bald eagles, on and around the refuge during the period mid-October through early April.

Incoming traffic would have to risk a much higher degree of air strikes at Site 5 than alternate sites located east of Interstate 29. Birds feeding off-refuge primarily concentrate within a 3-5 mile area north, northwest, northeast and east of the refuge, but usually West of Interstate 29. Returning concentrations often fly in at heights of 3,000 - 5,000 feet, so there's more to be concerned about than extreme low-level approaches.

On our part, we, must be concerned about potential disturbance and harassment of traditional waterfowl and eagle concentrations. Any development which would impact the wildlife resource would come under very critical review during the NEPA process, both by the U.S. Fish and Wildlife Service and various environmental groups. I imagine that you are aware of this, but I am simply writing to aid you in gaining a holistic view of potential impacts during your preliminary site-planning process.

Good luck in your endeavor. The community needs a good facility. I'm sure our Service will find it very convenient in the future.

Sincerely,

George E. Gage

George E. Gage
Project Leader

§ 27.34 Aircraft.

The unauthorized operation of aircraft, including sail planes, and hang gliders, at altitudes resulting in harassment of wildlife, or the unauthor-

U.S. Fish and Wildlife Serv., Interior

ized landing or take-off on a national wildlife refuge, except in an emergency, is prohibited. National wildlife refuge boundaries are designated on up-to-date FAA aeronautical charts.

Wetland / Flood Plains

With the exception of Sites 6 and 7, the remaining airport sites lie on valley floors. The sites most likely to be impacted by flooding are sites 8, 9, 10, and 11.

Airport facilities have been constructed within the flood plain areas. The primary concern is to ensure that the proposed construction avoid the floodway portion of the flood plain. Should the site selected be located within a flood plain, the airport owner/sponsor must obtain a Flood Plain Development Permit from the Iowa Department of Natural Resources.

The runway may extend into the floodway, but in no case can it obstruct flood water flows or increase such flows. Consequently, the runway elevation could be no more than the existing ground elevation. Terminal buildings could be located within the flood plain fringe area, but not in the floodway. The apron and hangars should be elevated at least one foot above the 50 year flood elevation. Other new construction to include the terminal building, airport managers residence, etc., should be located one foot above the 100 year flood elevation.

Sites 8, 9, 10, and 11 would be located within the floodway of the Boyer River.

Agricultural Lands

All of the candidate airport sites are under cultivation. The land capability classifications are noted for each major soil area found.

Symbol	Mapping Unit	Capability Unit	Corn (BUSHELS/ACRE)	Soybean
10	Monona silt loam, 0-2 % slope	I-3	100	38
10B	" " " , 2-5 % slope	IIe-2	98	37
10C	" " " , 5-9 % slope	III Ie-1	93	35
10C2	" " " , 5-9 % slope, moderately eroded	IIIe-1	90	34
10D	" " " , 9-14 % slope	IIIe-1	84	32
T10	" " " , Benches, 0-2 % slope	IIe-2	100	38
T10B	" " " , Benches 0-2 % slope	IIe-1	98	37
212	Kennebec silt loam	I-1	118	45
70	McPaul silt loam	I-2	98	37
46	Keg silt loam	I-1	118	45
36	Salix silty clay loam	I-1	114	43
866	Luton silty clay, thin surface	IIIw-1	70	27
66	Luton silty clay	IIIw-1	65	25
66+	Luton sitly loam, overwash	IIIw-1	80	31
446	Burcham silt loam	I-1	106	41

Also noted is crop production in bushels per acre for corn and soybeans. The broad classification of soils are summarized as follows:

Class I -Soils having few limitations that restrict their use.
Class II -Soils having moderate limitations that reduce the choice of plants or that require moderate conservation practices
Class III -Soils having severe limitations that reduce the choice of plants, require special conservation practices or both
e -subject to erosion unless close-growing plant cover is maintained
w -water in or on soil may interfere with plant growth or cultivation

SITE ONE

Candidate airport Site One is located in Section 25 of Calhoun Township and Section 26 of Taylor Township. The site is accessible from Interstate Highway 29 at the Modale interchange via County Road F50. County Road F50 also provides access to the site from U.S. Highway 30 at Logan. The site is located three miles east of I-29. The site is also accessible from Missouri Valley via State Highway 183.

The distance from selected communities to Site One via hard surface road(s) is summarized below:

Community	Miles	Population
Dunlap	25	1374
Woodbine	16	1463
Logan	7	1540
Missouri Valley	5	3107
Modale	3	373
Modamin	11	423
Magnolia	10	207
Pisgah	18	307
Little Sioux	17	251
Persia	72	355

The site lies at an elevation of 1010 feet above sea level and slopes from east to west. Soil types found on the site are Luton silt loam (66) and to a limited extent, Molville silt loam (275).

AASHO Classification - Luton silt loam - 0-21 inches = A-6
21-60 inches = A-7-5 or A-7-6
Shrink-swell capacity is rated as high
Depth to seasonal high water table is 0 to 3 feet
As a source of road fill, this soil is rated as poor

The conceptual layout prepared for Site One would find the primary runway located in a north-northwesterly direction (N14 degrees W). The crosswind would have an orientation of N80 degrees E. An ultimate length of 4000 feet plus could be obtained. The terminal area would be located near the midpoint of the intersecting runway with access from County Road F50.

Agricultural land uses surround the site. The proposed runway configuration would not appear to have any impact upon farmsteads. There are no urban land uses in close proximity of the site. The land is under cultivation and has a land capability classification of IIIw-1. Average productivity as measured by corn and soybean production is as follows: corn, 65 bu./ac.; soybeans, 25 bu./ac.

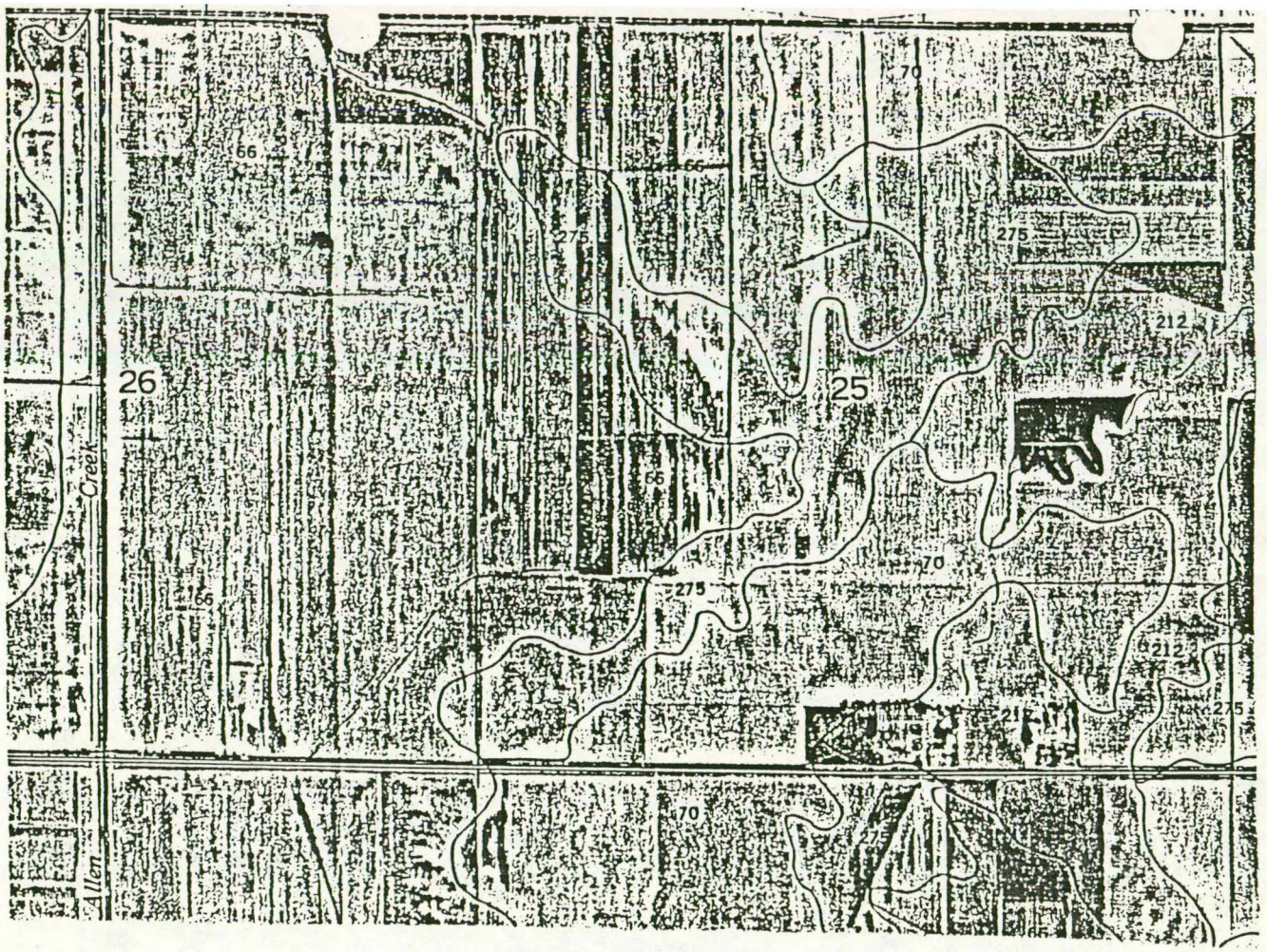


FIGURE 4-15: SOILS - SITE ONE

SITE TWO

Candidate airport Site Two is located in Section 36 of Calhoun Township. The site is located south of County Road F50. Accessibility to the site and distance from selected communities within Harrison County is the same as was described for Site One.

The site lies at an elevation of 1010 feet above sea level. Soil types found on the site comes of Luton silt loam (66) and McPaul silt loam (70). Based upon the conceptual layout, nearly all of the construction would take place upon the McPaul silt loam.

AASHO Classification - McPaul silt loam - A-4 or A-6
Shrink-swell capacity is rated as moderate
Depth to season high water table is 3 to 5 feet
As a source of road fill, the soil is rated as fair to poor

The conceptual layout prepared for Site Two would find the primary runway having a northwesterly orientation of N36 degrees W. The crosswind runway would have an orientation of N51 degrees E. An ultimate length of 4000 feet could be obtained. The terminal area as with Site One would be located near the intersection of the two runways with direct access provided by County Road F50.

The land is currently under cultivation. None of the existing farmsteads located in the area would be impacted by the proposed development. The land is classified as I-2. Average productivity as measured by corn and soybean production is as follows: corn, 98 bu./ac.; soybeans; 37 bu./ac.

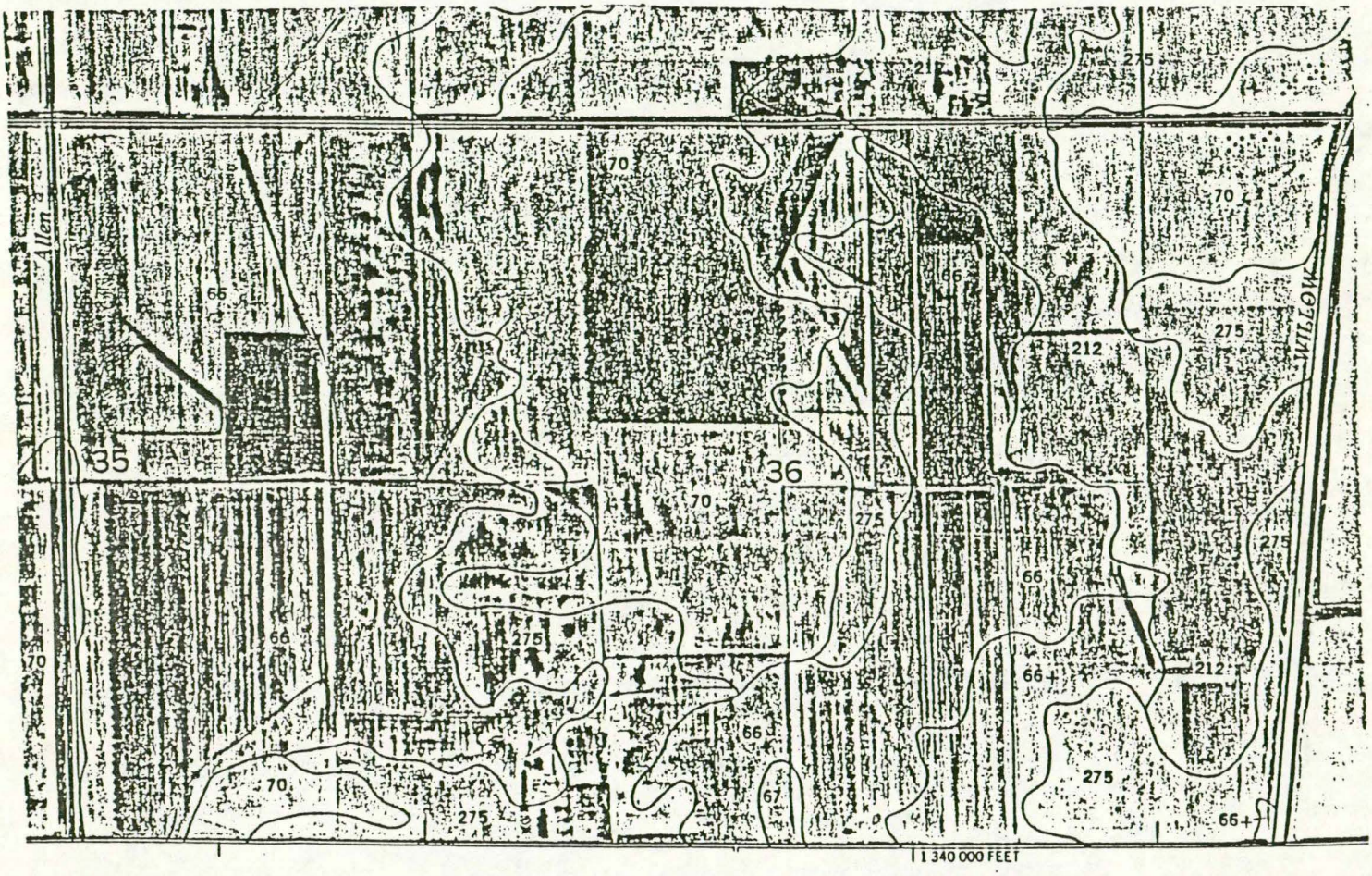


FIGURE 4-16: Soils - Site Two

SITE EIGHT

Candidate Site Eight is located in Section 27 and 34 of Boyer Township. The proposed terminal area would be located approximately 1.5 miles via a gravel road from U.S. Highway 30. A pipeline does cross part of the site.

Approximate distance from selected communities within Harrison County is summarized below:

Community	Miles	Population
Dunlap	13	1374
Woodbine	4	1463
Logan	5	1540
Missouri Valley	13	3107
Modale	18	373
Modamin	19	423
Magnolia	11	207
Pisgah	19	307
Little Sioux	27	251
Persia	17	355

The site lies at an elevation 1050 feet above sea level. Site Eight, like Sites One and Two, is level, sloping in a westerly direction. Soil types found on the site are Burcham silt loam (446) and Kennebec silt loam (212). As noted on the soil map, the site has a number of wet spots or areas where ponding may be found. Construction would impact both soil types. Soil characteristics are summarized as follows:

AASHO Classification - Burcham silt loam - 0-26 inches = A-6 or A-7-6
26-60 inches = A-7-6
Shrink-swell capacity is rated as moderate (0-26") to high (26-60")
Depth to seasonal high water table is 2 to 5 feet
As a source of road fill, the soil is rated as very poor
(Material below a depth about two feet is very clayey.)

AASHO Classification - Kennebec silt loam - 0-60 inches = A-7-6
Shrink-swell capacity is rated as moderate
Depth to seasonal high water table is 3 to 5 feet
As a source of road fill, this soil is rated as poor

The concept plan illustrated in Figure 4-9 depicts a north-south primary runway orientation. The crosswind runway has an orientation of N74 degrees E. The terminal would be located in the southwest quadrant of the site near the intersection of the primary and crosswind runways. The terminal area is accessible from U.S. Highway 30 via 1.5 miles of gravel road.

The site is under cultivation. Based upon the present orientation one farmstead would fall under the approach surface to the primary runway. The site could accommodate a primary runway 4000 feet in length. The land capability classification rating is I-2 for both soils impact by the proposed development. Productivity as measured by corn and soybean production is as follows:

Corn:	Kennebec	118 bu./ac.	Soybeans:	Kennebec	45 bu./ac.
	Burcham	106 bu./ac.		Burcham	40 bu./ac.

Power lines and a drainage ditch cross the site.

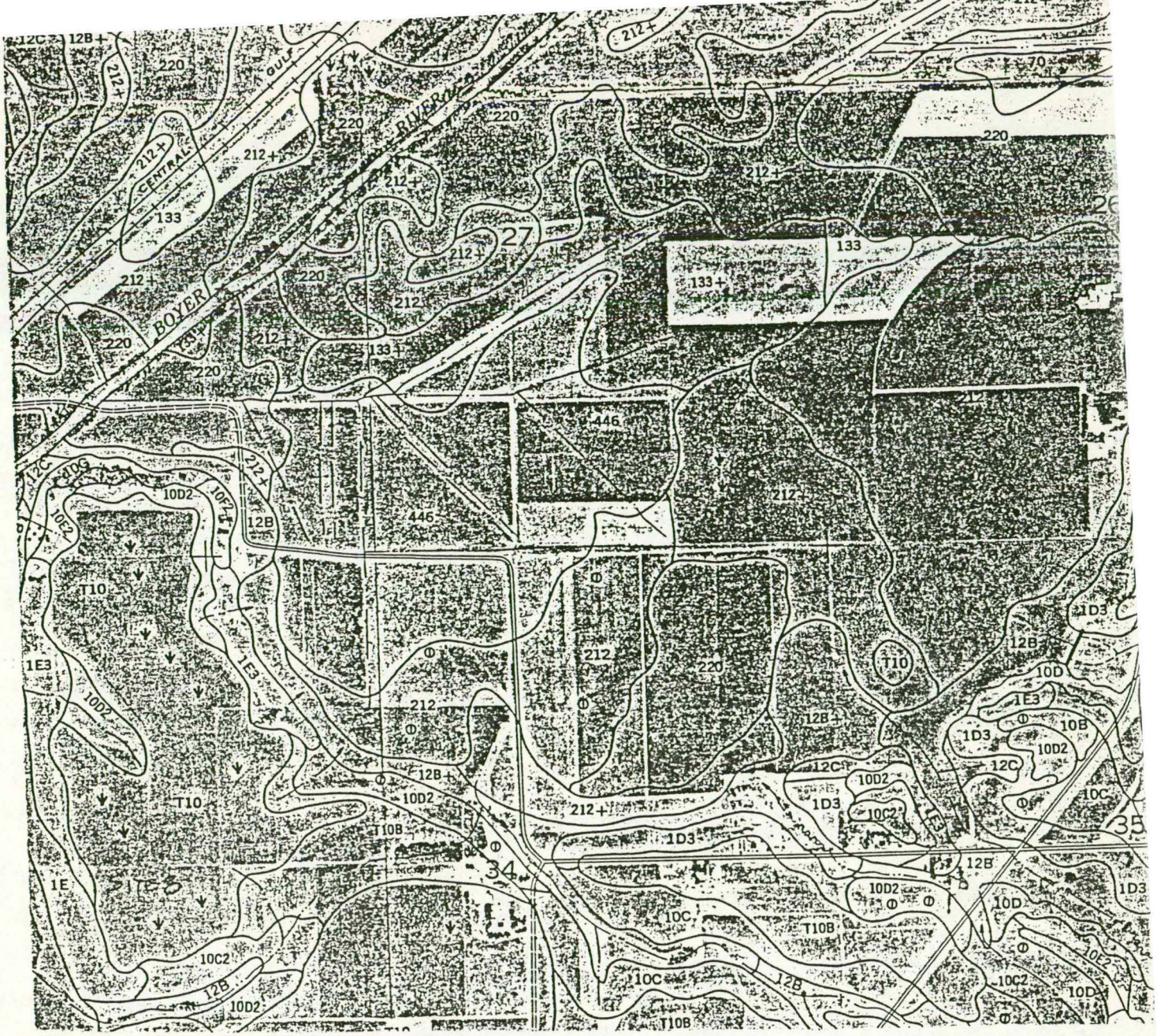


FIGURE 4-17: SOILS - SITE EI

SITE TWELVE

Site Twelve is located for the most part in Section 34 of Boyer Township. The primary runway extend into the north half of Section 3 of Jefferson Township. The site is located south of Site Eight. Access to the site as well as distance from area communties is the same as that described for Site Eight.

The site lies at a slightly elevation (40 feet +/-) than does that of Site Eight. Drainage on the site is from east to west. The pipeline that crosses the site would be affected by the proposed construction unless the primary runway was displayed more to the north.

Soil types found on the site consist of Monona silt loam, benches (T10, T10B).

AASHO Classification - 0-15 inches = A-7-6
15-30 inches = A-7-6
30-60 inches = A-6 or A-7-6
Shrink-swell potential is rated as moderate
Depth to the seasonal high water table it more than 5 feet
As a source of road fill, the soil is rated as fair

Figure 4-13 depicts a primary runway located N10 degrees W. The crosswind runway has an orientation of N70 degrees E. An ultimate length of 4000 feet could be obtained on the primary runway. The location of an ox bow and an existing road to the east would limit construction of the crosswind runway to less than 3400 feet based upon the orientation presented in Figure 4-13. Moving the crosswind to the south with a more north-northeasterly orientation would allow upwards of 4000 feet to be constructed. In any case, the crosswind runway would fall across the pipeline. The configuration of the airport would also be reduced since the runways would not intersect near the midpoints. The terminal area would be located near the intersection of the two runways and would be accessible from Hwy. U.S. 30 via gravel road.

The site like the other sites is under cultivation. Predicted yields for the Monona silt loam bench soils are as follows:

Corn:	T10	100 bu./ac.	Soybeans:	T10	38 bu./ac.
	T10B	98 bu./ac		T10B	37 bu./ac.

The land capability class assigned is I-3 for the 0 to 2 percent slopes and IIe-2 for the 2 to 5 percent slopes.

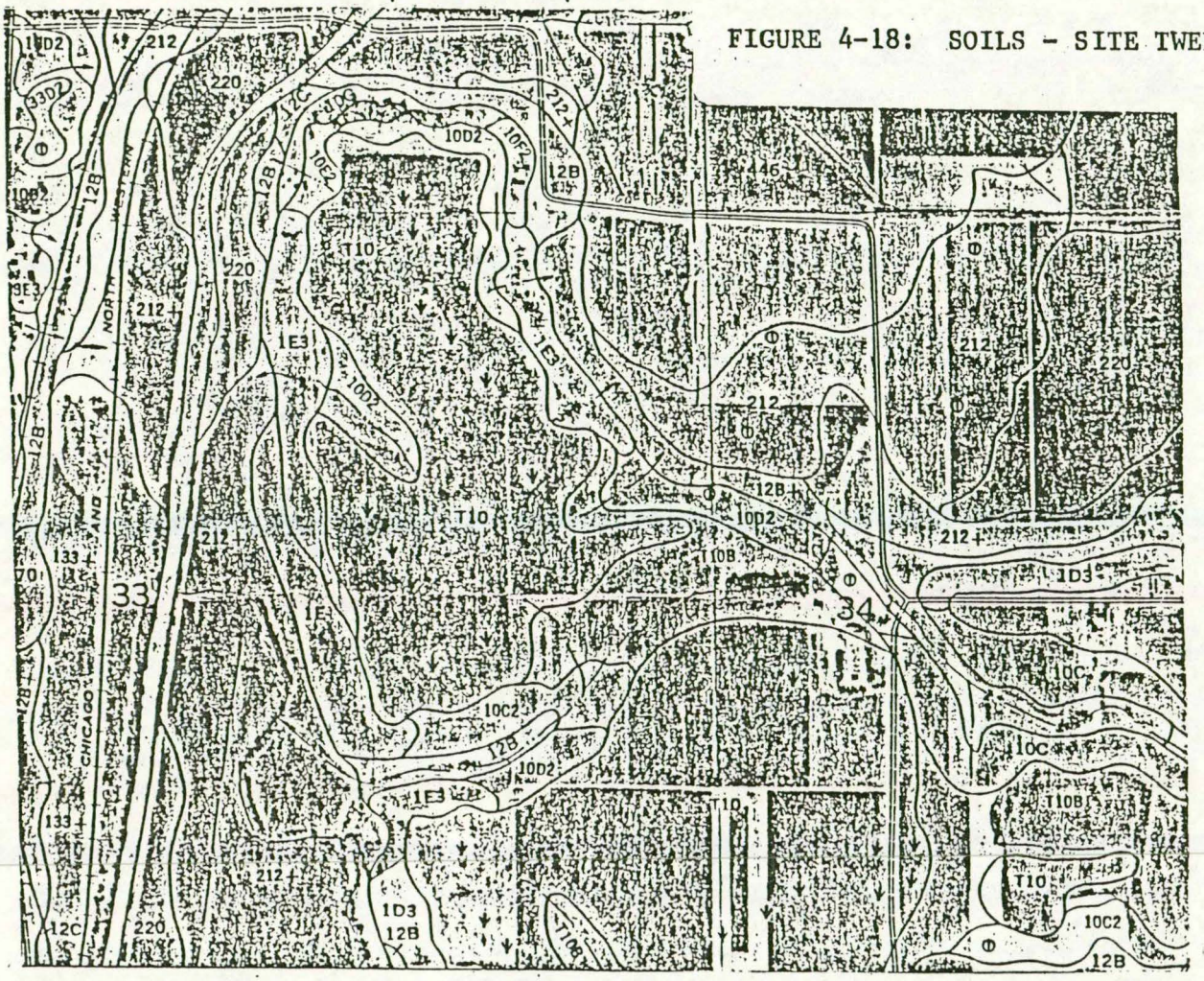


FIGURE 4-18: SOILS - SITE TWELVE

The relationship of the four sites to the airport service are is illustrated in Figure 4-19.

The Site Selection Committee conducted an on-site inspection of the four candidate sites on July 16, 1986. After the tour, the Site Selection Committee ranked each of the four sites; the results of which are summarized in the following table.

TABLE 4-1: RANKING OF AIRPORT SITE BY SITE SELECTION COMMITTEE AFTER BUS TOUR OF 4 CANDIDATE SITES

First	2	2	12	12	2	2	12	12	2	2	2	2
Second	12	12	2	2	1	1	2	2	12	12	1	12
Third	1	1	1	1	12	12	8	1	1	1	12	1
Fourth	8	8	8	8	8	8	1	8	8	8	8	8

RANK	SITE TWO	SITE TWELVE	SITE ONE	SITE EIGHT
First	8	4	0	0
Second	4	5	3	0
Third	0	3	8	1
Fourth	0	0	1	11

RANK	SITE TWO	SITE TWELVE
First	66.7%	33.3%
Second	33.3%	41.7%

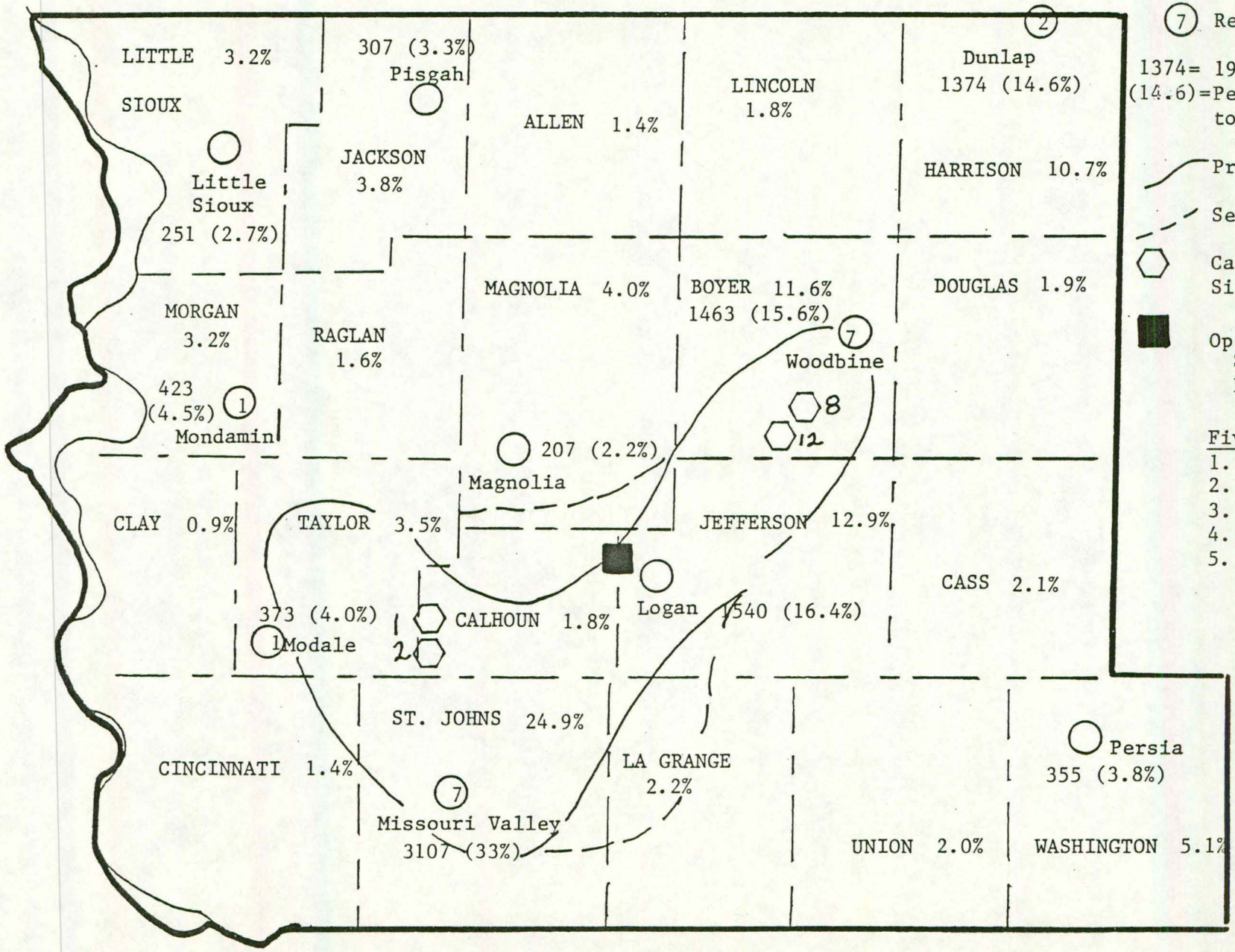
SOURCE: Site Selection Committee Survey on 7/16/86.

Sites One and Eight were eliminated from further consideration. The Committee requested that criteria for identifying the optimum location of an airport site be developed as a tool to select the preferred airport site. In addition, the Committee requested that a matrix comparing Sites Two and Twelve be prepared. Reference may be made to Tables 4-2 and 4-3.

As noted in Table 4-1, Site Two was ranked first with 67 percent of the Committee selecting Site Two. The objective of the selection process is to select one site as a preferred site for a more detailed evaluation. Should site limitations be encountered within the evaluation process, the number two choice may then be selected as a preferred site. The major goal is to obtain a consensus on the site which will best serve the needs of the Harrison County.

The optimum location of an airport based upon five factors was located 10 miles north of the Harrison Pottawattamie County line and 16.5 east of a line extending in a north/south direction from the westerly most part of the county. This calculated point is located north and west of Logan, (Section 14, R-43 W, T 79 N). The point lies one mile north of F50 and 1.4 miles west of Highway 127.

FIGURE 4-19: OPTIMUM LOCATION



ENVIRONMENTAL CONSIDERATIONS

NEED:

The need for the proposed actions are based upon present and future levels of aviation activity summarized in Section II. In addition to the alternatives previously discussed, the following alternatives were also available.

1. No Project Alternative

A no project alternative would not allow the airport to satisfy aviation demand expectations.

ENVIRONMENTAL CONSEQUENCES:

1. Noise: FAA Order 1050.26 Appendix 6, Chapter 5, Paragraph 47, Page 26 states: "No noise analysis is needed for proposals involving utility or basic transport type airports whose forecast of operations do not exceed 90,000 annual adjusted propeller operations or 700 annual adjusted jet operations."
2. Compatible Land Use: In general, industrial, agricultural, and open space land uses are compatible with the operation of the airport. The proposed actions are consistent with such community planning as has been carried out.
3. Social Impacts: The proposed actions will not involve the relocation of any existing residence or place of business. The proposed actions will require the removal of crop land from production.
4. Induced Socioeconomic Impacts: The proposed may have a positive impact upon industrial development in the airport service area.
5. Air Quality: The proposed actions are not expected to have any negative impact upon the Clear Air Act Amendments of 1977.
6. Water Quality: Provided mitigating measure to control erosion during construction are followed, the proposed action will have no significant detrimental impact upon water quality.
7. DOT, Section (F): There are no Section 4 (F) lands proposed for acquisition.
8. Historical, Architectural, Archaeological, and Cultural Resources: There are no known historical or cultural resources which would be affected by the proposed actions.
9. Biotic Communities: The proposed actions will have no known significant impact upon biotic communities.
10. Endangered and Threatened Species of Flora and Fauna: There are no known endangered or threatened species on the airport site.
11. Wetlands: There are wetland areas in the vacinity of the airport site.
12. Flood Plain: The airport does lie within a flood plain area of the Missouri River.
13. Prime and Unique Farmland: The proposed actions will remove certain amounts of farmland from production.
14. Energy Supply and Natural Resources: The proposed actions are expected to have no significant impact upon energy supplies and other natural resources.
15. Light Emissions: No detrimental impacts are expected.
16. Solid Waste: No detrimental impacts are expected.
17. Construction Impacts: Such impacts resulting from construction are of a short term nature and should have no detrimental impact provided mitigating measures are employed.

TABLE 4-2: OPTIMUM LOCATION FACTORS

	NORTH	EAST
Town Population	11.5	17.1
Retail Sales	9.5	16.8
Employment	10.9	16.8
Based Aircraft	6.4	15.0
Registered Aircraft	11.6	16.8
Average	10.0	16.5

The shortest distance to Sites 12 and 2 was calculated to be the shortest distance from the optimum point to a paved road - in this case F50 via one mile of gravel road. From the intersection of the existing road with F50 the shortest distance was calculated. Site 2 was located 7.5 miles from the optimum point while Site 12 was located 7.9 miles from the optimum point.

The following table provides an overview of Airport Candidate Sites Two and Twelve.

TABLE 4-3: EVALUATION OF SITE TWO AND TWELVE

SITE SELECTION FACTORS	SITE TWO	SITE TWELVE
1. Optimum Location Factors A. Town Population B. Retail Sales C. Employment D. Based Aircraft E. Registered Aircraft	+	0
	NOTE: (The centroid for each factor, A through E, was calculated and summed to produce the optimum location)	
2. Soil Conditions	0	0
3. Drainage	-	0
4. Topography	0	0
5. Grading	0	+
6. Agricultural Productivity	0	0
7. Historic / Archaeological	0	0
8. Flora and Fauna	0	0
9. Obstructions On Site	0	0
10 Access to Terminal Area	+	0
11. Airport Configuration	0	0
12. Underground Pipeline	0	-
13. O.H. Power Lines	0	0
14. Towers (radio, etc.)	0	-
15. Interstate Hwy. Access	+	0
TOTAL POINTS	+ (3); - (1)	+ (1); - (2)

Fifteen factors were examined with a plus value given to the site that had a definite advantage over the other. Where no significant difference was noted, a "0" value was assigned. Where a condition existed that was clearly undesireable a minus value was assigned. The FAA will be requested to conduct an airspace analysis for the preferred site. A minus value does not mean that the site is unacceptable, but it has a limitation not found on the alternative site.

From review of each criteria, it would appear that Site Two would best serve the needs of Harrison County.

The preceeding pages outlines subject matter typically contained within an Environmental Assessment. As previously noted, the Iowa DOT does not require a full-blown Environmental Assessment. As such, no in depth analysis was accomplished for items 1 through 17 above. Should any of the above have an impact or be impacted by the proposed actions, detailed evaluation of the impact should be accomplished prior to proceeding with implementation. Within the site selection process, consideration was given to selected environmental concerns as they related to the site selection process.

SECTION FIVE

AIRPORT LAYOUT PLAN

Introduction

Once the airport site has been firmly established, a comprehensive plan is drawn to depict the ultimate development of the site. For the Harrison County facility, the comprehensive plan consists of four (4) separate drawings which collectively comprise the Airport Layout Plan. Because the plan represents a twenty-year time frame, it must be reviewed periodically and even updated from time to time to keep the plan consistent with the airport's changing needs.

Airport Layout Drawing

The airport layout drawing is the most important drawing of the airport layout plan because it depicts the ultimate layout of the entire airport site. The Harrison County Airport site located adjacent to and south of paved county road F-50 is approximately 106 acres in size and will eventually accommodate two runways and an adequately sized terminal area with room for expansion even beyond the 20-year projections.

The primary runway is Runway 16/34, oriented in a NW-SE direction and will be a hard-surfaced runway, 60 feet wide and 3,400 feet long. The runway will be developed beginning at the north end of the site just south of Route F-50 and extend southeasterly. The length of 3,400 feet is the maximum length shown for the forecasted activity at the site. However, there is additional land available to make it physically possible to extend Runway 16/34 to 4,100 feet if future aviation activity would warrant it.

The exact position of Runway 16/34 on the site was governed by the proximity of adjacent farmsteads and farm buildings, several irrigation wells and center-pivot irrigation equipment in the vicinity. The site itself is quite flat but does have a slight ridge down the center. Runway 16/34 is located along this higher ground to keep it elevated and maintain good surface drainage. Surface drainage will remain as closely as possible to the natural conditions and still have a well-drained airport site.

A second, crosswind runway is Runway 5/23 in a northeast/southwest direction and will be a turf runway 120 feet wide by 2,720 feet long for ultimate development. This runway is aligned in a northeast/southwest direction to optimize crosswind coverage and to minimize conflicts with the irrigation wells in the area and the center pivot irrigation operations on the adjacent land.

For both runway locations, consideration was also given to land ownership boundaries as much as possible in an effort to minimize the number of land owners that would be affected by the acquisition.

Land needs for the new site are being kept to a minimum as much as possible. Fee title acquisition is proposed for the land within 300 feet of the centerline of Runway 16/34; within 250 feet of Runway 5/23 centerline; and for the land that falls within the runway visibility zone (RVZ) where the two runways cross. In addition, sufficient land will also be acquired at the north end of the site to accommodate the terminal area.

The planned approach for Runway 16/34 is a non-precision instrument approach and clear zones are shown accordingly for both runway ends. For Runway 5/23, the approaches will be visual.

Runway and airport data tables list pertinent information about the runways as well as the airport in general. A structure identification table lists future buildings on the site and a legend is shown to help identify certain features on the plan.

A ten-year summary of wind data for the determination of the prevailing crosswind components is shown graphically on the wind rose. Both runway orientations are overlaid on the wind rose to indicate the wind coverage provided. Both runways together provide coverage for crosswind components greater than 12 mph - meeting the 95% requirement of the FAA.

Taxiways shown on the drawing include two categories. A 25-foot wide connecting taxiway is shown extending from the terminal area and connecting to new Runway 16/34. Smaller taxiways in close to the terminal area are for access to tee hangars.

Rectangular turnarounds are shown on the ends of the paved runway and will improve the runway's safety and efficiency.

To protect the inner airspace around each runway, building restriction lines (BRL) are delineated on the ALP at a minimum of 300 feet from the primary runway and 250 feet from the crosswind to keep buildings of reasonable height and objects of natural growth from penetrating the runway's imaginary surfaces.

The runway visibility zone (RVZ) also bounds a restricted area which must remain free from obstructions. The area is formed by imaginary lines connecting the runway visibility points located at prescribed distances from the intersection of the two runways. The RVZ provides an unobstructed line-of-site from any point five feet above one runway centerline to a point five feet above the intersecting runway centerline.

The construction of primary runway 16/34 to a length of 3,400 feet is proposed entirely for the first stage development period to satisfy the initial activity and is projected to be an adequate length for the 20-year planning period.

Airport Airspace Drawing

The airport airspace drawing is the second sheet of the airport layout plan and shows the airport imaginary surfaces in plan and profile, as outlined in Federal Aviation Regulations (FAR) Part 77, Objects Affecting Navigable Airspace. The plan view is drawn to a scale of 1" = 2000', with elevation contours of the imaginary surfaces super-imposed over a USGS 7 1/2 minute, a quadrangle map of the area surrounding the airport. The map identifies ground features in the vicinity of the airport and those physical features which may have an adverse effect on airspace. Items specifically noted include cities, highways, railroads, rivers, towers, grain elevators, and other terrain features which are significantly higher in elevation than the airport site.

Small scale profile views of the imaginary surfaces along centerline of each runway are also included on the drawing. The profile views depict the approach slopes and their relation to physical features of the terrain that exist beyond the runway ends.

Clear Zone Drawing

The clear zone drawing consists of large scale plan and profile views of the inner approach surface or clear zone for each end of each runway. The plan views, drawn to a scale of 1" = 200', show each runway and the respective clear zone at each runway end, along with pertinent ground features.

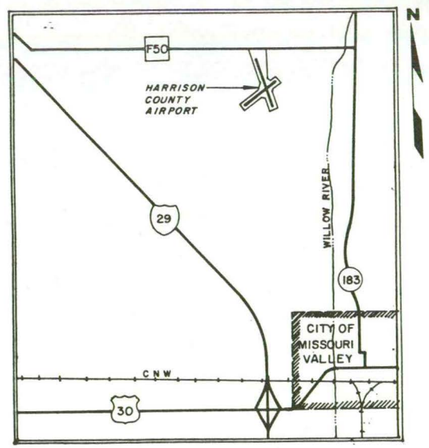
Directly below the plan views are drawn the respective profile views showing the planned approach slopes. The profiles extend a minimum of 1,000 feet beyond the runway ends at slopes of 20:1. Above-ground physical features, such as trees, power poles, roadways, buildings, etc. are identified in plan view and shown in profile in order to determine if any obstructions exist in the clear zone. There are no obstructions listed for any of the approach zones.

Terminal Area Drawing

The terminal area plan is drawn to give an overview of the proposed development of this area to a larger scale than that shown on the ALP. In the development of the plan, such items as surface drainage, surface access, available space, minimum clearance distances, grading, and ease of expansion were taken into account. Once the necessary features and their respective sizes were identified, areas were set aside for each. The next step was to determine where all the elements could best be located to provide safe, efficient aircraft operations in and around the terminal area.

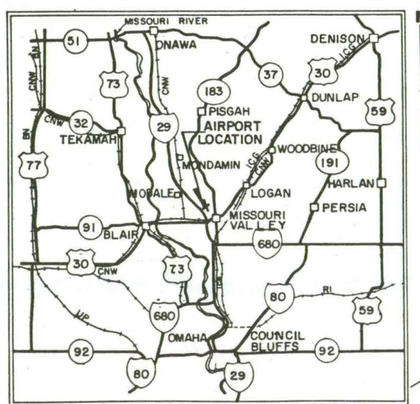
The airport entrance road extends southerly from paved Route F-50 directly into the center of activity for the terminal area for convenient access to the hangar, the administration building, and FBO facilities. Gravel surfacing should be adequate for the first stages of site development. A paved road and parking lot may be appropriate later on.

A major component of the new terminal area will be the apron area. The proposed size of 180′ x 230′ is adequate to accommodate some based and itinerant aircraft parking, plus ample space for refueling. The apron is considered to be the hub of the terminal area and will be bounded on the east side by the future maintenance hangar and administration building. The administration building is located on the south side of the terminal facilities for convenient access to the parking lot aircraft fueling and tie-down areas and to have the primary runway in full view to the south.



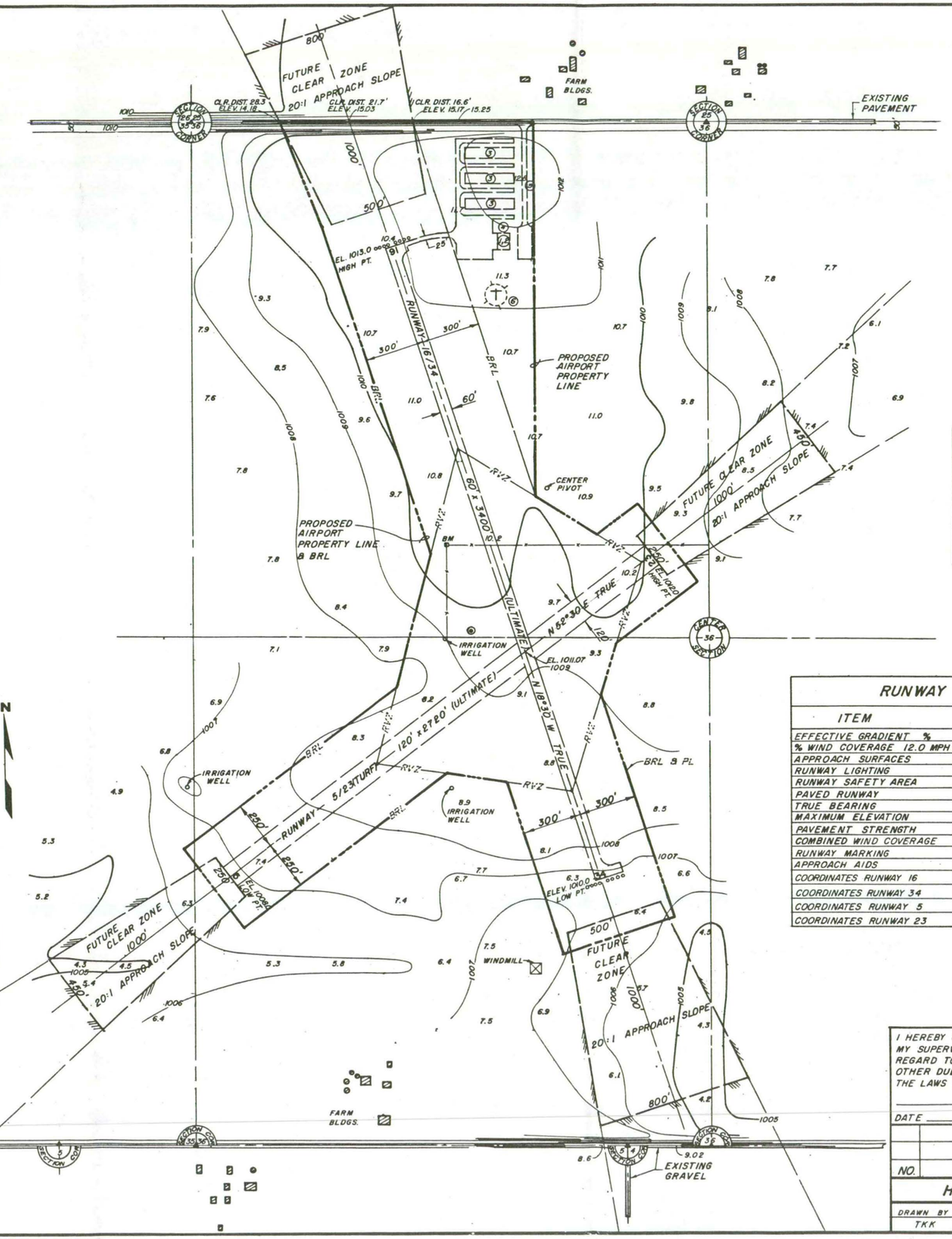
VICINITY MAP

1"=1mi. 0 1 2 3 scale miles



LOCATION MAP

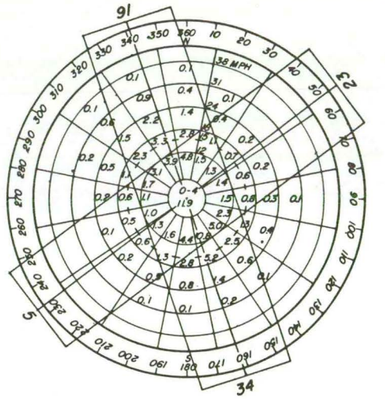
T=13mi. 0 13 26 scale miles



MAGNETIC DECLINATION 6°-28'
1970 VALUES

(TRUE) N

100 300 500
0 200 400 1000
SCALE IN FEET
SCALE 1" = 300'
CONTOUR INTERVAL OF ONE FOOT



SURFACE WIND VELOCITY
9 YEAR PERIOD 1951-1960 USWS
OMAHA, NEBRASKA

AIRPORT DATA

ITEM	EXISTING	FUTURE
ELEVATION DATUM	MSL	MSL
AIRPORT ELEVATION		1013
MEAN AVG. DAILY HI. TEMP.		87°F
ARP COORDINATES		41°38'26"N 95°56'13"W
NAVAIDS - AIRPORT		NDB
TAXIWAY LIGHTING & MARK.		MITL
NDB COORDINATES		41°38'08"N 95°56'08"W

WIND COVERAGE SUMMARY

RUNWAY	16/34	05/23	COMBINED
12 MPH	91.8	70.0	96.9

BUILDINGS

NO.	STRUCTURE
1.	FUTURE ADMINISTRATION & FBO
2.	FUTURE AIRCRAFT MAINTENANCE
3.	FUTURE HANGAR
4.	FUTURE LIGHT BEACON
5.	FUTURE RADIO BEACON (NDB)
6.	FUTURE WIND TEE & SEGMENTED CIRCLE

RUNWAY DATA

ITEM	RUNWAY 16/34 EXISTING	RUNWAY 16/34 FUTURE	RUNWAY 5/23 EXISTING	RUNWAY 5/23 FUTURE
EFFECTIVE GRADIENT %		0.0882%		0.1401%
% WIND COVERAGE 12.0 MPH		91.8		70.0
APPROACH SURFACES		20:1		20:1
RUNWAY LIGHTING		MIRL		LIRL
RUNWAY SAFETY AREA		150'x400'		120x270'
PAVED RUNWAY		60'x3400'		TURF
TRUE BEARING		N18°30'W		N52°30'E
MAXIMUM ELEVATION		1013.0		1012.0
PAVEMENT STRENGTH		12,500lbs.		NA
COMBINED WIND COVERAGE	12 M.P.H. 96.9 %			
RUNWAY MARKING		NPI		NA
APPROACH AIDS		PAPI-REIL		NONE
COORDINATES RUNWAY 16		41°36'26" N 95°56'20" W		
COORDINATES RUNWAY 34		41°36'11" N 95°53'03" W		
COORDINATES RUNWAY 5				41°36'11" N 95°53'38" W
COORDINATES RUNWAY 23				41°36'31" N 95°54'08" W

LEGEND

EXISTING	FUTURE	DESCRIPTION
—x—	—x—	FENCE LINE
1007	1007	GROUND CONTOURS
8.5		SPOT ELEVATIONS
		FACILITIES
		EASEMENTS
		PROPERTY LINE (FEE ACQUISITION)
BRL	BRL	BUILDING RESTRICTION LINE
◎	◎	ARP
•		POWER POLE
-☼-	-☼-	AREA LIGHTS
▲		SECTION CORNER
BM □	·	BENCH MARK
●●● ●●●	○○○○ ○○○○	RUNWAY THRESHOLD LIGHTS
		BEACON LIGHT
		ROADWAY DRAINAGE STRUCTURES
RVZ	RVZ	RUNWAY VISIBILITY ZONE
□□	□□	FUEL PUMPS
⊰○	⊰○	OBSTRUCTION LIGHT

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED UNDER MY SUPERVISION AND THAT ENGINEERING DECISIONS WITH REGARD TO THE DESIGN WERE MADE BY ME OR BY OTHER DULY REGISTERED PROFESSIONAL ENGINEERS UNDER THE LAWS OF THE STATE OF IOWA.

DATE _____ IOWA REG. NO. _____

NO.	REVISIONS	BY	APP'D	DATE

H. GENE McKEOWN & ASSOC.

DRAWN BY	DATE	APPROVED BY	DATE
TKK	JULY, 1987		

APPROVAL BLOCK

D.O.T. APPROVAL

TITLE OF D.O.T. APPROVING OFFICIAL _____ DATE

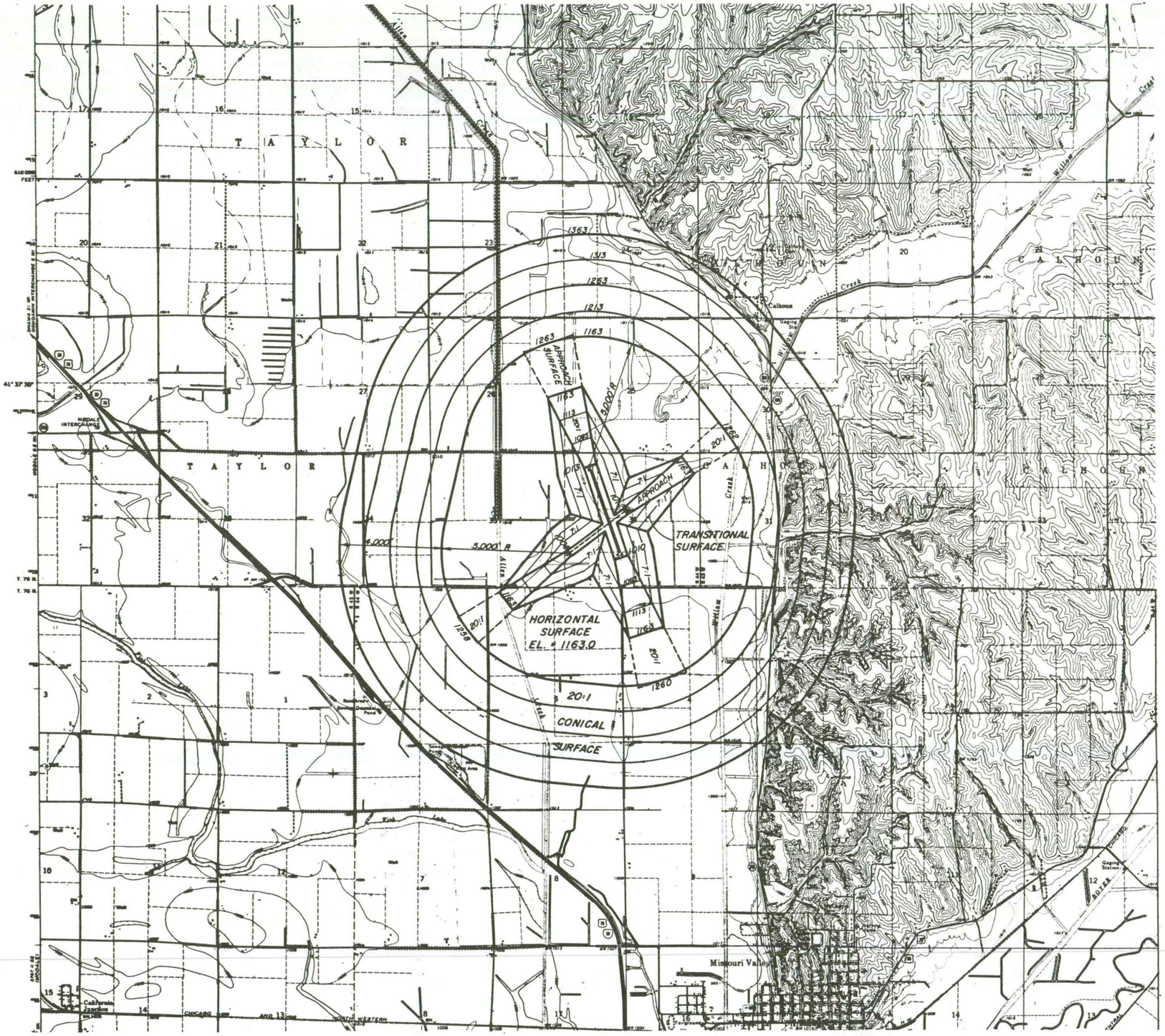
SPONSOR APPROVAL

TITLE OF ACCEPTING OFFICIAL _____ DATE

HARRISON COUNTY AIRPORT

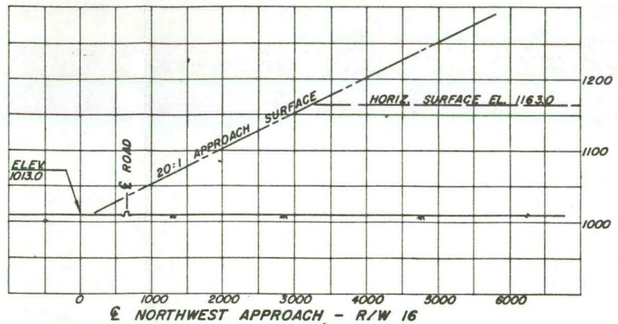
AIRPORT LAYOUT PLAN

FIG. 5-01 SHEET 1 OF 4

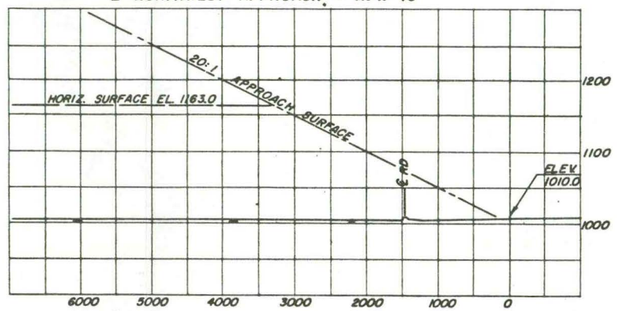


RUNWAY END PROFILES

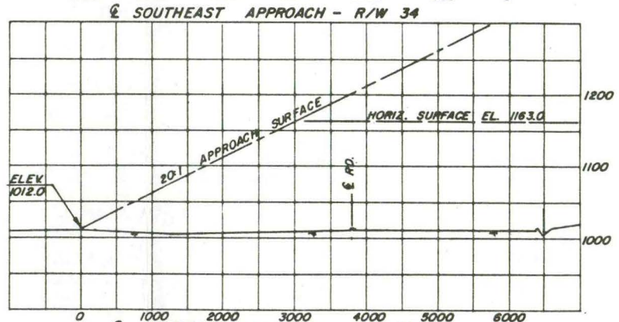
SCALE: 1" = 1000' HORIZ. @ 100' VERT.



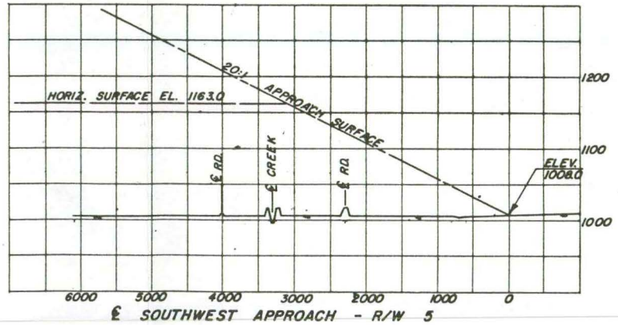
℄ NORTHWEST APPROACH - R/W 16



℄ SOUTHEAST APPROACH - R/W 34



℄ NORTHEAST APPROACH - R/W 23



℄ SOUTHWEST APPROACH - R/W 5

NO.	REVISIONS	BY	APPD.	DATE

H. GENE McKEOWN & ASSOC.

DRAWN BY	DATE	APPROVED BY	DATE
TKK	JULY, 1987		

HARRISON COUNTY AIRPORT

AIRPORT AIRSPACE DRAWING

FIG. 5-02 SHEET 2 OF 4

WINDOMILL GR. EL. = 1007.5 (40' HIGH)
500' PRIMARY SURFACE
PIVOT WELL
PROPOSED ℄ & BRL
CLEAR ZONE
1000'
20:1 APPROACH SLOPE
ELEV. 1010.0
1011.07
60' x 3400'
BRL
ELEV. 1013.0
CLR. DIST. 28.3' EL. 14.18 (3)
CLR. DIST. 21.7' EL. 15.03 (2)
CLR. DIST. 16.6' EL. 15.17 (1)
EXISTING GRAVEL ROAD
EXISTING PAVEMENT
200'
300'
500'
800'
N

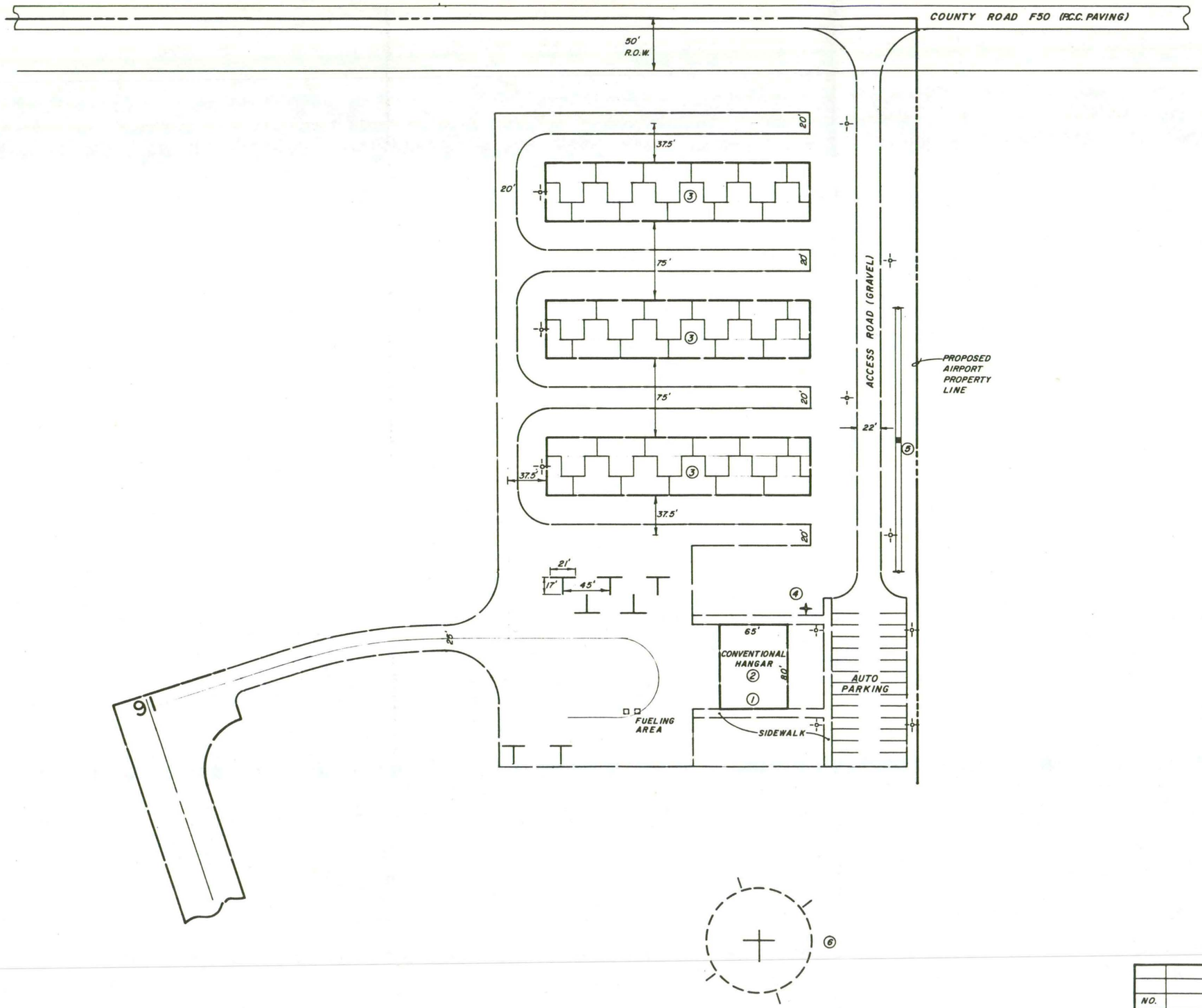
ELEV. 1060.0 AT END OF CLEAR ZONE
50:1 APPROACH SLOPE
℄ ROAD
EXISTING ℄ PROFILE
RUNWAY END 34 ELEV. = 1010.0
℄ CROSSWIND RUNWAY
RUNWAY END 16 ELEV. = 1013.0
ELEV. 1063.0 AT END OF CLEAR ZONE
20:1 APPROACH SLOPE
CLEAR DISTANCE = 21.7'

PIVOT WELL
250' PRIMARY SURFACE
ELEV. 1008.0
ELEV. 1011.7
120' x 2720' TURF
PROPOSED ℄ & BRL
CLEAR ZONE
1000'
20:1 APPROACH SLOPE
450'
250'

ELEV. 1058.0 AT END OF CLEAR ZONE
20:1 APPROACH SLOPE
RUNWAY END 5 ELEV. = 1008.0
℄ PRIMARY RUNWAY
RUNWAY END 23 ELEV. = 1011.7
ELEV. 1061.7 AT END OF CLEAR ZONE
20:1 APPROACH SLOPE
EXISTING ℄ PROFILE

HIGHWAY FEDERAL AID SHEET
PLATE 2-DOUBLE PLAN AND PROFILE-FULL DOT
"W" TELEDYNE
PRINTED IN U.S.A.

HARRISON COUNTY AIRPORT CLEAR ZONE PLAN & PROFILES
FIG. 5-03 SHEET 3 OF 4



N

SCALE: 1"=50'

LEGEND

EXISTING	FUTURE	DESCRIPTION
---x---	---x---	FENCE LINE
--100'--	--100'--	GROUND CONTOURS
8.5		SPOT ELEVATIONS
		FACILITIES
		EASEMENTS
		PROPERTY LINE (FEE ACQUISITION)
--BRL--	--BRL--	BUILDING RESTRICTION LINE
		ARP
		POWER POLE
		AREA LIGHTS
		SECTION CORNER
BM		BENCH MARK
		RUNWAY THRESHOLD LIGHTS
		BEACON LIGHT
		ROADWAY DRAINAGE STRUCTURES
RVZ	RVZ	RUNWAY VISIBILITY ZONE
		FUEL PUMPS
		OBSTRUCTION LIGHT

BUILDING TABLE

NO.	STRUCTURE	TOP ELEVATION		OBSTRUCTION MARKED	
		EXISTING	FUTURE	EXISTING	FUTURE
1	FUTURE ADMINISTRATION				
2	FUTURE A/C MAINTENANCE				
3	FUTURE HANGAR				
4	FUTURE LIGHT BEACON				
5	FUTURE RADIO BEACON (NDB)				
6	FUTURE WIND TEE & SEGM'TD CIRCLE				

NO.	REVISIONS	BY	APPD.	DATE

H. GENE McKEOWN & ASSOC.

DRAWN BY	DATE	APPROVED BY	DATE
TKK	JULY, 1987		

HARRISON COUNTY AIRPORT

TERMINAL AREA PLAN

FIG. 5-04 SHEET 4 OF 4

SECTION SIX

DEVELOPMENT SCHEDULE

Introduction

The Development Schedule is a listing of capital improvements needed at the airport over the twenty-year planning period. Where a new facility is being constructed, the first priority is the implementation of those facilities that will lead to airport certification. The development schedule is divided into two five-year phases and one ten-year phase.

1. Phase One: 1987-1991
2. Phase Two: 1992-1996
3. Phase Three: 1997-2006

Phase One activities would obviously involve those actions which will allow the airport to become operational. Safety and maintenance items would generally be given a lower priority since the facility represents new construction. Those development items, while desireable, but not critical to the operation of the airport, would generally be given a lower priority. There are a number of factors for which consideration needs to be given when assigning priorities to specific airport components. These considerations are as follows:

1. Absolute need to include safety and maintenance requirements.
2. Availability of grants-in-aid
   * Federal Aviation Administration
   * Iowa Department of Transportation
   * Other
3. Local financial constraints
4. Unforeseen changes in aviation activity within the twenty-year planning period.

In maintaining flexibility, the development schedule should be reviewed along with the aviation forecasts at five year intervals. Hangars may be constructed in a phase other than indicated since proposed hangar development is expected to be financed in part or wholly by the private sector.

The three development phases are described in terms of projects. Those projects having the highest priority were assigned to the first development phase while those having a lower priority were placed in the third development phase.

Phase One (One to Five Years)

Within Phase One, the first development project proposed is the acquisition of land in fee for the primary runway and terminal area. Easements for that area of the clear zone extending beyond airport property would also be obtained within the initial airport development project. Approximately 77 acres of land would be acquired in fee with an additional 22 acres in easement acquired for clear zone protection.

The second project within Phase One involves grading and drainage requirements necessary for the construction of the primary runway, taxiway, and apron. Also included is grading associated with the development of the airport access road and vehicle parking lot. A perimeter fence to enclose airport property would also be constructed in the second project.

The third project includes final subgrade preparation and paving of the primary runway, taxiway, and apron areas. The pavement areas would consist of a six inch granular base course and six inch P.C.C. paving. The paved areas would also be marked within this project. Subdrains would also be installed as required to provide required subsurface drainage.

The fourth project provides for the installation of landing and navigational aids. Landing and navigational aids to be installed within the fourth project include a rotating beacon, lighted wind cone, and non-directional radio beacon. Medium intensity edge lighting is proposed along the primary runway and taxiway. Threshold lights would be placed off each runway end. The third and fourth projects may be combined into a single project.

The fifth project would include the installation of a 5000 gallon underground fuel tank.

The sixth and final project proposed in Phase One is the construction of a ten-unit tee-hangar. The hangar may be constructed by the airport owner or private sector. The FBO shop/terminal building is proposed for construction in Phase Two. Consideration may be given to use of a tee-hangar space on an interim basis as the FBO shop.

Phase One will provide the Harrison County Airport Service Area with a public owned facility supporting a hard surface runway that is 3,400 feet in length and 60 feet in width. A non-precision approach to Runways 16 and 34 is planned. The primary runway would be lighted to include runway end identifier lights and a precision approach path indicator on Runways 16 and 34. Turnarounds would be constructed on each runway end. A connecting taxiway, 25 feet in width, would be constructed from RW 16 to the terminal area. The apron would accommodate five aircraft as well as provide queuing space for aircraft within the fueling area. A ten-unit tee-hangar would also have been constructed.

Phase Two (Six to Ten Years)

The construction of a conventional hangar is proposed within the period 1992 to 1996. The conventional hangar would be intended to accommodate the needs of a fixed base operator as well as provide space for terminal building functions. The latter would include a lounge area, restroom facilities, administrative office, and mechanical room. Other terminal area improvements would include sidewalk construction, apron lighting, fencing, and signage. A septic tank would also be installed within Phase Two. Construction of the FBO shop and area improvements would be accomplished within one project.

The second project would provide for the construction of a six-unit tee-hangar. No major improvements to the runway, taxiway, and/or apron are anticipated in Phase Two unless aviation demand would provide justification.

Phase Three (Eleven to Twenty Years)

Projects within the third phase may or may not be constructed within the twenty-year planning period. Such improvements would be constructed as need dictates and funding is available.

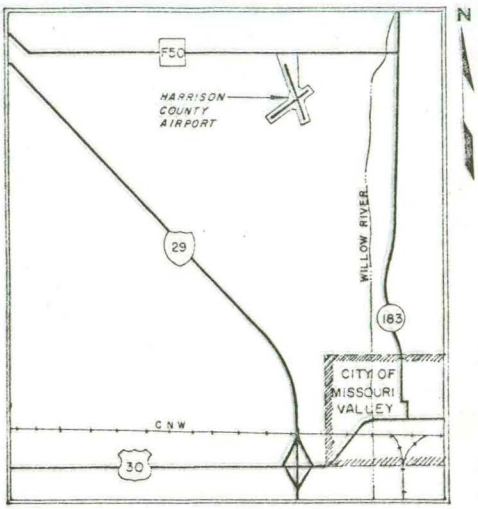
It is anticipated that the crosswind runway would be constructed sometime within the period of 1997-2006. The project would require the acquisition of 31 acres of land in fee. Clear zone protection would be provided by easement off each runway end.

Consideration may also be given to the construction of a partial parallel taxiway from RW 16 to the midpoint of RW 16/34. (The parallel taxiway would enhance the operational safety and capacity of the airport.) Apron expansion, to accommodate additional tie down spaces, would also be expected should aviation demand exceed forecast levels.

The development schedule proposed herein is intended to provide for the development of an airport facility that will satisfy aviation demand over a twenty-year period and beyond. Development priorities, while based upon safety and demand, must also be considered in terms of financial constraints.

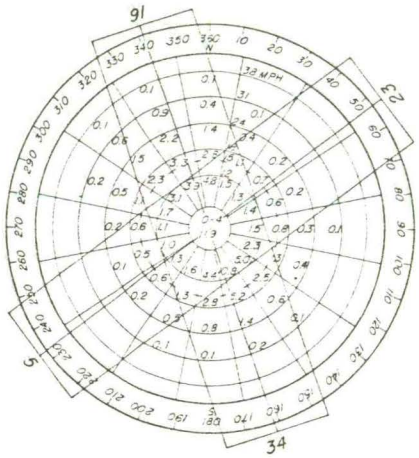
Development costs by item for Phase One and Two are summarized in Tables 6-1 and 6-2. No specific costs were prepared for development items contained within Phase Three. The cost within the 11 to 20 year period would be considered speculative. Actual construction costs by project will vary, depending upon several parameters, to include construction conditions, specification requirements, and time of construction.

ON 6°-28'

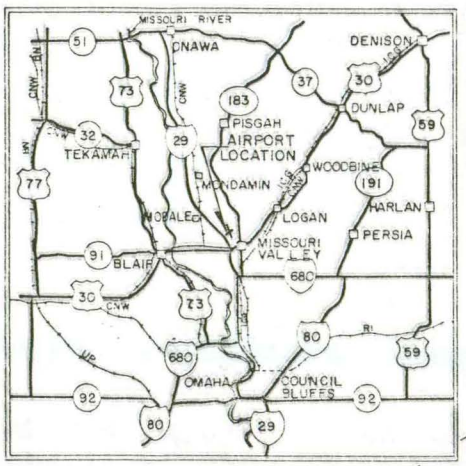


VICINITY MAP

1"=1mi. 0 1 2 3 scale miles



SURFACE WIND VELOCITY
9 YEAR PERIOD 1951-1960 USWS
OMAHA, NEBRASKA



LOCATION MAP

1"=13mi. 0 13 26 scale miles

LEGEND

PHASE ONE

- COUISITION FOR R/W 16/34, FEE-TITLE
- ZONE EASEMENTS FOR R/W 16/34
- RADING & DRAINAGE
- PAVING OF R/W 16/34, 60' X 3400'
- PAVING OF 25' CONNECTING D TERMINAL APRON 185' X 210'
- NG (MIRL) AND MARKING
- TIONAL AIDS - PAPI, REILS, OTATING BEACON, WIND CONE
- TER FENCING
- T TEE-HANGAR
- FUEL TANK

PHASE TWO

- AL/FBO BUILDING
- CESS/APRON EXPANSION
- TEE-HANGAR

PHASE THREE

- COUISITION FOR CROSSWIND R/W 5/23
- ZONE EASEMENTS FOR R/W 5/23
- G & DRAINAGE R/W 5/23
- NGAR EXPANSION, AS NEEDED

Y	APP. DATE	HARRISON COUNTY AIRPORT
SOC.		STAGE DEVELOPMENT SKETCH
DATE		FIG. 6-1

TABLE 6-1: PHASE ONE DEVELOPMENT COSTS

PHASE ONE DEVELOPMENT: 1987 - 1991

Description		Amount
1.	Land Acquisition	$ 150,000
	Fee title	11,500
	Easements	5,000
	Appraisals	3,000
	Land survey	7,500
	Land negotiations	2,000
	Legal, recording	17,000
	TOTAL ITEM ONE	$ 196,000
2.	Runway, Taxiway, Apron Grading	
	Excavation and grading	$ 66,000
	Seeding and fertilizing	21,000
	Fencing	21,000
	Driveway and parking surface	4,000
	Drainage, erosion control	20,000
	Contingencies	13,000
	Engineering, legal, and admin.	22,000
	TOTAL ITEM TWO	$ 167,000
3.	Runway, Taxiway, Apron Paving	
	Subgrade preparation	$ 30,000
	6" granular base	100,000
	6" P.C.C. paving	435,000
	Shouldering	3,500
	Seeding and fertilizing	6,000
	Marking	12,000
	Subdrains	37,500
	Contingencies	31,000
	Engineering, legal, and admin.	95,000
	TOTAL ITEM THREE	$ 750,000
4.	Lighting and Navigational Aids	
	Edge lights (MIRL)	$ 37,000
	PAPI	15,000
	REIL	10,000
	Radio control	2,000
	Electric vault	7,500
	Rotating beacon	5,000
	Lighted wind cone	2,500
	N.D.B.	5,000
	Contingencies	5,500
	Engineering, legal, and admin.	12,500
	TOTAL ITEM FOUR	$ 102,000

Description	Amount
5. Buried Fuel Tank	
5,000 gallon	$ 5,000
Dispenser, misc.	2,500
Contingencies	1,000
Engineering, legal, and admin.	1,500
TOTAL ITEM FIVE	$ 10,000
6. Hangar Construction, Tee	
Site preparations	$ 5,000
10-unit tee-hangar	125,000
Taxiways	45,000
Contingencies	5,000
Engineering, legal, and admin.	18,000
TOTAL ITEM SIX	$ 198,000
TOTAL PHASE ONE	$1,423,000

TABLE 6-2: PHASE TWO DEVELOPMENT COSTS

PHASE TWO DEVELOPMENT: 1992 - 1996

Description	Amount
1. Terminal/FBO Building	
Site preparation	$ 5,000
Terminal/FBO building	80,000
Contingencies	10,000
Engineering, legal, and admin.	11,000
TOTAL ITEM ONE	$ 106,000
2. Misc. Construction - FBO Access	
P.C.C. paving	$ 5,000
Apron lighting	3,000
Sidewalk	7,000
Security fence and signage	4,000
Septic tank	3,000
TOTAL ITEM TWO	$ 22,000
3. Hangar Construction, Tee	
Site preparation	$ 5,000
6-unit tee-hangar	75,000
Taxiway	45,000
Contingencies	5,000
Engineering, legal, and admin.	11,000
TOTAL ITEM THREE	$ 141,000
TOTAL PHASE TWO	$ 269,000

TABLE 6-3: PHASE THREE DEVELOPMENT ITEMS

PHASE THREE DEVELOPMENT: 1997 - 2006

1. Land Acquisition
   Land acquisition in fee (31 acres) and easement (15 acres) for crosswind runway

2. Runway Grading, Drainage, and Seeding
   Grading for crosswind runway (120′ x 2720′)
   Development of a turf runway (seeding)
   Seeding and fertilizing
   Runway markers or low intensity lights

3. Hangar Development
   As needed; by private sector

4. Apron Expansion
   As needed; turnaround lighting
   Additional clear zone easements

5. Parallel Taxiway
   Consideration may be given to the construction of a partial or full parallel taxiway. Based upon the forecast of activity and IDOT guidelines, construction of a full parallel taxiway would not be contemplated.

The total estimated capital cost to implement Phase One and Two is 1,692,000 dollars. In addition to the capital costs associated with the construction of airport facilities, the airport owner will also incur costs associated with the operation and maintenance of those facilities.

Recognizing local financial constraints of local governing bodies, alternative sources of funding must be examined in order to implement the capital facilities and provide for the maintenance of those facilities. Sources of funding include not only those generated by local governments but private sector sources as well. In addition, grants-in-aid available from State and Federal airport development programs represent additional sources of financial assistance. Development of public infrastructure should be undertaken to enhance not only public health and safety, but with the intent stimulating private investment as well.

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 tee-hangar facilities. Hangars benefit specific airplane owners. Consequently, it is reasonable to place 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 that it relieves the airport owner (sponsor) of the burden of financing private hangar facilities while retaining possession and control of all real property on the airport.

The proposed development strategy assumes that the private sector will construct the tee-hangar facilities and taxiway pavement within twenty (20) feet of the hangar. The private sector would be encouraged to construct a ten-unit tee-hangar in Phase One and a six-unit tee-hangar in Phase Two.

1. Tee-hangar construction, 10 units $198,000 (Phase One)
2. Tee hangar construction, 6 units $141,000 (Phase Two)

Private sector investment within the first two phases is expected to total 339,000 dollars.

Another alternative available would include a joint effort between the private sector and public sector. The latter may be required in some cases where the income generated from the rental of hangar stalls is insufficient to cover annual amortization costs.

After a 10 to 15 year amortization period, the hangars constructed by the private sector would become airport property. Revenue generated from hangar rental would at this point be available to the airport owner.

Airport Maintenance

The primary emphasis of the Airport Development Plan is placed upon identifying those facility needs required to bring the airport to 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 corrected immediately. A daily airport inspection program should be established and deficiences noted. This action should be undertaken by the airport manager with deficiencies reported to the Airport Board or Authority for correction.

Annual O & M Costs

An annual budget for the following items would need to be established: grounds maintenance, insurance, electrical power, snow removal, and administrative serives. The private sector would be expected to incur costs associated with building maintenance.

Since the facilities would be newly constructed, major expenditures for maintenance should be minimal. Runway marking and maintenance of the runway light system would involve annual inspection. The basic components (runway pavement, etc.) are expected to have a life extending over the 20-year planning period should adequate maintenance be provided.

An annual O & M budget of 25,000 dollars may be required to satisfy annual operating expenses. There are a number of variables of which the salary paid to the airport manager and/or FBO subsidy required are the more salient. Many of the smaller general airports have difficulty in attracting and maintaining an FBO without providing some subsidy. Most often, the FBO manages the daily operations of the airport in return for use of the terminal office and conventional hangar(s). In some situations, a dwelling unit is located on the airport and occupied by the FBO.

The annual O & M budget would generally contain the following line items.

- Grounds maintenance to include snow removal and mowing
- Insurance to include liability coverage
- Telephone, postage, travel
- Utilities to include electrial power, and heating fuel
- Administrative supplies, advertising
- Maintenance of radio, landing and navigational equipment
- FBO services contract and/or compensation for the airport manager
- Pavement marking and minor pavement repair

The FBO contract should identify specific services to be provided.

- Hours of operation
- Aircraft maintenance
- Airplane rental
- Pilot training

Consideration may also be given to contracting with an area FBO and/or Air Taxi operator to manage the airport. Contact should be made with operators located in Denison, Council Bluffs, and other communities to determine interest.

Funding

The development scenario described in Section Six proposes implementation of airport facility components in stages over a twenty-year period. Project implementation would appear feasible only with State and Federal assistance. Consequently, a realistic strategy for implementation must assume State and Federal assistance.

Generally, the airport must have at least ten (10) based aircraft or be designated as a state system airport to be placed in the National Plan of Integrated Airport System, (NPIAS). In addition, the proposed actions must have been found environmentally acceptable in accordance with Public Laws 91-190, 91-258, and 90-495. An environmental review would be required for new airport land acquisition, runway expansion, or a project which would accommodate larger aircraft (reference FAA Order 1050.1C).

The strategy for implementation assumes a combination of State, Federal, and private investment.

As previously noted, the private sector is expected to construct and maintain hangar facilities. The local share (sponsor) may come from the following sources:

1. Private Contribution, Local Development Corporation
2. General Obligation Bonds
3. Revenue Bonds
4. Annual levy not to exceed 27 cents per 1,000 dollars of assessed valuation (Airport Authority)

The airport is expected to generate little revenue. Some revenue may be generated from fuel flowage fee and cropping. Revenue may also be generated from hangar rental provided the hangars are constructed by the airport owner. Therefore, little airport generated revenue is expected to be available for capital projects. Airport generated revenue would typically be used to off set annual O & M expenditures.

Federal Assistance

The Federal Airport Act of 1946 created the Federal-Aid Airport Program (FAAP) and a National Airport Plan (NAP). The Airport and Airway Development Act of 1970 repealed FAAP and NAP programs and established the Airport Development Aid Program (ADAP) and National Airport System Plan (NASP). Public law 97-248 (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). Airports in Iowa have benefited from the various federal airport assistance programs since FAAP was created in 1946.

The Airport and Airway Trust Fund created in 1970 as a repository for the tax monies paid by aviation users supports federal programs. The primary source of revenue is generated by a eight (8) percent tax on passenger tickets. Other sources include a tax on freightway bills, international departures, and general aviation fuel. Trust fund outlays were projected to increase from two billion in 1983 to 3.9 billion dollars in 1987.

At present, the Federal Aviation Administration provides grants-in-aids up to 90 percent of the project cost on eligible items. In general, eligible items include all airport requirements except those which specifically benefit the private sector. For example, hangar facilities and the taxiway 20 feet out from the hangar are not eligible. Vehicle parking lots are not eligible nor are terminal buildings except at Commercial Service Airports.

State Assistance

The Iowa Department of Transportation provides assistance for airport improvements at those airports included in the State System of Airports.

At the present time, the rate of participation is 70 percent on eligible items. Airport components eligible for assistance are the same as those eligible for Federal assistance. Sources of aviation revenue are noted as follows:

1. Unrefunded gas tax (Iowa tax)
   A. 13 cents per gallon
2. Aircraft registration fees
   A. Commercial: $35/aircraft
   B. General aviation:
      Year 1 - 1.5% of list price
      Year 2 - 75% of first year
      Year 3 - 50% of first year
      Year 4 - 25% of first year
      minimum $15/aircraft

Estimated resources available for airport development in Iowa are shown in Table 6-4 for years 1985 through 1990.

IOWA AIRPORT IMPROVEMENT PROGRAM
ESTIMATED RESOURCES AVAILABLE [1]
$000's

AIR CARRIER	1985	1986	1987	1988	1989	1990
Federal (90%) [3]	2,893	3,119	3,360	3,495	3,633	3,800
Local Match (10%) [4]	321	346	373	388	403	422
Total	3,214	3,462	3,733	3,883	4,036	4,222
GENERAL AVIATION & OTHER COMMERCIAL SERVICE						
Construction						
Federal-formula (90%)	1,512	1,686	1,686	1,686	1,686	1,686
-discretionary (90%)	800	800	800	800	800	800
Local Match (10%) [4]	256	276	276	276	276	276
Subtotal	2,568	2,762	2,762	2,762	2,762	2,762
State (70%)	1,085	1,140	1,190	1,230	1,275	1,323
Local Match (30%) [4]	465	488	510	527	546	567
Subtotal	1,550	1,628	1,700	1,757	1,821	1,890
Total Construction	4,118	4,390	4,462	4,519	4,583	4,652
Safety						
State (50%) [5]	60	60	60	60	60	60
Local Share (50%)	60	60	60	60	60	60
Total	120	120	120	120	120	120

Notes: [1] This does not include possible federal-aid discretionary funds for reliever airports.
[3] This amount is the sum of the allocations for 4 locations.
[4] Includes only estimates of local funds needed to match federal and state funds. Does not include 100% locally financed improvements.
[5] State funds reserved for cooperative safety improvements, 50% state; 50% local.

TABLE 6-4: IOWA AIRPORT IMPROVEMENT PROGRAM RESOURCES

STRATEGY FOR IMPLEMENTATION

Airport Ownership

Methods of airport ownership are defined in Chapter 330 of the Iowa Code. Cities and counties within the State may own and operate an airport facility.

> 330.2 Powers: Counties and townships may acquire, establish, improve, maintain, and operate airports, either within or without their limits.....

Chapter 330A of the Iowa Code provides for the establishment of Aviation Authorities.

> 330A.3 Creation: Two or more municipalities may, under the provisions of this chapter, enter into an agreement creating an authority.....
>
> The term municipality means any county or city.

The proposed airport may then be owned by a single political subdivision of government or jointly as provided for in Chapter 330A. Since benefits from the airport generally extend beyond that of a single city, the most appropriate basis of support in Iowa would be provided by the county or through an aviation authority.

The ownership and operation of the proposed airport should, as discussed herein, be through an aviation authority made up of those municipalities within the airport service area.

Incorporated Communities

1. Dunlap
2. Logan
3. Magnolia
4. Mondamin
5. Pisgah
6. Persia
7. Missouri Valley
8. Woodbine
9. Modale
10. Little Sioux

County

11. Harrison

Eleven public entities within the airport service area may elect to join the authority. Participation in the authority may be made by resolution and giving public notice. Withdrawal can be accomplished in the same manner. Member municipalities may, by ordinance, provide for the assessment of an annual levy not to exceed 27 cents per 1000 dollars of assessed value upon all the taxable property in such minicipality for a period not to exceed 40 years.

The authority is granted by Code a wide range of powers necessary to operate and maintain the facility. The powers include but are not limited to the following: to acquire, hold, construct, improve, maintain, operate and own an aviation facility to fix and collect fees, to borrow money, to issue bonds and notes, to enter into contracts, to sue and be sued, to employ technical experts, and to have the power of eminent domain.

Property used by the Authority is exempt from taxes and assessments. The tax exempt status also applies to all forms of income received and the bonds issued by the Authority.

A municipality may enter into a cooperation agreement with the Authority for the purpose of making a loan, gift, grant or contribution. A municipality may also convey real or personal property.

Authority Creation

Step 1 - Member Municipality Procedures

The creation of an Authority requires two or more municipalities (any city or county) agree to form an Authority. The formal procedure requires that each member municipality do the following:

1. Each municipality must adopt a resolution signifying its intent to participate in the creation of the Authority. The resolution must be published once in a newspaper at least 14 days before the meeting. The resolution must state the following:

   A. Intention to join in the creation of an Authority pursuant to the provisions of Chapter 330A.

   B. The names of other municipalities which have expressed their intention to join in the creation of the Authority.

   C. Number of committee members to be appointed from such municipality.

   D. Name of Authority.

   E. Place, date, and time of hearing.

2. After the hearing, and if in the best interests of the municipality, the municipality shall enact an ordinance authorizing the joining of the Authority.

3. Each member municipality shall appoint one person per 50,000 population or fraction thereof to a committee. The county shall compute its representation on the unincorporated area population. No official or employee of the member municipality shall be appointed to the committee. The appointee serves a 6 year term and shall be a resident of the municipality they represent. Except for financial support and cooperation efforts the direct responsibility of the member municipality for the further organization and operation of the authority ends here.

Step 2 - Committee Procedures

The Committee's purpose is to elect the Airport Authority board members and to advise the aviation board on matters with respect to the needs and operation of the Authority.

1. Besides the ongoing function of advising the airport board, the Committee has the following duties:

   A. The Committee shall elect one of its members as a chairperson and another as secretary. Each officer shall serve a two-year term.

   B. The Committee members shall also elect in separate ballots from among their membership seven persons to serve on the airport Authority Board. However, the Board may be larger if there are more than seven member municipalities. Each municipality shall be represented on the Board.

      a. Committee members elected to the board shall resign from the Committee.

      b. Where the Committee consists of less than seven members such committee shall elect sufficient nonmembers so that the Board consists of seven members.

      c. No official or employee of any member municipality is eligible for election to the Board.

      d. Board terms at creation
      first two persons elected - 5 years
      next three persons elected - 3 years
      next two persons elected - 1 year
      as terms expire each successor shall be five years

Step 3 - Board

The Board shall be the governing body of the Authority and empowered to all the rights, duties, and powers conferred by Chapter 330A.

1. The Board shall also elect from its membership a chairperson, secretary, and treasurer. Each officer shall be bonded and serve a two year term.

2. All actions by an Authority shall requrie majority vote of the Board as it may exist at the time.

Project Implementation

Outlined below is a single strategy for the first five-year period. Other strategies may be developed in response to funding constraints and program requirements. Project development assumes participation by the Iowa Department of Transportation and Federal Aviation Administration. The local share represents the cost to the airport owner. The State and Federal share represents grants-in-aids.

TABLE 6-5: PHASE ONE DEVELOPMENT STRATEGY

ITEM	LOCAL	STATE	FEDERAL	TOTAL
A. PUBLIC SECTOR				
1. Land Acquisition	19,600	---	176,400	196,000
2. Runway Taxiway, Apron Grading	50,100	116,900	---	167,000
3. Runway, Taxiway, Apron Paving	75,000	---	675,000	750,000
4. Lighting and Navigational Aids	30,600	71,400	---	102,000
5. Fuel Tank	10,000	---	---	10,000
SUBTOTAL - PUBLIC SECTOR	185,300	188,300	851,400	1,225,000
B. PRIVATE SECTOR				
1. 10-Unit Tee-Hangar	---	---	---	198,000
SUBTOTAL - PRIVATE SECTOR				198,000
TOTAL PHASE ONE				1,423,000

Public sector costs within Phase One is expected to total 1,225,000 dollars. The scenario above assumes that a grant-in-aid totaling 851,400 dollars would be obtained from the FAA over the five-year period. An additional 188,300 dollars would be applied for through IDOT. The local airport owner would be obligated to provide the required match, 185,300 dollars. The local airport owner match and grants-in-aid is expected to induce a 198,000 dollars investment by the private sector for the construction of a hangar facility.

Phase Two projects include construction of the FBO/Terminal facility and a six-unit tee-hangar.

TABLE 6-6: PHASE TWO DEVELOPMENT STRATEGY

ITEM	LOCAL	STATE	FEDERAL	TOTAL
A. PUBLIC SECTOR				
1. Terminal/FBO Facility	106,000	---	---	106,000
2. Misc. Construction	22,000	---	---	22,000
SUBTOTAL - PUBLIC SECTOR	128,000	---	---	128,000
B. PRIVATE SECTOR				
1. 6-Unit Tee-Hanger				141,000
SUBTOTAL - PRIVATE SECTOR				141,000
TOTAL PHASE TWO				269,000

None of the items within Phase Two are eligible for a grant-in-aid, (IDOT/FAA). The airport owner would be expected to construct the FBO shop and terminal building. The private sector, as in Phase One, would be expected to construct the six-unit tee-hangar.

Within the first ten years, the following expenditures for capital projects would have been made.

Local public/airport owner	$313,000
IDOT Grant-in-aid	$188,300
FAA Grant-in-aid	$851,400
Private sector	$339,000

Financing of the local public share by the Airport Authority would require a tax levy. The levy would not only be required for debt service but to meet annual O & M expendiutres. An illustration of funding required is provided below given a ten year amortization period and an interest rate of eight percent.

Capital Project Amortization	
Phase One (0 - 5 years)	
Local public share of capital costs	185,300 dollars
Amortization	10 years
Interest rate	8 percent
Constant annual payment	22,447 dollars
Phase Two (6 - 10 years)	
Local public share of capital costs	128,000 dollars
Amortization	10 years
Interest rate	8 percent
Constant annual payment	15,506 dollars

The funds required within the first five years on an annual basis would total 47,447 dollars. Adding the capital expenditures in Phase Two would require an additional 15,506 dollars in annual revenue or on an annual basis, approximately 62,953 dollars over a five-year period. Assuming no additional capital projects after ten years and no increase in annual O & M expenditures, 40,506 dollars in annual funds would be required in the third five-year period.

The assessed and net valuation of the political subdivisions within Harrison County are noted in Table 6-7.

TABLE 6-7: ASSESSED AND NET VALUATION, POLITICAL SUBDIVISION, 1987

A. MUNICIPAL CORPORATION	100% VALUATION	NET VALUATION	PERCENT OF TOTAL NET
1. Dunlap	18,964,625	15,664,533	3.8
2. Logan	22,167,045	18,164,438	4.4
3. Magnolia	1,993,109	1,552,145	0.4
4. Mondamin	4,966,232	4,045,756	1.0
5. Pisgah	3,562,630	2,885,467	0.7
6. Little Sioux	1,238,004	915,604	0.2
7. Modale	4,600,829	3,794,420	0.9
8. Persia	4,016,402	3,231,698	0.8
9. Missouri Valley	38,592,577	31,498,314	7.6
10. Woodbine	24,658,767	20,229,276	4.9
TOTAL CORPORATION	124,760,220	101,981,851	24.7
B. RURAL COUNTY	324,330,125	310,230,107	75.3
C. TOTAL COUNTY	449,090,345	412,211,958	100.0

SOURCE: COUNTY AUDITOR, HARRISON COUNTY, January 1, 1987

The total net taxable valuation for Harrison County as of January 1, 1987 was 412,211,958 dollars. Of the total, 24.7 percent of the net valuation was within the ten municipal corporations. The remaining 75.3 percent was within the rural (unincorporated) area of the County.

TABLE 6-8: VARIABLE LEVY - AIRPORT AUTHORITY

	NET TAXABLE VALUATION 412,211,958
27 Cents Per 1000 Dollars	111,297
25	103,053
23	94,809
21	86,565
19	78,320
17	70,076
15	61,832
13	53,588
11	45,343
9	37,099

SOURCE: RDG, 1987

Assuming that the maximum levy of 27 cents per 1000 dollars were applied to the net taxable, some 111,297 dollars would be generated. An amount considerably less than the maximum levy would enable the Airport Authority to amortize the capital costs and meet annual O & M costs. The preceeding table illustrates funds generated by applying variable levy amounts. A levy somewhere between 13 and 17 cents would provide sufficient funding assuming that grants-in-aid were available and all political subdivisions in the County participated.

TABLE 6-9: ANNUAL FUNDS NEEDED

ANNUAL O & M	CAPITAL DEBT SERVICE	TOTAL	LEVY REQUIRED
25,000	30,000	55,000	.1334
25,000	32,000	57,000	.1383
25,000	34,000	59,000	.1431
25,000	36,000	61,000	.1479
25,000	38,000	63,000	.1528

SOURCE: PDS, 1987

Table 6-9 provides an illustration of levy requirements given an increasing debt service requirement. The local debt service would increase should actual construction costs exceed the estimates used herein. Other factors would include a higher rate of interest, greater state participation (70%) as opposed to Federal (90%) participation on selected projects and construction of hangars by the Airport Authority rather than by the private sector.

The Airport Authority may also elect to establish a levy slightly greater than needed so as to have available revenue to meet unforseen maintenance costs. Another alternative is to create and maintain a capital project fund so as to have available the local match.

The Airport Authority is recommended as the most appropriate form of ownership.