AIRPORT DEVELOPMENT PLAN

FOR THE

BELLE PLAINE MUNICIPAL AIRPORT

BELLE PLAINE, IOWA

CGA
CONSULTING ENGINEERS
MARSHALLTOWN
IOWA

PN 4066.03

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I - COMMUNITY AND AIRPORT BACKGROUND

COMMUNITY AND AIRPORT BACKGROUND

INTRODUCTION:

The City of Belle Plaine created an airport study committee to determine the feasibility of constructing an airport to serve the City of Belle Plaine and immediate hinterland. A grant-in-aid was obtained from the Iowa Department of Transportation (IDOT) to prepare an estimate of potential aviation activity. The firms of Professional Design Services of Iowa Inc. (PDS) and Clapsaddle-Garber (CGA) were retained to carry out the scope of work. Specific objectives of the scope are summarized as follows:

- To summarize relevant socio-economic background data,
- To define an airport service area,
- To prepare an estimate of the potential numbers of based aircraft that might be based at a Belle Plaine facility should one be constructed,
- To prepare an estimate of aviation operations for a 20 year period,
- To determine the type of airport facility needed to meet estimated aviation demand levels.

The major decision point is found upon conclusion of the forecast of aviation activity. The City of Belle Plaine, based upon the estimates provided herein, may conclude that:

- Sufficient aviation activity exists to justify continuation of study efforts to include the selection of an airport site.
- Estimated aviation demand and secondary benefits are insufficient to justify continued evaluation.

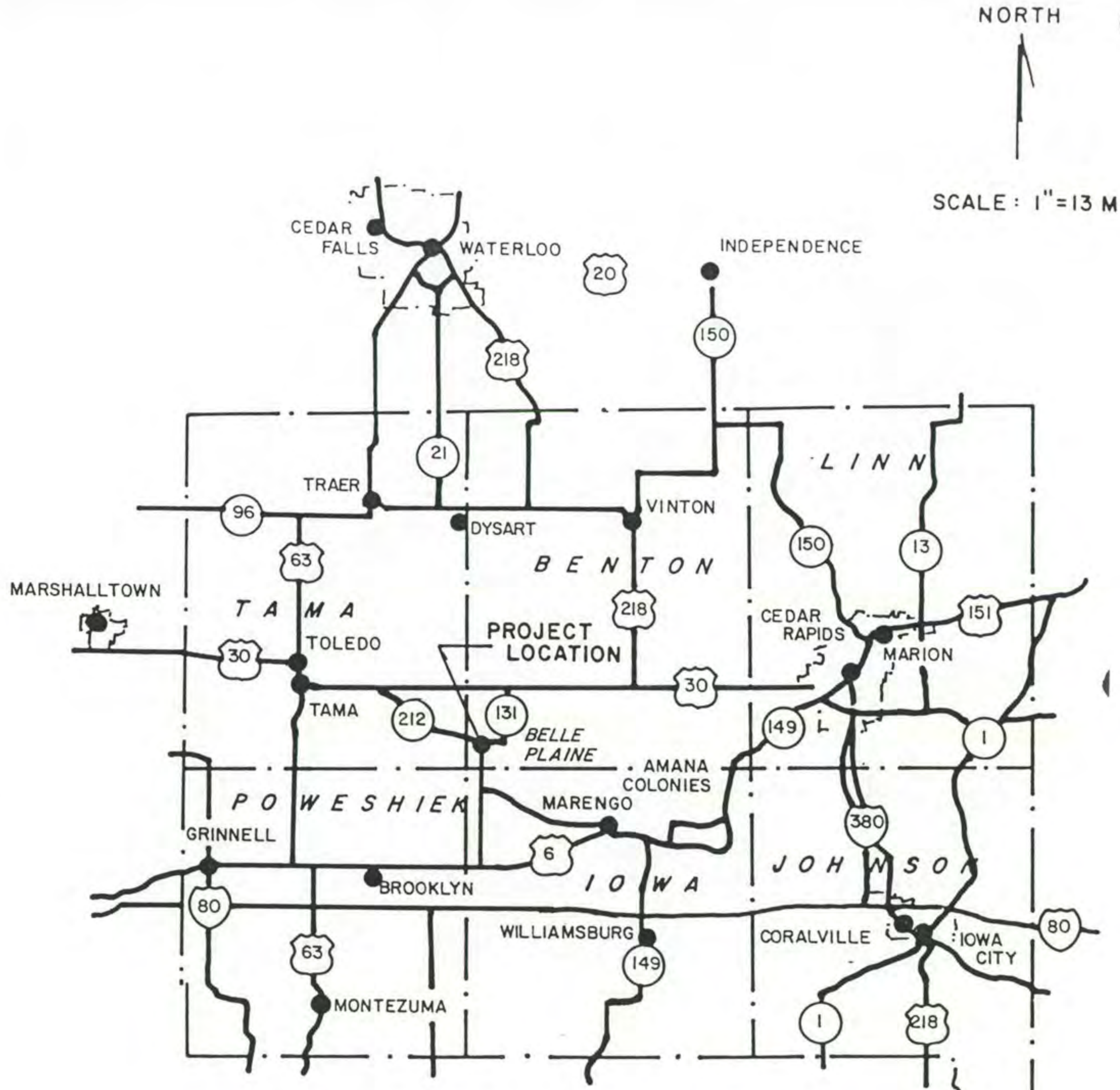


FIGURE :1-1 PROJECT LOCATION

The ultimate decision is a local one. The IDOT will provide input concerning the role, if any, a Belle Plaine facility may have within the state system of airports. Inclusion within the state airport system is required before the facility is eligible for state development assistance (except for safety type improvements).

The report is presented in Two sections, the first of which summarizes relevant background information used in the preparation of the forecast of aviation demand.

COMMUNITY CHARACTERISTICS

PHYSICAL SETTING:

The City of Belle Plaine is located in the extreme southwest part of Benton County on State Highway 21 approximately 15 miles north of Interstate Highway 80 and 5 miles south of U.S. Highway 30. The main east-west line of the Chicago and Northwestern Railroad passes through the Community. Cedar Rapids is located 34 miles east of Belle Plaine via U.S. Highway 30. Vinton, the county seat, is located 28 miles to the northeast via U.S. Highways 30 and 218. Reference may be made to Figure 1-1.

The most notable physical features noted are the Iowa River and Salt Creek valleys. The location of Belle Plaine at the intersection of the two valleys provides for varied topography ranging from the level flood plain areas to upland ridges and stream benches. The highest point in the community is approximately 950 feet above sea level. The lowest point is found along the valley floors at approximately 770 feet above sea level.

The landscape in the Belle Plaine area consists of thick deposits of glacial rock deposited by the Kansas Glacier. These deposits are covered by a variable layer of loess. Sand and gravel deposits along the Iowa River and Salt Creek provide a source for the community's water supply.

Climatic conditions are classified as humid continental with large seasonal and daily variations in temperature. The average winter temperature is 23.8° F. The average summer temperature is 72.2° F. The mean maximum temperature is approximately 86.7° F. (Waterloo).

HISTORIC SETTING:

The primary impetus for the growth of Belle Plaine came with construction of the Cedar Rapids and Missouri River Railroad which was latter absorbed by the Chicago and Northwestern. The original town of Belle Plaine was platted in 1862. Continued development of railroad activities and designation of the community as a division headquarters was the major factor contributing to a rapid population growth. The railroad along with the development of the agricultural hinterland contributed to the establishment of a diversified retail and service sector.

SOCIOECONOMIC BACKGROUND:

The population grew steadily from 1,488 persons in 1870 to some 3,887 by 1920. Beginning in the 1920s, railroad activity began to decrease. With the relocation of division headquarters and the closing of maintenance facilities, the community experienced a gradual loss of population through 1970 when 2810 persons resided in the community. However, the five decades of population loss was reversed in the 1970s. The U.S. Census of Population recorded 2903 residents in 1980 for a 3.3 percent increase over 1970. Reference may be made to Table 1-1.

TABLE 1-1: COMPARATIVE POPULATION, 1890 - 1980

Year	Population	%Change	Year	Population	%Change
1890	2,623		1940	3,202	-1.1
1900	3,283	25.2	1950	3,056	-4.6
1910	3,121	-4.9	1960	2,923	-4.4
1920	3,887	24.5	1970	2,810	-3.9
1930	3,239	-16.7	1980	2,903	3.3

SOURCE: U.S. Census of Population

Population change is attributed to fertility, mortality and migration. The out-migration of persons of child bearing years will have a pronounced impact upon future population growth. The 1979 Comprehensive Plan Update suggests that the community may experience a modest rate of growth through the year 2000 provided that the out-migration of families of child-bearing years is reduced.

> "Continued population decline can only be prevented by increasing the number of young families in the community, either through reducing out-migration of this group, or encouraging the in-migration of younger families from outside. Using a lower out-migration rate in a cohort component calculation, it was determined that Belle Plaine's population could be stablized if out-migration in the 15-29 age group could be reduced by one-half."

SOURCE: "1979 Comprehensive Plan Update" p.32

To reduce the out-migration of the 15 to 29 age group or to encourage in-migration, new job opportunities must be created within the community or near by communities within commuting distance.

The 1979 Comprehensive Plan Update suggests that the community's population will increase approximately 3 percent per decade to 3000 persons in 1990 and 3100 by 2000.

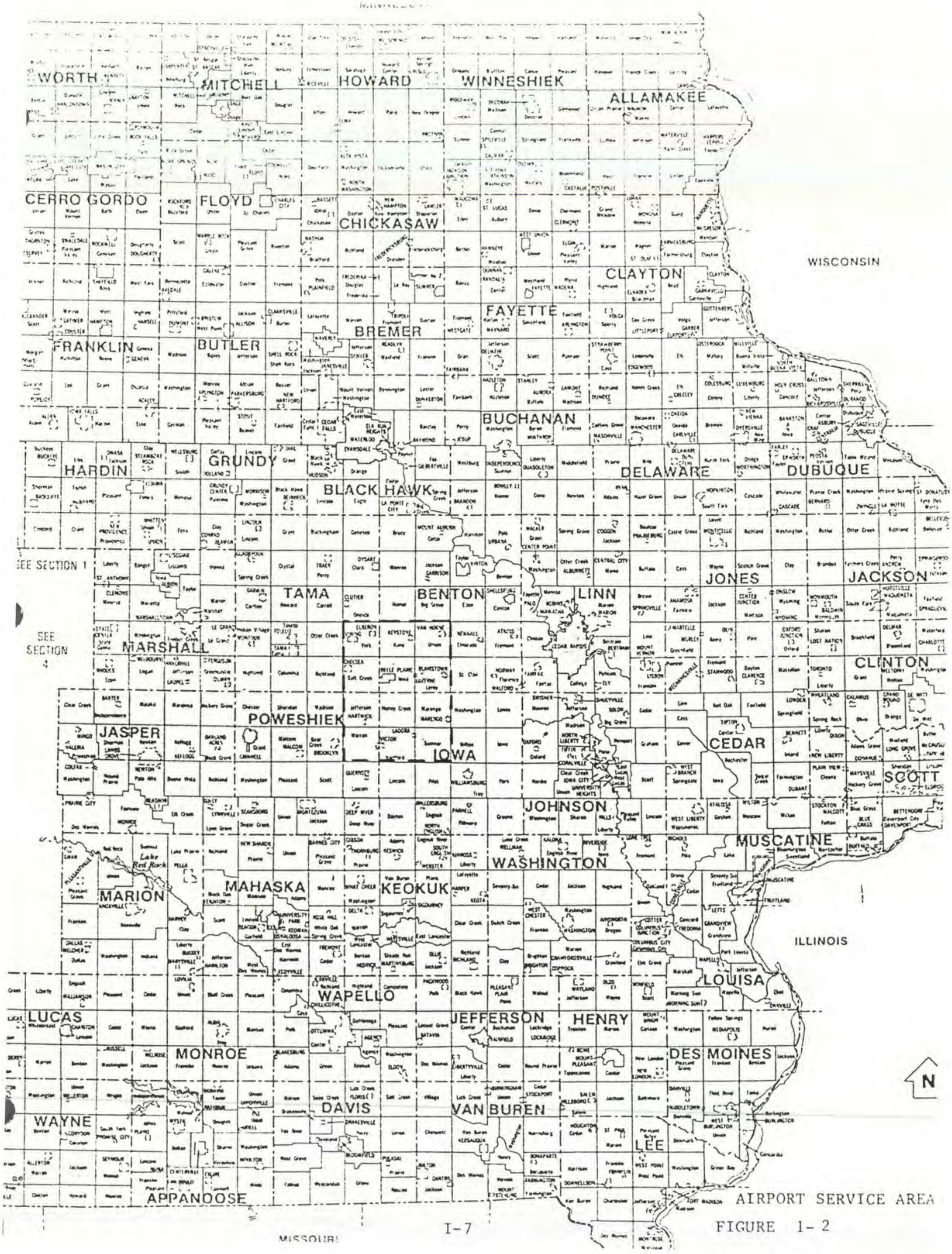
Population trends within Benton County and five area Counties are summarized in Table 1-2. As noted, Benton County is expected to experience a 1.1 percent increase in population from 1980 to 2000. Tama County is expected decline in population through 2000 while Iowa and Poweshiek Counties are anticipated to record little change over their 1980 population level. Linn and Johnson Counties are expected to record population increases of 4.0 percent and 8.6 percent respectively by the year 2000.

TABLE 1-2: POPULATION TRENDS, SIX COUNTIES, 1980 - 2000

COUNTY	1980	1985	1990	1995	2000
Benton	23,649	24,350	25,131	25,802	26,320
Iowa	15,429	15,132	15,382	15,542	15,661
Poweshiek	19,306	19,415	19,558	19,606	19,590
Tama	19,533	18,379	18,480	18,572	18,736
Linn	169,775	164,641	170,121	174,227	176,713
Johnson	81,717	83,098	85,133	86,814	88,759
TOTAL	329,409	325,015	333,805	340,563	345,779
Benton County As % of Total	7.2%	7.5%	7.5%	7.6%	7.6%

SOURCE: Provisional Population Projections - Nov. 1982
East Central Iowa Council of Governments

The 6 county region is expected to record an overall population increase throughout the next 20 years. In 1980 7.2 percent of the regional



AIRPORT SERVICE AREA

FIGURE 1-2

population resided in Benton County. By the year 2000, this number is expected to increase to 7.6 percent (of the regional total).

Table 1-3 summarizes population changes within the immediate service area of Belle Plaine. The immediate service area is depicted in Figure 1-2 and includes 12 townships and 12 communities. The immediate service area population in 1980 was 19,665.

TABLE 1-3: AIRPORT SERVICE AREA POPULATION

Area	1960	Year 1970	1980	% of County
Benton County - 23649				
-Townships				
Iowa	527	505	441	
Kane	1056	986	942	
Union	1022	1002	1027	
Leroy	1157	1140	1153	
-Communities				
Belle Plaine	2923	2810	2903	
Luzerne	466	358	316	
Blairstown	583	612	695	
Van Horne	554	613	682	
Keystone	552	549	618	
Subtotal			8777	37.1%
Tama County - 19533				
-Townships				
York	806	633	633	
Salt Creek	873	717	670	

Table 1-3 cont.

Area	1960	Year 1970	1980	% of County
-Communities				
Elberon	211	203	194	
Chelsea	453	381	376	
Vining	122	71	96	
Subtotal			1969	10.0%
Poweshiek County - 19306				
-Township				
Jefferson	595	490	381	
Warren	586	493	468	
-Communities				
Hartwick	126	101	92	
Subtotal			941	4.9%
Iowa County - 15429				
-Townships				
Honey Creek	472	375	396	
Marengo	2480	2413	2413	
Hartford	1550	1517	1483	
Sumner	556	506	432	
-Communities				
Marengo	1903	1936	1919	
Victor	870	949	1046	
Ladora	307	321	289	
Subtotal			7978	51.7%
Total Service Area		--	19665	

Source: U.S. Census of Population

Population change within the immediate service area is expected to experience a modest growth through the year 2000. Assuming that the service area maintains its share of the estimated population (25.2% of 4 county population totals in 1980) some 20,237 persons are expected to reside within the service area in the year 2000. This represents an increase of 572 persons or a 2.9 percent growth over a 20 year period.

The propensity to use air as a mode of transportation is dependent upon a number of factors. In addition to socioeconomic factors such as income, occupation and family size; the following are also factors:

- Travel Distance
- Accessibility
- Cost Per Unit of Travel
- Type and Value of Cargo
- Availability of Other Transportation Modes

Occupation or employment by industry provides some insight into travel tendencies. The ENO Foundation catagorized industry by travel tendency as follows:

HIGH TRAVEL:

Mining, Manufacturing, Government, Business Services

MEDIUM TRAVEL:

Construction, Wholesale and Retail Trade, Professional Services, Finance, Insurance and Real Estate

LOW TRAVEL:

Agriculture, Forestry, Transportation, Communication, Utilities, Repair Service, Recreation, Amusement, Printing

An indication of travel tendency within the 6 county region can be obtained from reference to Tables 1-4.

TABLE 1-4: LABOR FORCE - 1983, SIX COUNTIES

	Benton	Iowa	Linn	Poweshiek	Tama	Johnson
Civilian Labor Force	9730	7830	79,500	9990	9110	45,550
Total Employment	8880	7450	73,300	9430	8740	44,120
Percent Unemployed	8.8	4.9	6.2	5.7	4.1	3.1
Agriculture	1830	1530	2,100	1560	1920	1,720
Manufacturing	300	2490	21,300	1100	540	3,340
Construction	160	100	1,800	170	140	1,100
Transportation Communication & Public Utilities	160	80	3,700	690	250	860
Wholesale Trade	570	380	4,600	420	460	990
Retail Trade	780	1300	12,700	1420	810	7660
Finance, Insurance & Real Estate	240	160	4,200	480	250	1150
Service and Mining	630	580	15,700	1800	610	5810
Government	1230	670	900	960	1020	22,900

Selected categories (does not include domestic workers)

Source: Iowa Department of Job Service - May 1983

Within the 6 county area, 58.3 percent of the labor force (as of May 1983) was employed in high travel industries while 30 percent were employed in medium travel industries. 11.7 percent were employed within low travel industries.

The City of BellePlaine experienced a significant increase in the number of persons employed within those industries having high travel tendencies and a decrease in the total numbers employed within low travel industries. The travel tendency trends established from 1950 to 1980 are expected to continue. The economy is becoming more diversified with agricultural employment decreasing as economies of scale dictate fewer and larger farming operations.

A summary of retail sales activity is provided in Tables 1-5 and 1-6.

TABLE 1-5: RETAIL SALES - FY 1982, SIX COUNTIES

	FISCAL YEAR - 1982		
County	1982	In Millions	Percent
Benton	73,918,719	73.9	4.5
Iowa	72,273,222	72.3	4.5
Johnson	353,494,374	353.5	21.8
Linn	965,138,280	965.1	59.5
Poweshiek	86,976,099	87.0	5.4
Tama	70,289,399	70.3	4.3
TOTAL	$162,200,000	$1,622.1	100.0

Source: Iowa State Department of Revenue

TABLE 1-6: RETAIL SALES - FY 1982, BENTON COUNTY

Community	Number of Returns	Taxable Sales	Percent of Total Sales
Belle Plaine	482	14,193,554	19.2%
Vinton	818	34,040,929	46.0
Blairstown	170	5,151,017	6.9
Shellsburg	94	1,582,832	2.1
Van Horne	130	1,755,399	2.3
Atkins	103	1,303,084	1.8
Garrison	81	749,511	1.0
Keystone	147	5,998,528	8.2

TABLE 1-6 cont.

Mt. Auburn	48	678,962	0.9
Newhall	118	2,252,070	3.1
Norway	119	2,212,699	3.0
Urbana	93	642,877	0.8
Walford	50	933,264	1.3
Non-Permit	15	77,232	0.1
Other	540	2,346,661	3.3
TOTAL	3008	$73,918,719	100.0

Source: Iowa State Department of Revenue

Retail sales were used to allocate projected numbers of based aircraft. Belle Plaine in FY 1982, had 120 retail establishements with reported taxable sales of 14,193,554 dollars. Taxable retail sales within the immediate service area totaled 44,654,721 dollars or 2.7 percent of the regional total. Benton County accounted for 4.5 percent of the regional taxable retail sales.

AREA AIRPORTS

STATE SYSTEM OF AIRPORTS:

The 1982 IOWA AVIATION SYSTEM PLAN identifies 80 airports which will serve the needs of the state. In addition, there are 41 publicly-owned airports that are classified as "local service airports."

A local service airport is 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 a hierarchy of airports each providing an increasing service capability.

Basic Utility (BU):	Those airports designed to accomodate 95 percent of all aircraft weighing 12,500 pounds or less.
General Utility (GU):	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.

The state system consists of four general transport airports and 16 basic transport category airports. Of the 60 utility category airports, 33 are classified as general utility airports and 27 basic utility facilities.

Vinton is classified as a basic utility category airport, while Pella and Oskaloosa are classified as general utility facilities. Newton and Marshalltown are classified as basic transport category airports. Cedar Rapids is a general transport category airport. Toledo, Grinnell and Traer are considered local service airports.

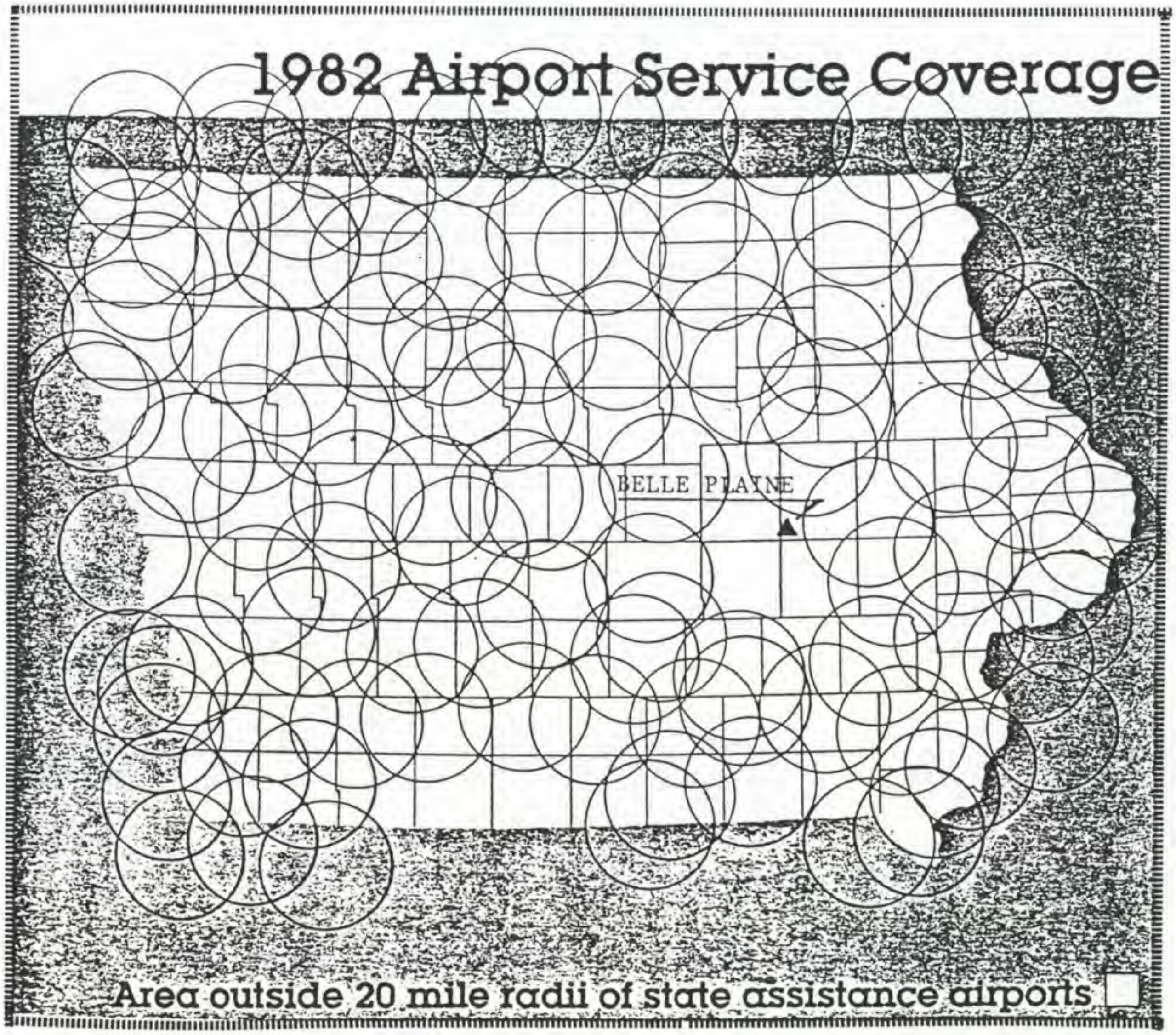
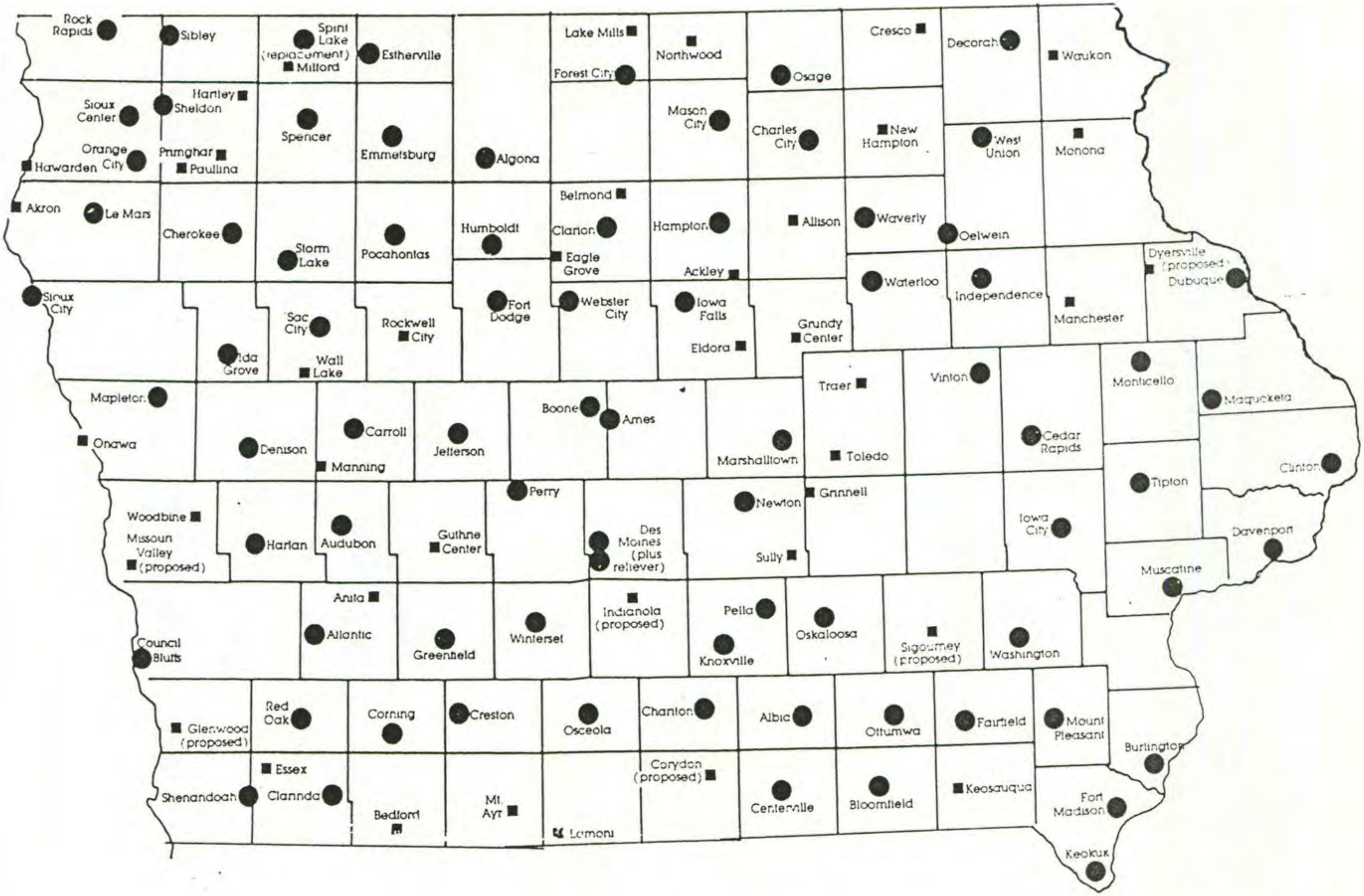


FIGURE 1 - 3: AIRPORT SERVICE AREA COVERAGE



State Assistance Airport ● Local Service Airport ▪

FIGURE 1 - 4 : 1982 IOWA AIRPORT SYSTEM

II - FORECAST OF AVIATION DEMAND

FORECAST OF AVIATION DEMAND

INTRODUCTION:

The forecast of aviation demand provides a basis by which to estimate immediate and long range number of based aircraft and operational activity which may potentially be developed. The estimates presented herein are based upon a potential level of demand within a given geographical area. The difference between existing or documented demand and potential demand is that there are certain actions to be taken before the potential demand may be realized.

The mathematical values obtained reflect in part potential aviation activity within the airport service area. The overall assumption is that an airport facility meeting minimum Iowa Department of Transportation standards for a basic utility stage two category airport would be constructed. Minimum standards are defined herein as follows:

1. Hard surfaced runway 60 feet in width and 3400 feet in length. Turf crosswind runway.
2. Landing and navigational aids to include a medium intensity runway light system, rotating beacon, non directional radio beacon, lighted wind tee and segmented circle.
3. Terminal area development to include hangar facilities, vehicle access and parking, terminal building and aircraft parking apron.
4. Land acquisition to accommodate short and long term facility needs to include clear zone protection and fencing.

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

1. BASED AIRCRAFT

   A. Population (size, change and characteristics)

   B. Economic Base (industry and employment)

2. AIRCRAFT OPERATIONS

   A. Number of Airmen (pilots)

   B. Economic Base (industry and employment)

In addition to the key variables noted above, there are other factors which have a pronounced impact upon present and future numbers of based aircraft and operational activity. These factors relate to the availability of services (fix base operator, air taxi operator) as well as aircraft storage facilities found at the airport.

While the need to travel can be satisfied in a number of ways and by various modes, travel by air offers a convenient, safe and cost effective way to transport personnel and cargo. 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 Per Unit of Travel
- Reason for Making Trip, Length of Stay
- Number of Persons
- Type and Value of Cargo
- Availability of Other Modes of Travel
- Aviation Interest

The forecast of aviation activity represents a trend line along which actual occurrences are anticipated. The procedure for estimating potential numbers of aircraft is based upon a step down from a regional area projection within the State of Iowa. Operational estimates are made from findings at other facilities, local input, and methodologies developed by Iowa State University.

The service area was defined in Section One and referenced as the immediate service area and expanded service area. The basis of estimating herein is based upon the immediate service area.

REGISTERED AND BASED AIRCRAFT

NATIONAL TRENDS:

Nationwide forecasts indicate a continued growth in the number of registered aircraft, registered pilots and aircraft operations. In 1970 there were 131,700 registered U.S. aircraft. By 1979, this number reached 198,000 and is projected to approach 430,000 by the year 2000.

The number of registered pilots nationwide increased from 720,028 in 1970 to 844,100 in 1979. By the year 2000, 1,331,300 persons are expected to be registered pilots.

TABLE 2-1: NATIONAL TRENDS, REGISTERED AIRCRAFT AND PILOTS: 1970-2000

	Year					
Registered	1970	1979	1980	1985	1990	2000
Aircraft	131,700	198,800	208,600	261,900	310,800	430,000
Registered Airmen	720,028	844,100	899,700	1,038,800	1,155,800	1,331,300

Source: IDOT 1982 Iowa Aviation System Plan

Total annual operations are also expected to increase from 134,100,000 operations in 1980 to 290,000,000 by the year 2000. General aviation aircraft operations are expected to experience an average annual increase of 3.4 percent through the year 2000.

IOWA TRENDS:

The Iowa Department of Transportation anticipates a future growth in the number of registered aircraft within the State. A continued growth in the number of registered pilots is also expected.

TABLE 2-2: REGISTERED AIRCRAFT - STATE OF IOWA: 1960 - 2000

Year	Number	Year	Number
1960	1700	1985	3400
1970	2600	1990	3800
1975	2800	2000	4500
1980	3000		

Source: IDOT 1982 Iowa Aviation System Plan

TABLE 2-3: REGISTERED AIRMEN - STATE OF IOWA: 1965 - 2000

Year	Number	Per 10,000 Population
1965	7,963	29
1970	12,432	44
1975	10,802	38
1980	11,731	40
1985	12,043	40
1990	12,353	40
2000	12,812	40

Source: IDOT 1982 Iowa Aviations Systems Plan

The IDOT projection of registered aircraft was based upon a simple linear regression analysis of historic trends. Projections of registered pilots were based on the ratio of average county pilots to total state population for the period 1970 - 1977. IDOT estimates of future general aviation activity in the 1982 Systems Plan are somewhat lower than the estimates presented in the 1978 Plan.

REGIONAL TRENDS:

Table 2-4 summarizes historic numbers of registered aircraft for the years 1972 through 1982 for Benton, Iowa, Poweshiek, Tama, Linn and Johnson Counties.

TABLE 2-4: REGISTERED AIRCRAFT, SIX COUNTIES, 1972-1982

Year	Benton	Iowa	Poweshiek	Tama	Linn	Johnson	Total
1982	28	24	20	30	254	104	460
1981	23	22	23	26	261	92	447
1980	22	23	25	26	253	101	450
1979	23	22	29	27	242	99	442
1978	22	23	29	29	233	98	434
1977	26	32	29	24	205	88	404
1976	20	9	27	18	169	72	315
1975	20	5	27	13	152	65	282
1974	17	4	20	14	147	66	268
1973	13	8	10	19	151	66	267
1972	15	17	14	15	154	69	284

Source: 1982 - IDOT

1972-1981 - FAA, As of Dec. 31

Benton county, from 1972 to 1982 experienced a 87 percent increase in the number of registered aircraft. The region as a whole recorded a 61.9 percent increase for the same period. In terms of absolute numbers, Linn County experienced the largest increase. The six county region had an average annual increase of 16 registered aircraft from 1972 through 1982.

An insight into the potential numbers of aircraft that may be based at a Belle Plaine facility can be obtained from observing regional trends. A second degree linear equation was utilized to fit a trend line to observed data for the years 1972 through 1982. Reference may be made to Figure 2-1:"Registered General Aviation Aircraft, Six County Area, 1972-1982". As noted in the graph, the calculated trend line approximates actual observations.

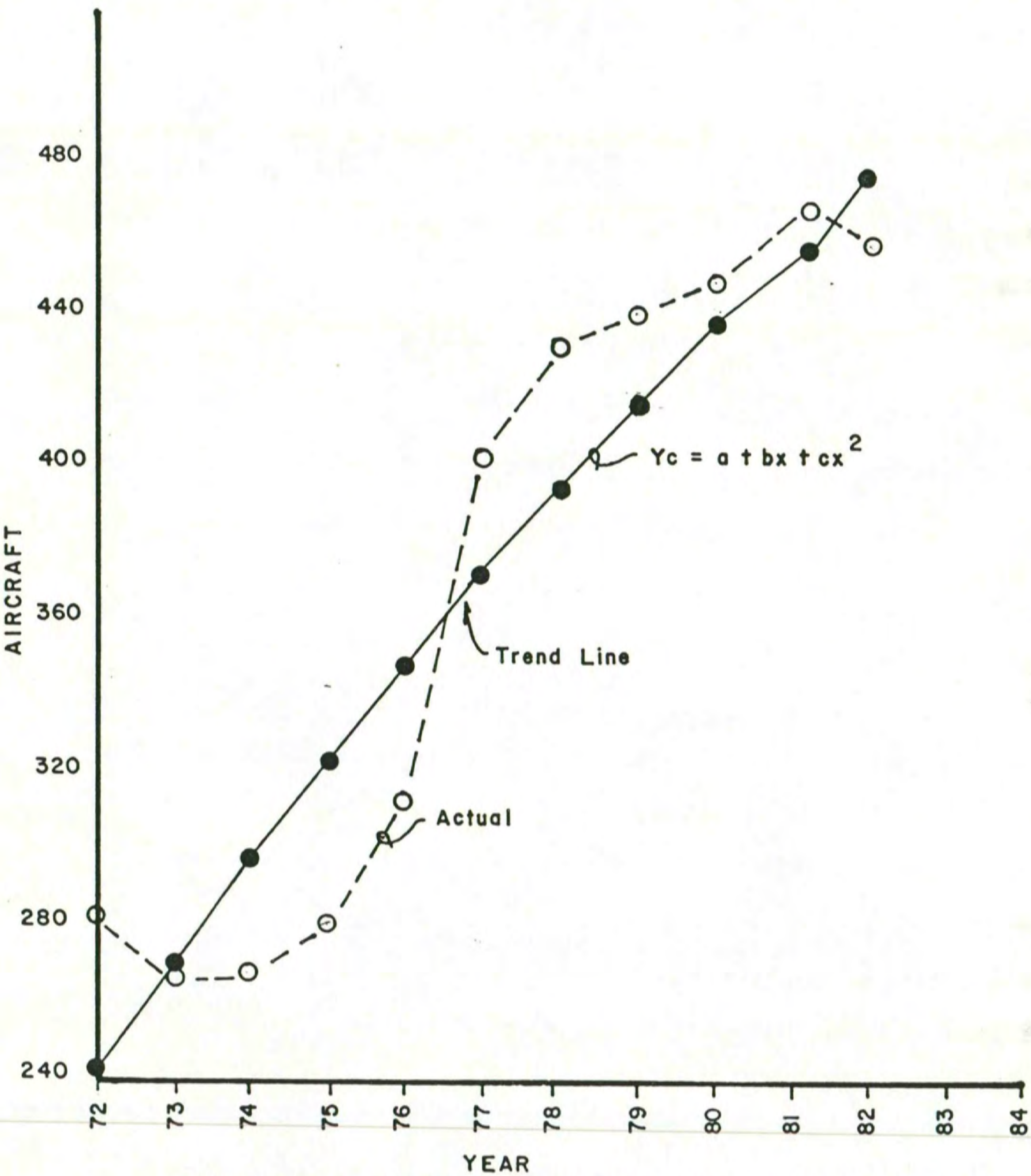


FIGURE: 2-1 REGISTERED G/A AIRCRAFT - 6 COUNTIES
1972-1982

Future numbers of registered aircraft through the year 2002 were estimated using the equation $Yc = a + bx + cx^2$ where:

Y = Number of Aircraft

x = Year

a = 373.1

b = 23.5

c = -0.4645

Table 2-5 summarizes the estimated growth of registered aircraft within the six county area for the years 1983 through 1987, 1992, 1997 and 2002.

TABLE 2-5: REGISTERED G-A AIRCRAFT, SIX COUNTIES, 1983 - 2002

Year	Six County Area Total (Benton, Poweshiek, Iowa, Tama, Linn, Johnson)
1983	497
1984	515
1985	531
1986	547
1987	561
1992	621
1997	657
2002	670

Source: PDS

The calculated values through 2002 are within anticipated increases, From 1983 through 1992, the six county area is expected to experience an increase of some 124 aircraft or a 24.9 percent over 1983. This rate of increase is considerably less than the 72.2 percent increase experienced from 1973 to 1982. From 1992 through 2002, the region is expected a modest increase in registered aircraft reaching some 670 aircraft in 2002.

Regional registered aircraft (as of July 1, 1983) are summarized by community in the following table for the four counties in which the Belle Plaine service area extends into.

TABLE 2-6: REGIONAL REGISTERED AIRCRAFT, 4 COUNTIES, 1983

(by place of residence)

Place	Number of Registered Aircraft
Tama County	
Dysart	5
Toledo	5
Tama	1
Traer	9
Benton County	
La Porte City	2
Vinton	9
Garrison	1
New Hall	1
Atkins	1
Keystone	2
Blairstown	1
Cedar Falls	1
Poweshiek County	
Montezuma	7
Brooklyn	3
Grinnell	6
Hartwick	1
Iowa County	
Marengo	4

TABLE 2-6 cont.

Place	Number of Registered Aircraft
Iowa County	
Homestead	2
Amana	3
Williamsburg	3
Victor	2
Anamosa	1
North English	1

Source: IDOT Aeronautics Division-July 1983

BENTON COUNTY TRENDS:

As noted in Table 2-4, Benton County recorded a moderate increase in the number of registered aircraft from 1972 through 1982. The number of aircraft registered in Benton County is expected to increase through 2002.

TABLE 2-7: REGISTERED G-A AIRCRAFT, BENTON COUNTY, 1982 - 2002

Year	Method 1	Method 2	Method 3
1982	28	28	20
1983	30	30	22
1984	31	31	23
1985	32	32	24
1986	33	33	25
1987	34	34	25
1992	37	38	28
1997	39	40	30
2002	40	41	30

Allocation of regional aircraft

Method 2- 6.08% of regional registered aircraft - 1982

Method 1- 6.0% of total civilian labor force - 1983

Method 3- 4.5% of regional retail sales - FY1982

Source: P.D.S.

Because of the small numbers dealt with at the county level, a decision made locally could drastically alter any estimates made herein. The validity of the estimates come from the long term trend within the area. As historical data would indicate, decisions are mde to relocate aircraft from one airport to another for reasons ranging from personal, to cost and services. Such events, while affecting a specific airport, have less influence on a regional basis.

The proximity of Benton County to two metropolitan centers will have an influence upon the number of aircraft based within the county. 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 fee 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: 1978, SASP, p. 38

The above 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 loose 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: 1978, SASP, p. 39

Current registered aircraft owners with a Benton County mailing address are summarized in Table 2-8.

TABLE 2-8: BENTON COUNTY REGISTERED AIRCRAFT, 1983

Name	Address	Aircraft
Boyd, Leroy	Dysart	Cessna 182P
Speidel Well	Vinton	Beech C-23
Van Wechel Farms	Vinton	Brantly
Brandt, Steven	Dysart	Bushby Mustang II
Bascom, Vernon	Vinton	Piper PA28R
Vinton Flyers Inc.	Vinton	Cessna 150
Pardum, Tony	Vinton	Piper PA28235
Schlarbaum Real Estate	Vinton	Piper PA28R-200
Boddicker, Ralph	Vinton	Cessna 182 L
West Side Grain & Salvage	Atkins	Beech A65
R & J Aviation Inc.	Keystone	Cessna 172
Hansen, Jon E.	Cedar Falls	Piper
Rohlena, Marvin	Keystone	Beech F33A
Mechant, Jerry	Vinton	Pitts
Mechant, Jerry	Vinton	Piper
Thorman, William	Blairstown	Cessna 182
Vinton Flyers, Inc.	Vinton	Luscombe 8F

Source: IDOT Aeronautics Division, Sept. 1983

The number of registered aircraft within Benton County is expected to reach some 30 to 40 aircraft by the year 2002. A majority of these aircraft are expected to be based at the Vinton Municipal Airport. Should a facility be developed at Belle Plaine, a number of these aircraft would be based at Belle Plaine.

BELLE PLAINE SERVICE AREA:

The service area of an airport facility located in Belle Plaine would extend into four counties and encompass 12 communities. As previously noted, some 19,665 persons reside (1980) within the service area. Nine aircraft are currently registered within the defined service area.

TABLE 2-9: REGISTERED AIRCRAFT, BELLE PLAINE SERVICE AREA, 1983

Immediate Service Area	Number of Registered Aircraft
Keystone	2
Blairstown	1
Marengo	4
Victor	2
Total Immediate	9
Expanded Service Area	
Tama	1
Dysart	5
Toledo	5
Brooklyn	3
Total Expanded	14
Total (Immediate, Expanded)	23

Source: P.D.S.

Two variables must be considered in the final assessment of the potential number of aircraft that may be based at a Belle Plaine facility. The first considers the physical location of the facility. The second must consider what improvements areas communities may make to community airports.

An airport located north of Belle Plaine would be in a position to service the communities of Dysart, Tama, and Toledo. A facility located south of the community would be in a better position to service Marengo and Brooklyn. Should Grinnell proceed with the development of a community airport, such a facility would compete for Brooklyn activity as well as potential activity within Tama-Toledo.

The potential number of general aircraft that may be based at a Belle Plaine facility are summarized in Table 2-10.

TABLE 2-10: POTENTIAL BASED AIRCRAFT - BELLE PLAINE 1983-2002

	Number of Based Aircraft		
Year	Low (1)	Middle (2)	High (3)
1983	9	11	13
1984	9	12	14
1985	10	12	14
1986	10	13	15
1987	10	13	15
1992	11	14	17
1997	12	15	18
2002	12	15	18

Source: P.D.S.

(1) Based upon immediate service area (current aircraft registration) and 1.81 percent of regions total aircraft registration.

(2) Average of low and high estimates.

(3) Based upon 2.7 percent of retail sales for 6 counties and 100 percent of aircraft potential.

The low estimate reflects a conservative point of view with an airport facility serving Belle Plaine, Keystone, Blairstown, Marengo and Victor and the immediate service area as previously defined. The high estimate represents the expanded service area less Tama and Toledo. The middle estimate is an average of the low and high estimates.

The immediate service area would be well served by a facility located south of Belle Plaine which would better serve potential demand within Marengo and Victor. A facility located north of Belle Plaine would better serve the expanded area and assumes that Victor and Marengo would utilize the facility at a location north of Belle Plaine.

Other factors must be considered in the process of site selection to include available sites, etc. Site selection is beyond this scope of work.

The more conservative estimate would appear to be most appropriate approach for estimating future aircraft operational activity. Aircraft based at the facility would consist for the most part of single and light twin engine aircraft. For planning purposes the following assumptions were made:

Aircraft Approach Category

Category A Aircraft: Speed less than 91 knots

Airplane Design Group

Design Group I: Wingspan up to but not including 49 feet

AIRMEN

STATE TRENDS:

Table 2-11 summarizes the historic and projected numbers of airmen for Iowa. There was a forty seven percent increase in the number registered pilots within the state from 1965 to 1980. Future increases in pilot registrations are expected to be minimal.

TABLE 2-11: REGISTERED PILOTS - IOWA, 1965 - 2000

Year	Iowa Pilots	Pilots/10,000 Population
1965	7,963	29
1970	12,432	44
1975	10,802	38
1980	11,731	40
1985	12,043	40
1990	12,353	40
2000	12,812	40

Source: IDOT 1982 Iowa Aviation System Plan

The 1980 ratio of forty airmen per 10,000 population was used to estimate future numbers of resident airmen within the Belle Plaine service area. As noted, in Table 2-11, the Iowa DOT anticipates that the ratio of airmen to population to remain constant through the year 2000. Deviation from the state wide average will vary from county to county with various social and economic characteristics of the population being key variables. In addition, local efforts to attract residents to aviation will also provide a basis in which local numbers may exceed the state wide average.

Reference may be made to Table 2-12 concerning future numbers of airmen within the Belle Plaine Service Area.

TABLE 2-12: AIRMEN - BELLE PLAINE, 1983 - 2002

Year	Airmen	Year	Airmen
1983	78	1992	79
1987	78	2002	80

As noted in Table 2 -12, the number of airmen residing within the airport service area is expected to remain stable.

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 Airmen
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 airmen.

Total annual aircraft operations were computed utilizing the following equation:

Log (Total Annual Operations) = 2.614 + 0.501 Log (Based Aircraft X Airmen)

The same variables were used to estimate itinerant operations:

Log (Total Itinerant Operations) = 1.865 + 0.605 Log (Based Aircraft X Airmen)

The above models were 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.

TABLE 2-13: G-A OPERATIONS, BELLE PLAINE, 1983 - 2002

	Total Annual Operations		
Year	Low	Middle	High
1983	10,965	12,125	13,183
1987	11,560	13,183	14,163

TABLE 2-13 cont.

Year	Low	Middle	High
1992	12,203	13,770	15,176
2002	12,827	14,344	15,716

Source: P.D.S.

As noted in Table 2-13, the total number of operations are expected to reach 12,827 to 15,716 by the year 2002. Should an airport facility have existed in 1983, some 10,916 to 13,183 operations could be expected. This expectation is based upon factors previously discussed and represent a potential market that is at present underserved or not served at all. Table 2-14 summarizes estimated operational activity for selected area airports for the years 1980 through 2000.

TABLE 2-14: AIRCRAFT OPERATIONS AT SELECTED AIRPORTS, 1980 - 2000

Airport	Total Annual Operations			
	1980	1985	1990	2000
Vinton	11000	13000	14000	18000
Grinnell	8000	9000	9000	9000
Toledo	4000	4000	5000	5000
Newton	27000	32000	35000	45000
Independence	14000	17000	19000	23000
Washington	10000	12000	12000	16000

Source: 1982 Iowa SASP

Of the airports noted above, all are in the state systems plan with the exception of Toledo which is classified as a local service facility.

No estimates were made of peak day and peak hour operational activity for Belle Plaine. Reference to FAA AC 150/5060 - 3A, "Airport Capacity

Criteria Used In Long-Range Planning" reveals the following gerneralities concerning airport capacity:

Single Runway Configuration

- Arrivals = Departures; Mix One
- Practical Hourly Capacity
    1) IFR: 53 Operations/Hour
    2) VFR: 99 Operations/Hour
- Practical Annual Capacity
    1) 215,000 Operations/Year

Total annual itinerant and local operations are summarized in Table 2-15.

TABLE 2-15: TOTAL ANNUAL ITINERANT AND LOCAL OPERATIONS, BELLE PLAINE, 1983 - 2002

	Middle Trend Line	
Year	Itinerant	Local
1983	4363	7762
1987	4827	8356
1992	5087	8683
2002	5344	9000

Source: P.D.S.

COMMUTER - AIR TAXI SERVICE

SERVICE LEVEL:

The Airline Deregulation Act of 1978 provided for the phase out of Civil Aeronautics Board (CAB) control over pricing, market exit and market entry. Consequently, there has been a significant change in certificated air service in Iowa. Commuter service has typically replaced certificated service in smaller markets as has been the case in Ottumwa and Clinton. Commuter airline service is also expected to replace certificated air carrier service in Fort Dodge, Mason City, Dubuque and Burlington.

The IDOT concluded in the State Airport Systems Plan that commuter service to communities without prior service was 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 SASP p. 27

Air taxi service is the most appropriate carrier of air passengers and cargo for the Belle Plaine Service area. The number of air passengers was estimated at 1.5 times the number of itinerant operations.

TABLE 2-16: AIR PASSENGERS, 1983 - 2002 (Enplanement/Deplanement)

Year	Passengers	Year	Passengers
1983	6544	1992	7631
1986	7241	2002	8016

Source: P.D.S.

Air freight may be estimated at 8 pounds per enplaned passenger.

BENEFIT - COST PARAMETERS:

The Iowa Department of Transportation developed a benefit- cost annalysis to consider public benefits accuring as a result of projected airport use and airport location and public costs necessary to meet the development needs of the airport. The IDOT estimated that airport development cost over a 20 year period would total $2,497,000. (This cost was based upon standards set forth in the 1982 State Airport Systems Plan and assumes a minimal level of development).

(B) Benefit Per Operation = $W\left(\frac{D}{M}\right) + XD$, where

W = Value of time for all aircraft operations = $12.50

D = Distance to nearest alternative system airport (variable)

M = Average rural automobile speed = 45 m.p.h.

X = Average total automobile operating cost per mile = $0.28

PVB = Present value of stream line benefits over 20 years

(Present worth factor by IDOT = 10.594)

PVC = Present value of development costs (to system plan standards)

BCR = Benefit - cost ratio (PVB ÷ PVC)

Nearest alternative airport = Vinton - 31 miles

TABLE 2-17: BENEFIT - COST, BELLE PLAINE FACILITY

	Total Annual Operational Activity		
Year	Low	Middle	High
1983	0.80 BCR	0.89 BCR	0.97 BCR
1987	0.85	0.96	1.04
1992	0.90	1.01	1.11
2002	0.94	1.05	1.15

BRC = (B x Number of Operations x 10.594) ÷ PVC)

Source: P.D.S.

The Iowa Department of Transportation considers those airports (basic and general utility) having a benefit - cost ratio in excess of 0.75 to be statewide interest. Based upon the forecast of aviation demand, an airport facility located near Belle Plaine would be eligible for state airport development assistance.

SERVICE AREA:

An airport facility located to the south and/or southwest would best complement the state system of airports. Such a location would serve extreme southwestern Benton County, north eastern Poweshiek County, northwestern Iowa County and southeastern Tama County. Based upon an immediate service area (conservative basis), the airport would serve 19,665 persons within 12 townships and 12 communities. The benefit-cost ratio (assuming the low number of aircraft operations was realized) exceeds the 0.75 BCR criteria for inclusion in the state system.

AIRPORT DEVELOPMENT:

An airport developed to Basic Utility standards would provide an adequate level of service through the year 2002.

RECOMMENDATION:

1. Review by IDOT
2. Review by Airport Committee and City Council of Belle Plaine
3. Decision Point
    A. Conclude study
    B. Proceed with Airport Development Plan
        1) Facility Needs
        2) Site Selection
        3) Socioeconomic/Environmental
        4) Development schedule
        5) Cost Estimates
        6) Implementation Plan

III - AIRPORT FACILITY NEEDS

AIRPORT FACILITY REQUIREMENTS

INTRODUCTION

This report outlines those facilities required to meet and satisfy anticipated aviation activity through the year 2002. Facility requirements outlined herein are based upon Federal Aviation Administration (FAA) and Iowa Department of Transportation (IDOT) standards. It should be noted that 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."
>
> (1978 IDOT SASP, p.54)

Such deviation by the IDOT is based upon the assessment of future funding levels for airport improvements in the State of Iowa. Whereas the FAA standards 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 needs which will provide the community with a facility meeting current operational and safety standards in a viable and prudent manner.

As noted in Section II, the airport should ultimately be developed to Basic Utility-Stage II standards. This section examines the existing level of service provided by each air and landside component of the airport.

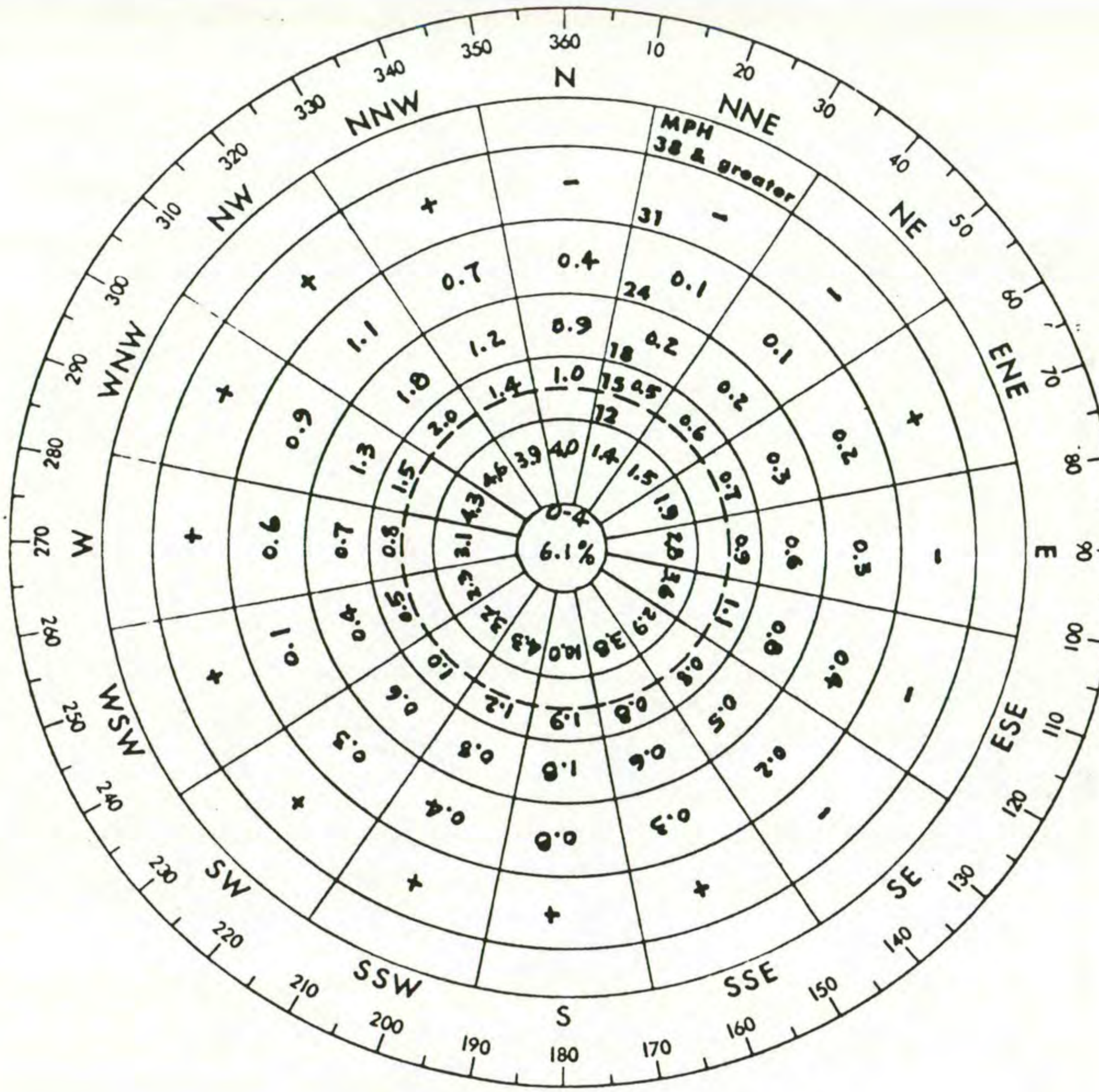
RUNWAYS AND TAXIWAYS

Runway Alignment

Runway alignment is based upon a number of factors. The most salient of these is the level of wind coverage provided. Other factors often are of equal importance. Among these are topography, cultural features, physical features, land ownership and environmental considerations.

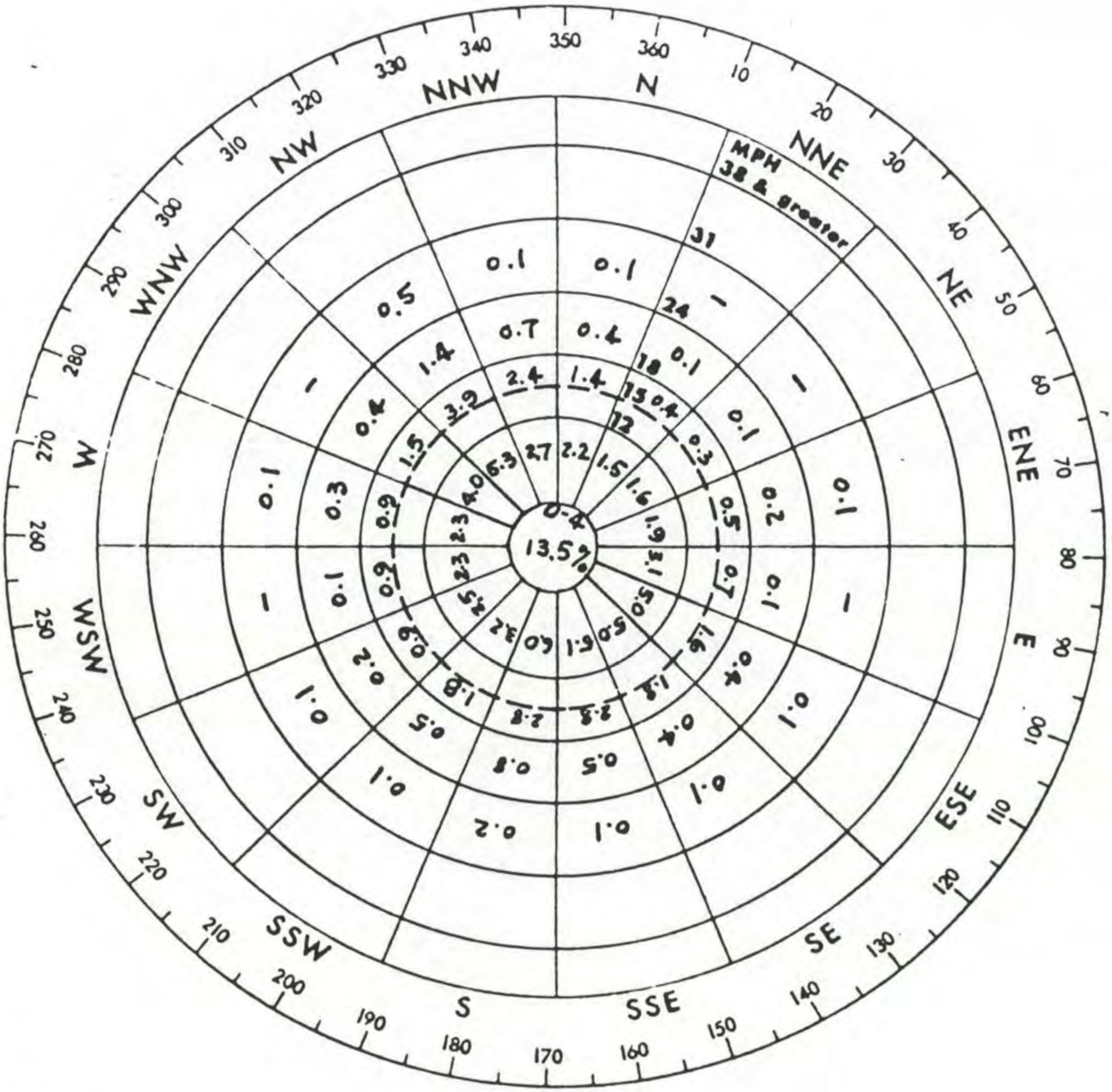
The optimum runway orientation is one which will provide the airport a 95 percent level of wind coverage at a crosswind component value of 12 M.P.H. (10.5 knots) for utility airports and 15 m.p.h. for larger than utility airports. It would be desirable to orient a single runway so as to obtain the 95 percent wind coverage. In Iowa, the wind is so varied that a crosswind runway is required to supplement coverage obtained from the primary runway.

The IDOT, as a rule of thumb, recommends a 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.



Calms = 6.1%
Ceiling and visibility group:
Greater than 1000 ft and/or 3 miles = 90.2%
Less than 1000 ft and/or 3 miles = 9.8%

Exhibit L. Cedar Rapids wind rose (mph), record of period 1964-1968.



Calms = 13.5%
Ceiling and visibility group:
Greater than 1000 ft and/or 3 miles = 96.2%
Less than 1000 ft and/or 3 miles = 3.8%

Exhibit N. Waterloo wind rose (mph), record of period 1948-1950 and 1963-1964.

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 area BT airport facilities.

Runway length requirements were obtained from FAA AC 150/5300-4B, CHG. 6, page 13 referenced 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
- Optimum Flap setting for the shortest runway length
- Relative humidity and runway gradient were accounted for by increasing the takeoff or landing distance of the groups most demanding aircraft by 10 percent.

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

Given the following:

- Elevation: 950$\pm$ feet (ASL) (To vary with airport site)
- Temperature: 86.7^{o} F (Waterloo)

The runway length requirement for the Belle Plaine Airport facility is as follows:

- Basic Utility Stage Two Airport: 3400 feet (Figure 3-2)

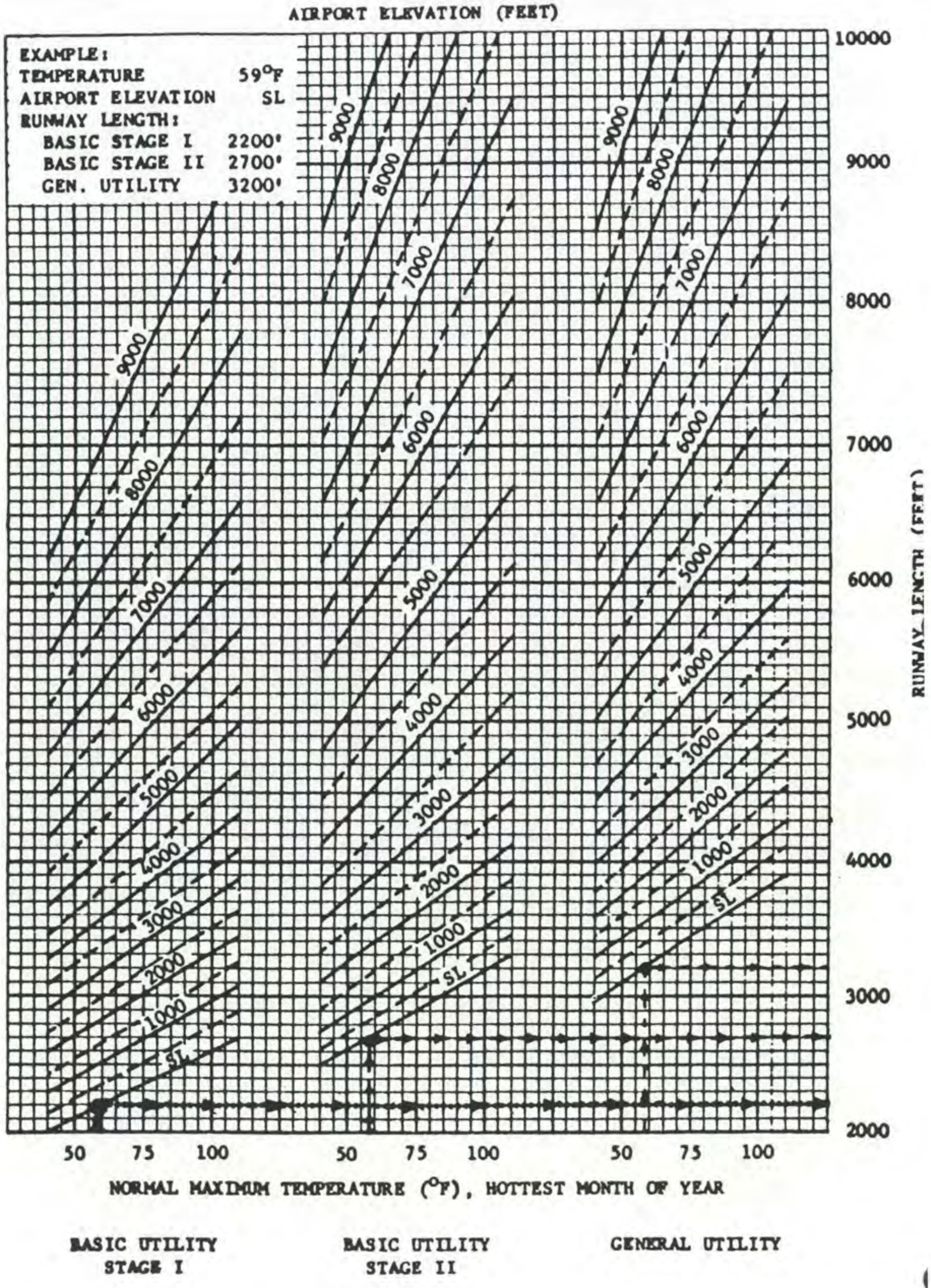


FIGURE 3-2

RUNWAY LENGTH

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 than 2720 feet.

For planning purposes an ultimate length of 3400 feet is recommended. Based upon anticipated use, it would not appear to be cost effective to extend the runay length beyond 3400 feet.

The runway width should be no less than 60 feet for a basic utility runway (airplane design group I with a non precision approach).

Taxiway

The IDOT finds justification for a partial 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.

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 will be shown on the Airport Layout Plan (ALP). However, the 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
1983-1987	3400'	60'	Parallel	25'
1988-1992	3400'	60'	Parallel	25'
1993-2002	3400'	60'	Parallel	25'

Holding Apron

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

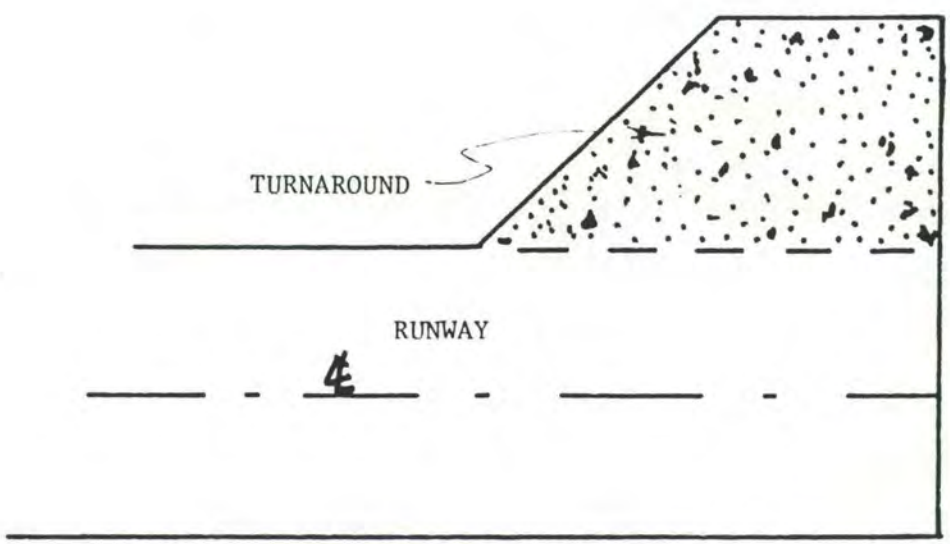


FIGURE 3-3 TYPICAL TURNAROUND

Runway Grade Change and Visibility

Consideration must be also 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 must be taken into account.

- Runway grade changes should be such that any two points 5 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:

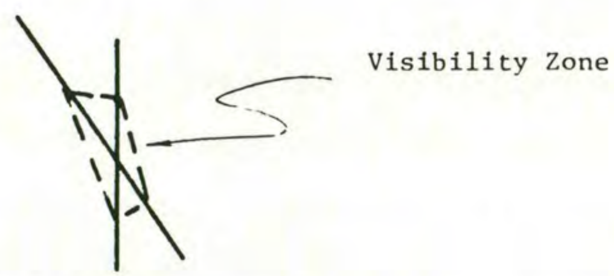


Figure: 3-4 VISIBILITY ZONE

- Runway grades; terrain etc. must be such that a line of sight is maintained within the visibility zone of the intersecting runways 5 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.

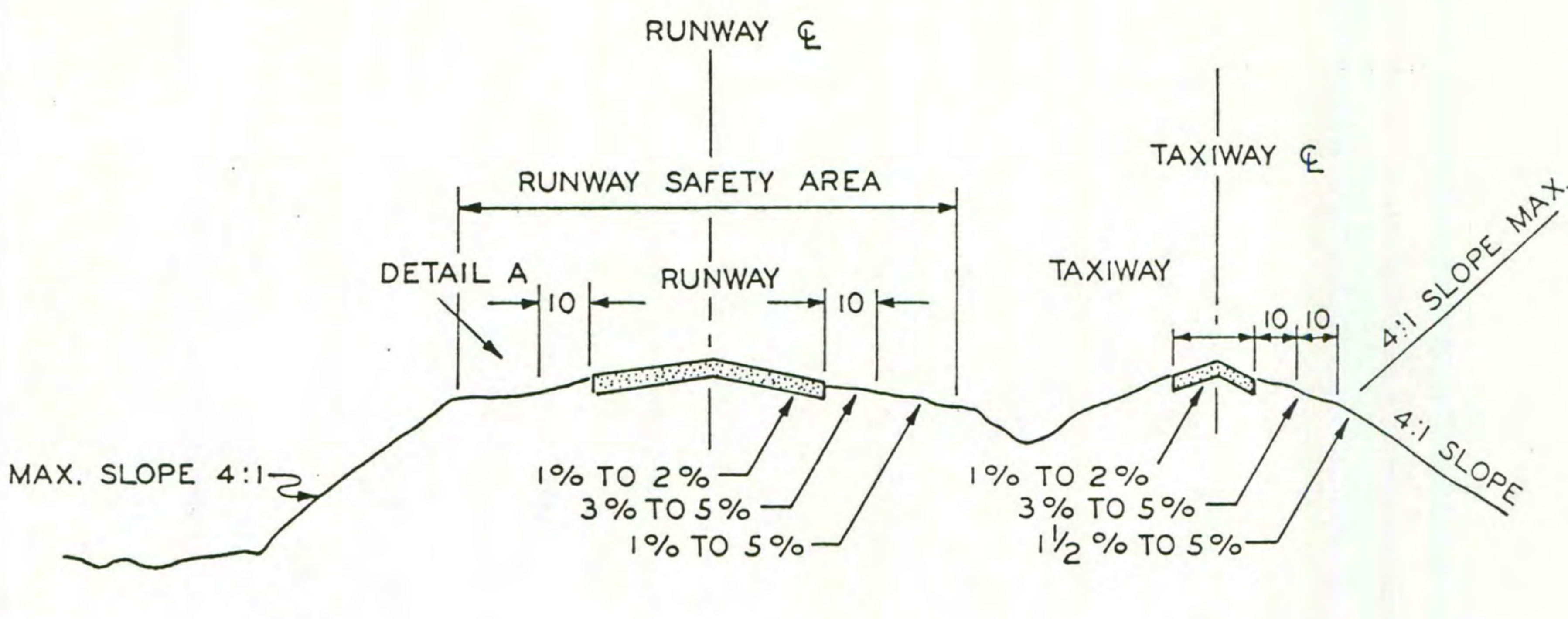
A graded area beyond the runway surface is referred to as the runway safety area. The area, located symmetrically about the runway, extends outward from the runway centerline 120 feet and 240 feet beyond the runway ends. The primary function of the runway safety area is to provide a degree of safety should an aircraft veer off the runway. The traverse grade should not exceed five percent.

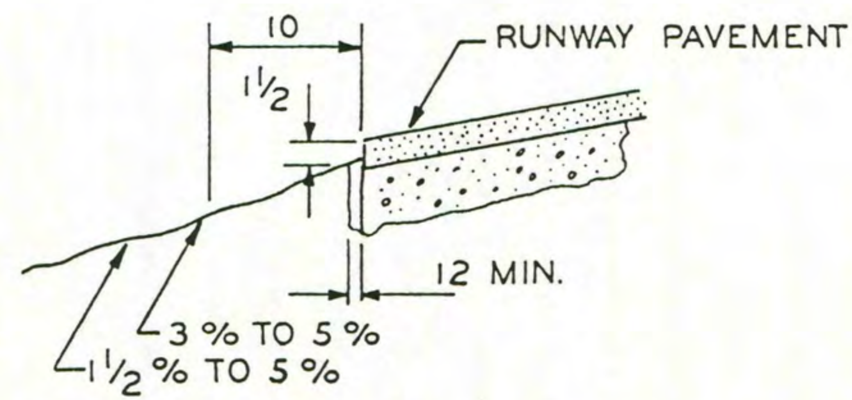
Lateral Widths and Clearances

The following are criteria for separation of airport facilities that should be taken into consideration (Design Group I):

- Runway centerline to taxiway centerline	225'
- Runway centerline to building restriction line (BRL) and airplane tiedown area	200' (Min. + 7
- Runway centerline to property line (PL)	250'
- Taxiway centerline to airplane tiedown area and to fixed or movable obstacle	50' Min.
- Taxiway centerline to hangar structure (one way traffic)	37.5' Min.
- Runway safety area width	120'

SOURCE: FAA AC150/5300-4B CHG. 7





DETAIL A

TYPICAL CROSS SECTION

FIGURE 3 - 5

Runway and Taxiway Pavement Design

From the forecast of aviation demand, a runway pavement strength which would support an aircraft with a gross weight strength (single wheel) of 12,500 pounds would appear adequate to meet aviation demand expectations. It is not however the intent herein to specify an engineering design for the hard surfaced areas.

Flexible pavements consist of a bituminous wearing course, a base course and subbase. In some cases, a subbase may not be required. The surface course generally has a 2 inch depth. The base course will vary subject to subgrade characteristics and design load.

Generally, a rigid pavement designed to serve aircraft with a gross weight of 12,500 pounds or more should be not less than six (6) inches thick. A minimum subbase thickness of four (4) inches thick is generally required except where soil conditions are poor. A six (6) inch PCC rigid pavement will accommodate aircraft up to 30,000 pounds gross weight.

Reference may also be made to FAA AC 150/5320-6C. "Airport Pavement Design and Evaluation" regarding a more detailed discussion. A typical pavement cross section is depicted in Figure 3-5.

Pavement Markings

Non-precision instrument (NPI) markings are recommended for installation on the primary runway. 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 one foot.

- Designation markings:

  Each runway end is marked with designated numbers representing the magnetic azimuth, measured clockwise from north and 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 3 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, 6 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 AC 150/5340-1D.

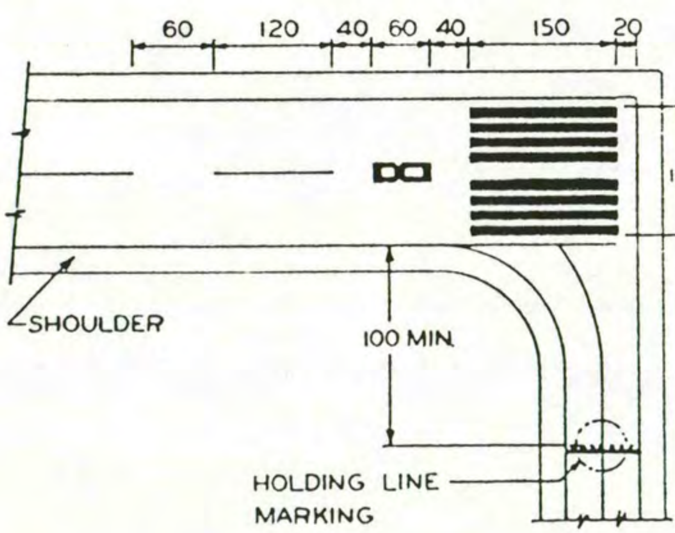


Figure 3-6 NPI MARKINGS

Runway and Taxiway Lighting

A medium intensity light system should be installed on the primary runway and on the crosswind runway should one be constructed.

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 an 180° red light inward and 180° green light outward. Threshold lights should be located no closer than two feet and nor 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 on ten foot centers towards the runway centerline extended.

Taxiway edge lights should be located no more than 10 feet from the taxiway edge on 200-foot centers.

The taxiway edge lights which emit 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

Visual Approach Slope Indicator, VASI

A Simple Abbreviated Approach Slope Indication (SAVASI) is recommended on the primary runway. The color light beams enable the pilot to determine if his approach is high, on course, or low. The SAVASI benefits the facility because of potential noise impacts and structures in the area. Installation of a VASI system is recommended by IDOT when there are 10,000 or more annual operations. A 2 light unit system is referenced as a VASI 2.

The VASI-2 is located on the left side of the approach to the runway. Ideally, the first light box is located 50 feet out from the runway edge and 500 feet from the threshold. The second light box should be located 700 from the first box.

Runway End Identifier Lights, REIL

Runway End Identifier Lights (REIL'S) are recommended by FAA where there is a visual deficiency and no approach light system is planned.

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 3000.

Reference may be made to FAA AC150/5340-14B, AC 150/5300-2C, and AC 150/5340025 concerning VASI and REIL design requirements.

Airport Beacon Light

An airport beacon light should be operational at the airport. The FAA recommends a rotating beacon light (L-801) at general utility airports. 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 and 150/5345-12

Segmented Circle and Lighted Wind Tee

A segmented circle and lighted wind tee should be placed in operation.

Reference may be made to FAA AC 150/5340-5

NON-DIRECTIONAL RADIO BEACON, NDB AND TERMINAL VERY HIGH FREQUENCY OMNIRANGE, TVOR

An NDB system allows an aircraft equipped with an automatic direction finder, (ADF), to "home" in on the signal. An NDB is currently at Emmetsburg.

A non-precision instrument approach could also be established by the location of a VOR facility on or near the airport. The TVOR provides alignment and position location information. Guidance to a point in space is provided where a pilot must establish visual contact with the runway to accomplish the landing. A TVOR may be justified where annual instrument approaches exceed 300.

Aircraft Hangar Facilities

The assumption is made that all aircraft based at the Belle Plaine Municipal Airport would be kept in hangars.

TABLE 3-2 PROPOSED HANGAR FACILITIES

Hangar Unit Number	Type	Capacity
One	Tee	6-10
Two	Conventional	FBO Shop
Three	Tee	4- 6

To accomodate future numbers of based aircraft, it is recommended that a 6-10 unit tee hangar be constructed within Phase One, 1983-1987. An additional 4-6 units may be needed in Phase Three, 1992-2002. An alternative may be to consider use of a conventional shop area for storage should a conventional hangar be constructed. The IDOT recommends a minimum 60 feet by 80 feet facility for the FBO shop. Subject to aircraft size, the shop area may accommodate up to two aircraft. This storage may be used as an interim solution to hangar needs. It should also be noted that hangar demand will vary from year to year based not only upon aircraft ownership, but cost per unit as well. The cost of comparable space at area airports will also influence the demand for hangar facilities at Belle Plaine. Furthermore, a number of aircraft owners may choose to tiedown their aircraft rather than lease hangar space should the cost be beyond what the owner is willing to pay.

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 services area of 500 square feet
- A pilot's briefing area of 180 square feet
- An airport administrator's office of 180 square feet
- A separate structure provided a new facility is required of a minimum 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 20 vehicles may be needed by the year 2002.

Apron Tiedowns

An apron area should be maintained to provide for improved surface tiedowns as well as queuing space for aircraft movement. 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 2002.

Year	Annual Itinerant Operations	Avg/Day	10% Increase For Busy Day	50% on Ground At Any One Time
1983	4363	12	1	7
1987	4827	13	1	7
1992	5087	14	1	8
2002	5344	15	1	8

In addition to the improved surface tiedowns, a number of unimproved tie-down spaces may be maintained in order to accommodate itinerant traffic exceeding the average day estimates.

TABLE 3-3 TIEDOWN NEEDS, 1982 -2002

Year	Improved Tiedowns	Apron Area Square Yards (360 S.Y./Aircraft)
1983	7	2520
1987	7	2520
1992	8	2880
2002	8	2880

Through the year 2002 eight improved surface tiedowns should be constructed to serve itinerant traffic.

Access Road

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

Consideration may be given to hard surfacing of a 20 stall parking lot and drive. An area to accommodate additional stalls should be set aside or maintained with a gravel surface for overflow parking.

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 will be used as a guide in the preparation of a zoning ordinance and the airport layout plan.

Standards for Determining Obstructions

I. 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 3 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.

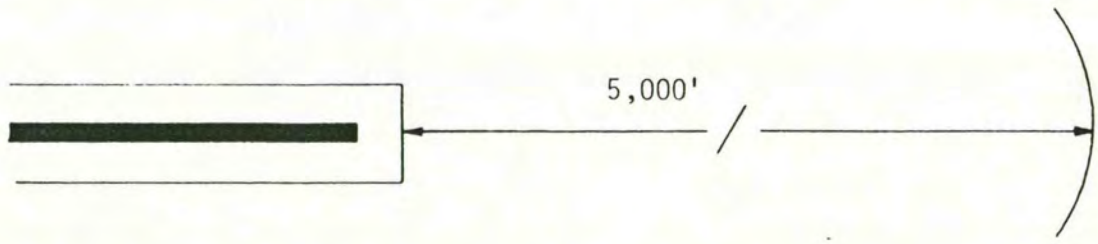
-Interstate Highway	17 feet
-Public Roadway	15 feet
-Private Road	10 feet or height of the highest mobile object
-Railroad	23 feet

Imaginary Surfaces

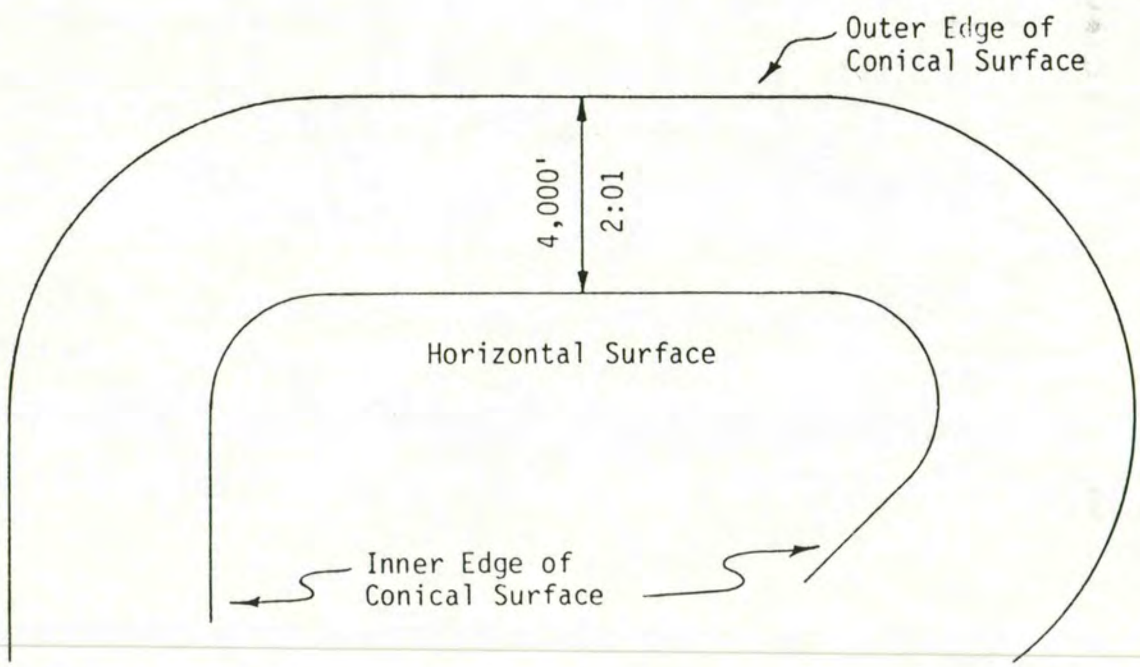
Imaginary surfaces establish areas where any object penetrating that surface would be considered an obstruction to air navigation. The imaginary surface establishes an imaginary line that separates ground activities from aircraft activities. In order to select the applicable imaginary surface, the type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



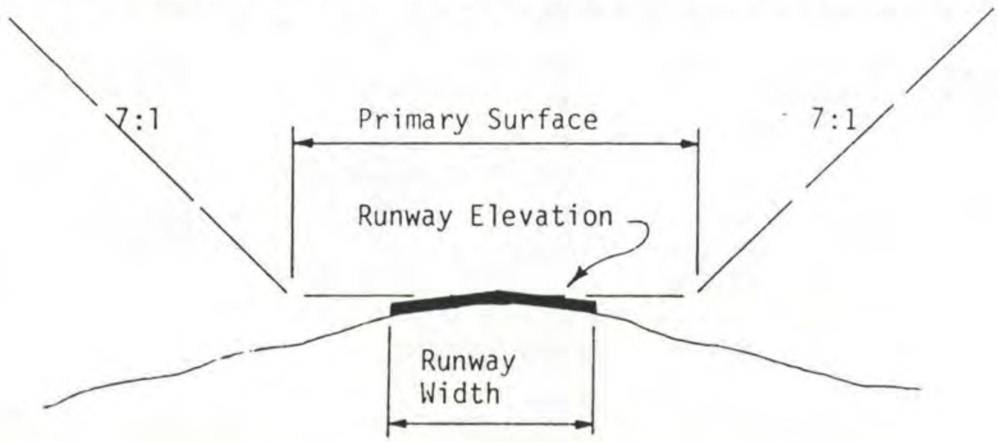
B. Conical Surface: The conical surface extends outward and upward from the periphery of the horizontal surface at a slope of 20:1 for a horizontal distance of 4,000 feet at the ends and 7:1 laterally.



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.

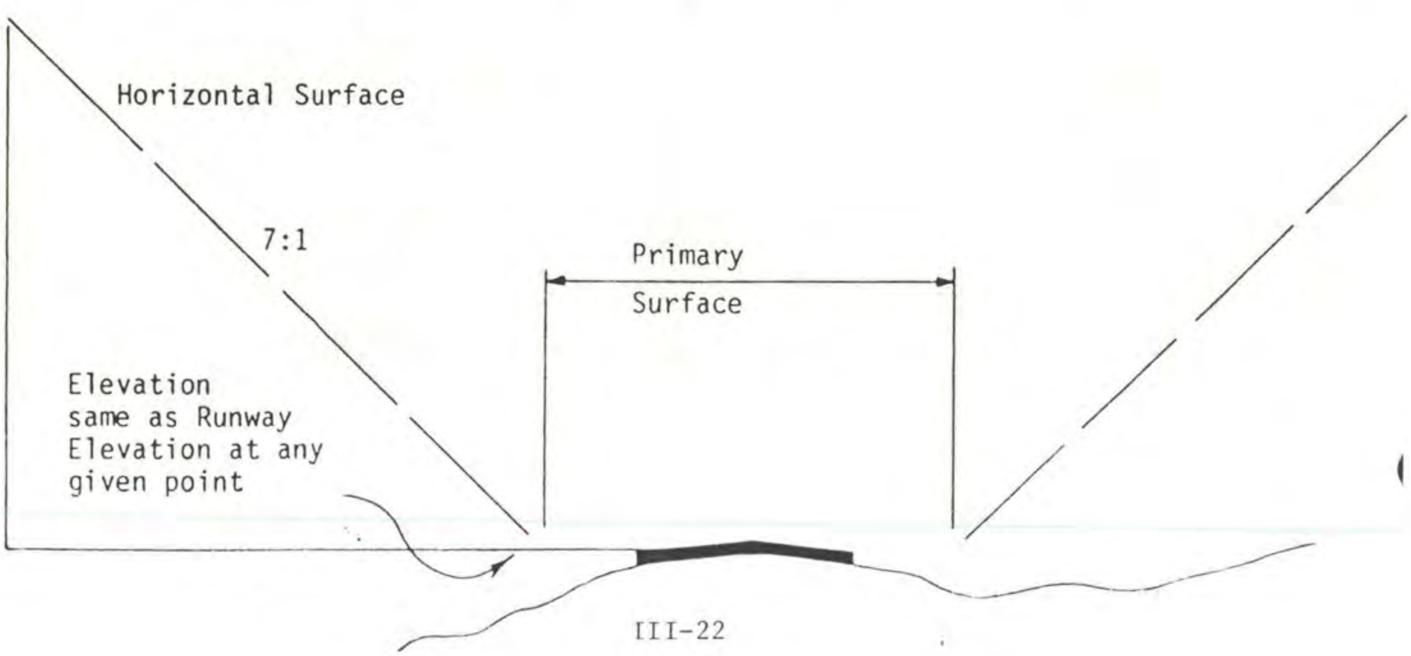
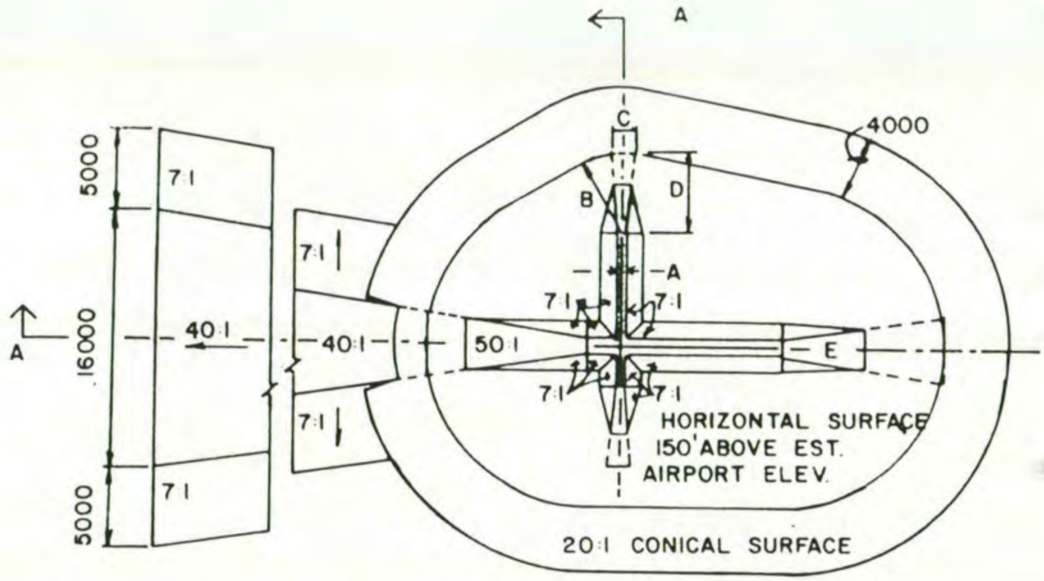
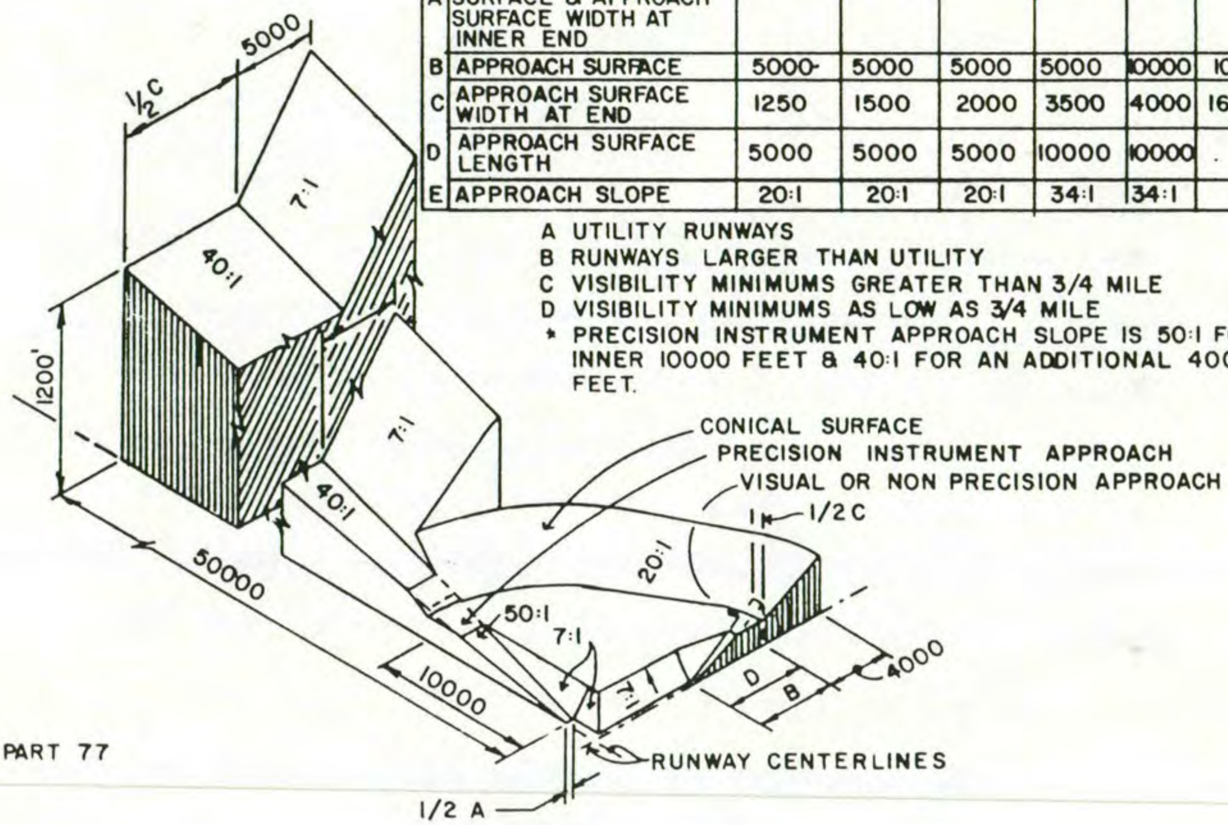


FIGURE 3-7



	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	5000	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

x and y vary in dimension and are determined by the distance required for an imaginary line at a 7:1 slope, to intersect with the primary 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 w/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 or 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 and elevation. FAA recommends clear zones be acquired in fee and that they be free of all objects, as well as concentrations of people. Acquisitions of easements for restricting heights and activities, in lieu of fee, may be acceptable but is less desirable.

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 only 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 FAR Part 77 surfaces are obstructions, and are presumed to be a hazard to air navigation, unless an FAA aeronautic study determines otherwise.

FAA AC 150/5300-4B CHG 6 summarizes minimum standards for identifying and preventing airport hazards on the airport.

- All objects which prevent operational clearance for terminal navigational facilities.
- All objects, including parked aircraft, within 7 feet plus 0.75 feet times the wing span 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 wing span of the most demanding aircraft from a taxiway centerline.

LAND USE

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 Areas
Forest Reserves
Land Reserves and Vacant Land

- Open Space Areas

Memorial Parks and Pet Cemetaries
Water & Sewage Treatment Plans
Water Conservation Areas
Marinas, Tennis Courts
Golf Courses
Park & Picnic Areas
Botanical Gardens
Bowling Alleys
Landscape Nurseries

Archery Rangs
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 Transporation Facilities

Textile & Garment Industries
Fabricated Metal Products Industries
Brick Processing Industries
Clay, Glass, Stone Industries
Chemical Industries
Tire Processing Companies
Food Processing Plants
Paper Printing & Publishing Inds.
Public Workshops
Research Labs
Wholesale Distributors
Bus, Taxi & Trucking Terminals

Foundries
Saw Mills
Machine Shops
Office Parks
Industrial Parks
Public Buildings
Auto Storage
Parking Lots, Gas Stations
Railroad Yards
Warehouse & Storage Buildings
Freight Terminals

- Airport and Aviation Oriented Facilities

Airparks
Banks
Hotels
Motels
Restaurants

Aerial Survey Labs
Aircraft Repair Ships
Aircraft Factories
Aviation Schools
Employee Parking Lots

Aerospace Industries
Airfreight Terminals
Aviation Research and Testing Labs
Aircraft and Aircraft Parts Manufacturers

- Commercial Facilities

Retail Businesses
Shopping Centers
Parking Garages
Finance & Insurance Companies

Professional Services
Gas Stations
Real Estate Firms
Wholesale Firms

SUMMARY

Facility Needs:

The facility needs presented herein are based upon basic utility stage II standards and airplane design group one. The majority of aircraft operations are expected to be made by single and light twin engine aircraft with approach speeds of more than 91 knots but less than 121 knots and wingspans up to but not including 49 feet.

Typically such design standards provide for a runway 60 feet in width and 3400 feet in length. While the 3400 foot length may serve local needs, itinerant traffic may find a 4000 foot length more desireable. Consequently, the site ultimately selected should be able to accommodate a 4000 foot runway even though the recommendation herein finds a 3400 foot facility adequate. There have been occassions where a "branch" plant frequently visited by company aircraft requires additional length.

The site selection process will require the identification of a site capable of accommodating airport facility components. The site should be accessible and so located as to minimize any negative environmental impacts. The total acreage involved will vary with the site selected At mimimum, approximately 70 acreas would be required to construct a primary runway and terminal area.

IV - SITE SELECTION - SOCIOECONOMIC/ENVIRONMENTAL FEASIBILITY

AIRPORT SITE SELECTION

INTRODUCTION

Section Three, Facility Needs, identified those airport components required through the year 2002 to satisfy estimated levels of aviation activity. The selection of an airport site upon which to construct those airport facilities should meet not only present day needs, but long term needs as well. The selected site should represent an acceptable use of the land and not significantly impact the environment in a negative way. The site must also be one which represents a prudent choice in terms of total development costs.

Three candidate airport sites were selected for consideration from an initial list of eight. The initial list was developed by identifying those sites with topographic features which would permit construction of an airport to standards outlined within the Facilities Requirements Section. Consideration was given to all possible land areas within six miles of the City of Belle Plaine. Of the eight sites, the three sites selected were those that were most accessible from the community and service area to the south. The three sites also represented an opportunity to consider other associated development. Finally, minimal grading would be required compared to the other sites where there was greater variation in topography. Reference may be made to Figure 4-1 which depicts the geographic location of the initial eight sites.

An airport development concept depicting runway orientation and minimum land area needs was prepared for each of the three selected sites. These concepts are shown in Figures 4-2, 4-4, and 4-7 and are referenced as Site One, Site Two and Site Three. All three sites are located south of the Belle Plaine and in the Iowa River Valley.

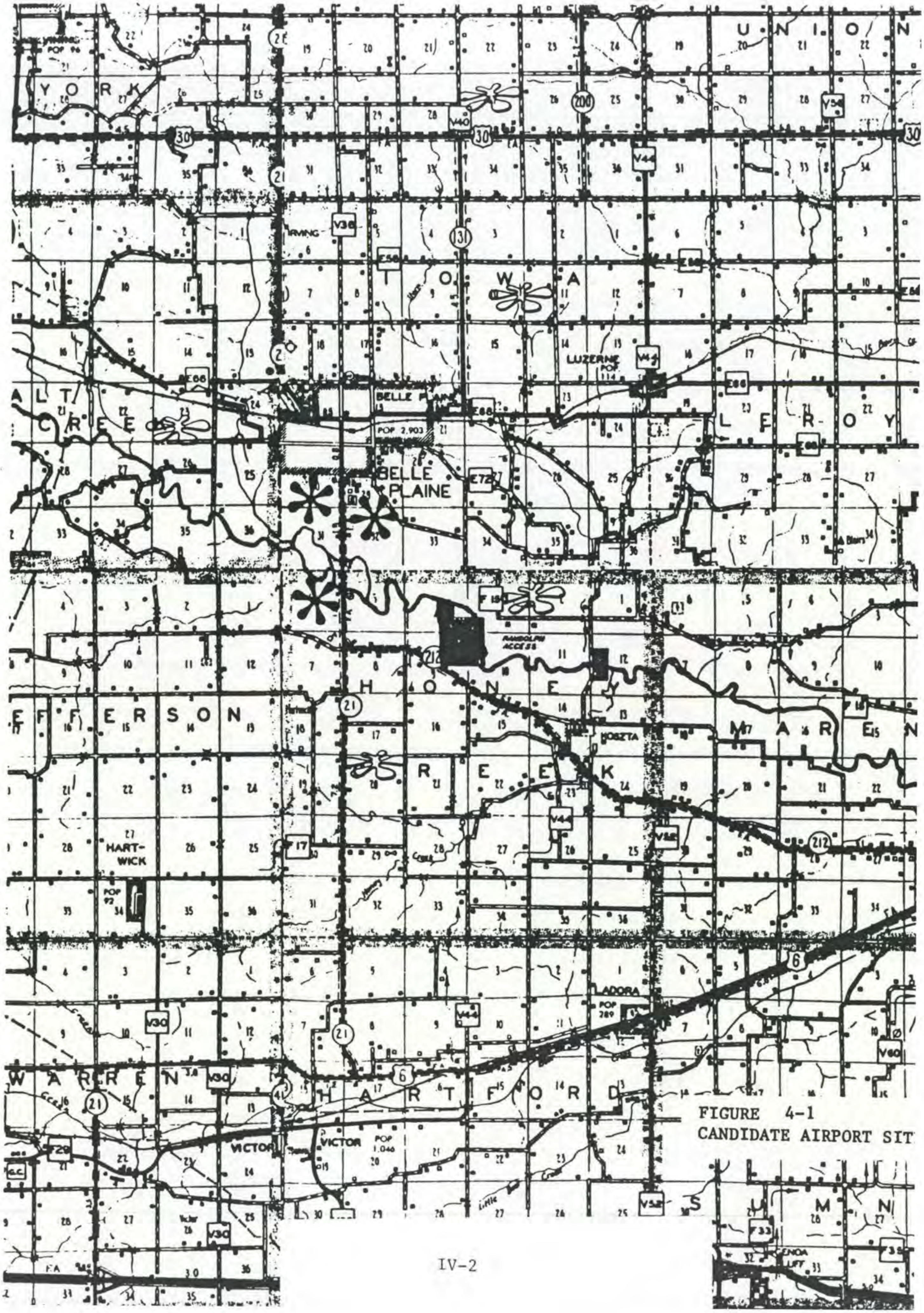


FIGURE 4-1
CANDIDATE AIRPORT SIT

EVALUATION CRITERIA

Eleven criteria were developed to evaluate each of the three candidate airport sites. Each site has certain attributes and limitations which influence the development of the airport, the availability of municipal utilities and services become an important criteria for consideration. Other criteria, though not of lesser importance, are those having an impact upon adjacent land uses. Aircraft noise is often a concern expressed by the public and should be considered in the final selection of an airport site. The eleven evaluation criteria are noted as follows:

Accessibility:

An airport site, where possible, should be located adjacent to or within close proximity of an existing public owned highway or road. Ideally, the road should be hard surfaced.

Topography:

The airport site should be relatively level and able to accommodate two runway facilities with a minimum 60 degree separation between each runway. The terrain should be uniform for a minimum distance of 4,000 feet along the proposed runway alignment.

Prime Farm Land:

The preservation of prime land 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 lands, every effort should be made to minimize the number of acres removed from production. Airports are compatible, for the most part, with agricultural land uses.

Urban Land Uses:

An airport proposed for consturction near an urban area should consider the potential impact it will have upon residential neighborhoods and other places where a sensitivity to noise may become a concern. Generally, an airport is compatible with industrial and commercial type developments.

Sensitive Ecological Areas:

Parcels of land located within areas supporting an unique habitat or endangered species of flora and fauna should be avoided. Where land has been used for agricultural (cropping) purposes, this concern is minimal. However, approach zones and traffic patterns located beyond the airport site may impact such areas should they exist.

Flood Plan:

Airport construction on a flood plain is generally permited provided no such construction takes place within the floodway. Approval must be obtained from the Iowa Department of Water, Air and Waste Management.

Obstructions:

Airport construction in the vicinity of existing obstructions should be avoided. While such concern generally relates to man made structures, terrain and vegetation may also be an obstruction.

Airport Service Area:

The airport should be so located as to be accessible to the greatest number of users. Since there are no state system airports located south of Belle Plaine, a location south would contribute more to satisfying an unmet need than would a facility located north of the community.

FACILITY NEEDS AND UNIT COSTS

For purposes of assessing each site in terms of development costs, facility needs discussed in Section Three have been summarized in Table 4-1.

TABLE 4-1 AIRPORT FACILITY NEEDS:

Item	Description		
Runways:	Length	Width	Strength
Primary	3400'	60'	12,500 lbs. S.W.
Crosswind	2720'-3400'	150'	Turf
Wind Coverage: (60 degree separation between facilities)			
Primary	N 50° W to N 10° E		
Crosswind	N 70° E to N 10° E		
Approach Slopes:			
Primary	20:1	N.P.I.	
Crosswind	20:1	Visual	
Runway Landing and Navigational Aids:			
Primary	Medium Intensity RW Lights (MIRL) Visual Approach Slope Indicator (VASI-2) Runway End Identifier Lights (REIL)		
Crosswind	None		
Airport Land and Navigational Aids:			
Rotating Beacon, Segmented Circle, Lighted Wind Cone Non Directional Radio Beacon (NDB)			
Terminal Area Development:			
Apron	8 tiedowns 2880 S.Y.		
Tee Hangars	6-10 units; 4-6 units		
FBO Shop	60 x 80 (Terminal office located within FBO Shop)		
Vehicle Parking	20 stalls		
Vehicle Access	From existing highway or road		

TABLE 4-1 AIRPORT FACILITY NEEDS: (continued)

Item		Description
Land Acquisition - Fee Title:		
Primary Runway	47.9 Acres (Minimum)	(200' x 3400' x 200') 3800 Ft. x 550 Ft.
Crosswind Runway	41.1 Acres (Maximum)	3800 Ft. x 550 Ft. Less intersection with primary runway (6.9 acres)
Terminal Area:	12 to 24 Acres	
Visibility Zone Acquisition:	Varies with angle of intersecting runways Average 24 Acres	
Clear Zone Protection - Primary Runway:	29.8 Acres	
Clear Zone Protection - Crosswind Runway:	16.1 Acres	
Total Land Acquisition - Initial:	89.7 Acres to 102 Acres	
Total Land Acquisition - Ultimate:	154.8 Acres to 167 Acres	
Taxiway:		
Stub from Primary Runway to apron	300' x 25'	
Pavement Markings:		
Primary Runway	N.P.I.	
Crosswind Runway	None (Turf with markers)	
Taxiway Lighting:		
Medium intensity or reflectors		
Fencing:		
Varies with land acquisition		

Clear zone protection may be satisfied through the purchase of an easement thereby reducing the number of acres purchased in fee title. For purposes of assessing each alternative site, it was assumed that all land requirements would be purchased in fee title.

Runway Alignment Alternatives:

As previously noted, the runways should be so aligned as to provide a maximum level of wind coverage. However, runway alignment alternatives must be assessed not only in terms of wind coverage, but also in terms of the potential impact upon farm operations and ownership patterns. Consequently, a runway alignment alternative which may sacrifice an optimum level of wind coverage may be considered provided that the combined wind coverage is 95 percent or more at a 12 m.p.h. crosswind component value.

Soil Characteristics:

Within this scope of work, an assessment of soil characteristics shall be limited to data available from the Soil Conservation Service (SCS). The site having soils representing those with good construction characteristics should be considered over those with limitations.

Development Cost:

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

Land acquisition costs are a negotiable item and may vary significantly from site to site. Runway, taxiway, and apron costs may vary subject to soil characteristics. Grading and drainage costs may also vary depending upon topography, soil conditions and drainage ways.

Unit costs are based upon current dollars and are intended for assessing the development cost associated with each of the three candidate sites:

TABLE 4-2 AIRPORT DEVELOPMENT - UNIT COSTS:

Paving:	
8000 Lb. Flexible:	
2" Surface (.110 Tons/S.Y. @ $42/Ton)	$ 4.62
2" Base (.1066 Tons/S.Y. @ $38/Ton)	4.05
6" Subbase (.315 Tons/S.Y. @ $10/Ton)	3.15
	$11.82 /S.Y.
12,500 lb. Flexible:	
2" Surface (.110 Tons/S.Y. @ $42/Ton)	$ 4.62
3" Base (.1333 Tons/S.Y. @ $32/Ton)	5.07
6" Subbase (.315 Tons/S.Y. @ $10/Ton)	3.15
	$12.84 /S.Y.
A.C. Overlay - 2" minimum thickness	
2" Overlay (.110 Tons/S.Y. @ $42/Ton)	$ 4.62 /S.Y.
5" Rigid Pavement (12,500 + lbs.)	
5" P.C.C. Pavement	$12.00
4" Subbase (.2132 Tons/S.Y. @ $10/Ton)	2.13
	$14.23 /S.Y.
Site Preparation:	
Evcavation & Grading (Average)	
5.5 C.Y./L.F. @ $1.5/C.Y.	$ 8.25 /L.F.
or on a square yard basis	$ 1.00 /S.Y.
Subgrade Preparation	$ .50 /S.Y.
24" R.C.P. Culvert	$25.00 /L.F.
Fencing	$ 2.00 /L.F.
Lighting and Marking:	
M.I.R.L. System	$10.00 /L.F.
Taxiway Edge Lights	$10.00 /L.F.
Radio Control	$1500.00
V.A.S.I.	$8000.00 /Set
R.E.I.L.'s	$2000.00 /Set

TABLE 4-2 AIRPORT DEVELOPMENT - UNIT COSTS: (continued)

Lighting and Marking: (continued)

Marking	
Basic	$1000.00 + $0.20 /Ft.
N.P.I.R.	$4200.00 + $0.30 /Ft.

Navaids:

N.D.B.	$6000.00 /Each
Rotating Beacon	$5000.00 /Each
Lighting Wind Cone	$3000.00 /Each

There is expected to be no substantial difference in airport development costs among the three candidate sites. Land acquisition represents the only significant variable. It is also an item subject to negotiation.

The acquisition of property, where federal funds are involved, must follow a detailed procedure outlined in the Uniform Property Acquisition Policies Act 1970. (P.L. 91-646)

FLOOD PLAIN

The three candidate sites are located within an area subject to flooding. Information available would indicate that the flood prone area follows the 770 foot contour.

Development is generally permitted on flood plain provided that such development is located beyond the floodway. The floodway is defined as the channel of a river or stream and those portions of the flood plains adjoining the channel, which are reasonably required to carry and discharge flood waters or flood flows so that confinement of flood flows to the floodway area will not result in substantially higher flood levels and flow velocities.

Prior to construction on a flood plain, approval must be obtained from the Iowa Department of Water, Air and Waste Management. At present the encroachment limits of the Iowa River in the vicinity of Belle Plaine have not been set.

The flood plain is defined as that land area susceptible to being inundated by water as a result of a flood. The regulatory flood is a flood having a one percent change of occurring in any one year (100 year flood).

SITE ONE

Airport Site One is located in Section 32 and 29, Range 12W, Township 82N at an elevation of 770 feet above sea level. The site lies in the flood plain of the Iowa River approximately one half mile southeast of the City of Belle Plaine. The terrain is described as level-sloping from the northwest to the southeast.

The land is presently classified as agricultural. The community's sewage treatment plant is located northwest of the site. There are three farmsteads located in the immediate vicinity of the site. Urban land uses are found to the northwest and within 3500 feet of the proposed primary runway threshold. Land uses beyond the proposed runway ends are presently agricultural in nature.

To the northeast, the terrain rises from the valley floor to an elevation 950 feet above sea level. The remaining area to the northwest, south and southeast consist of relatively level land characteristic of a flood plain area with a five to ten foot difference in elevation across the entire site. Minimal grading would be expected.

Natural drainage is from north to south towards the Iowa River. Three manmade/natural drainage ways cross the primary runway, reference may be made to Figure 4-2.

The site could accommodate runway construction beyond the 3400 feet proposed to 4000 feet. A terminal area could be constructed on either side of the primary runway with sufficient land available at either location for expansion.

Access to the site would be provided by an airport access road constructed from the existing county road (gravel) to the east or from

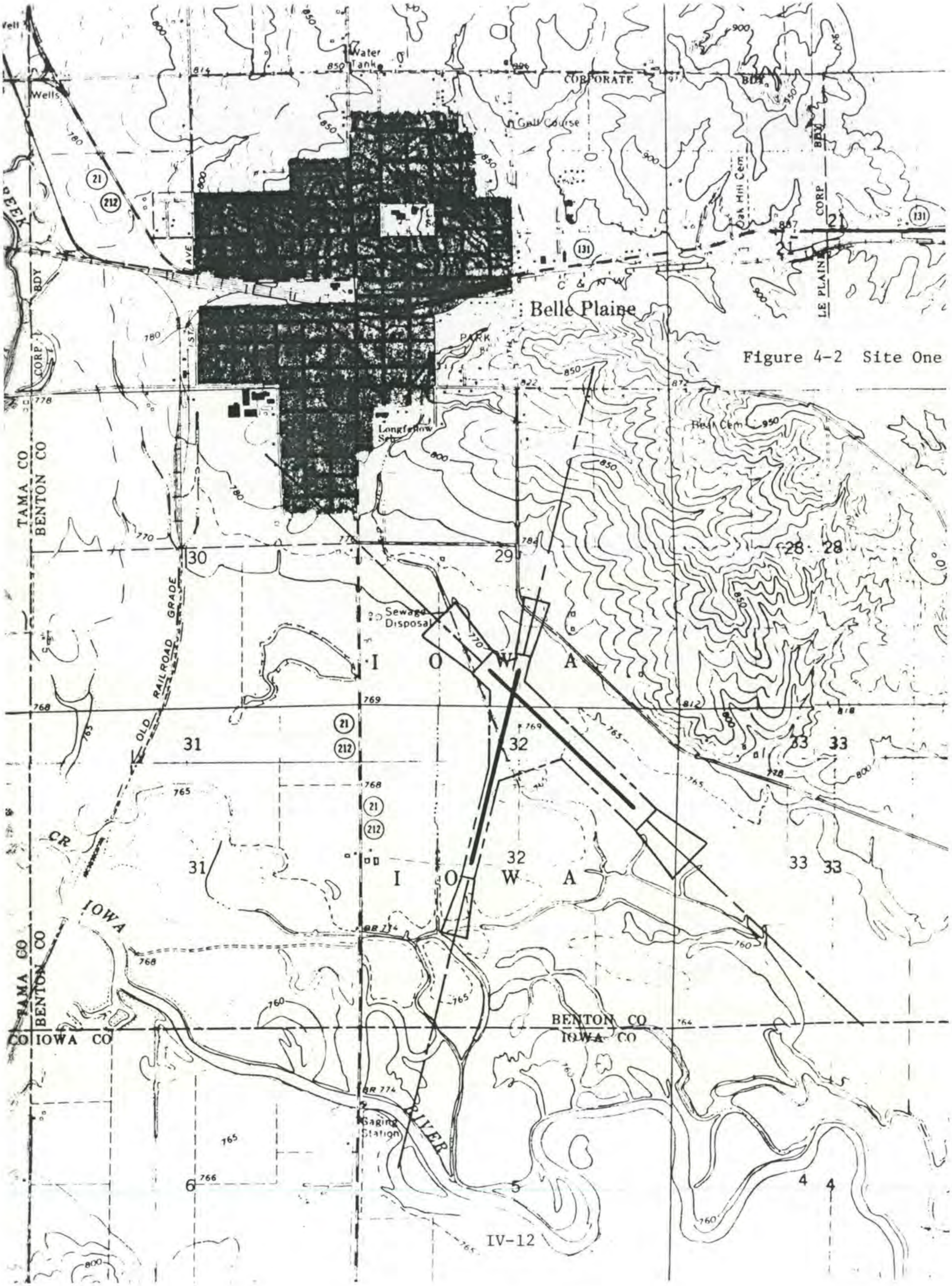


Figure 4-2 Site One

State Highway 21 to the west. From State Highway 21 east to the terminal area would require construction of an access road approximately 1300 feet in length. Location of the terminal area off State Highway 21 would provide for better accessibility from the service area. Approximately 300 feet of access road would be required should the terminal area be constructed to the east.

There are no known obstructions in the immediate vicinity (one mile) of the site. Encroachment upon the proposed clear zones would appear remote due to location of the airport site within the flood plain and the location of the sewage treatment plant to the northwest.

Four land owners would be impacted by the proposed development of which fee title acquisition would involve three. A clear zone easement would involve one land owner.

There are no known historic or archaeological sites located on the site. Since the land is under cultivation, it is assumed that there are no areas supporting an unique habitat that would be disturbed. The impact upon flora and fauna beyond the site from aircraft operations is unknown. Numerous oxbows are located within the flood plain.

Soil on and in the immediate vicinity of the proposed construction consist of the following types:

1. Bremer silty clay loam, 0-2% slope, llw (1043)
2. Zook silty clay loam, 0-2% slope, lllw (54)
3. Colo silty clay loam, 0-2% slope, Vw (133)
4. Nevin silty clay loam, 0-2% slope, I (1088)

Zook silty clay loam is described as nearly level, poorly drained soils and is subject to occasional flooding. Permeability is slow and surface runoff is very slow. The soil is defined as being poorly suited for most engineering uses.

Colo silty clay loam is defined as nearly level, poorly drained soil found on alluvial flood plains and in narrow drainageways in uplands. The soil is also poorly suited for most engineering uses. Permeability is moderate. Surface runoff is slow.

Bremer silty clay loam, sandy substratum is described as nearly level, poorly drained soil on low stream terraces. It is subject to rare flooding. Permeability is moderately slow. Surface runoff is very slow. It is defined as being poorly suited for most engineering uses.

Nevin silty clay loam, sand substratum is described as nearly level poorly drained soil found on moderately wide low alluvial stream benches. Permeability is moderate. Surface runoff is slow. It is moderately suited to most engineering uses.

The engineering properties and soil classification for each of the four major soil types found on Site One are summarized in Table 4-3.

TABLE 4-3 ENGINEERING PROPERTIES, SOILS, SITE ONE

Name	Depth Inches	USDA Texture	AASHTO Classification	Liquid Limit %	Plashi Li %
Zook	0-26	Silty Clay Loam	A-7	45-65	20-35
(54)	26-60	Silty Clay	A-7	60-85	35-55
Bremer	0-20	Silty Clay Loam	A-7	45-60	25-40
(1043)	20-47	Silty Clay Loam	A-7	45-55	20-30
	47-60	Loamy Coarse	A-1	20	NP-5
Colo	0-38	Silty Clay Loam	A-7	40-60	15-30
(133)	38-60	Silty Clay Loam	A-7	40-55	20-30
Nevin	0-17	Silty Clay Loam	A-6, A-7	35-45	11-20
(1088)	17-44	Silty Clay Loam	A-7	40-50	20-30
	44-55	Loam, Sandy Loam	A-4,A-6	20-30	5-15
	55-60	Loam Sand	A-2	20	NP-5

Source: SCS Soil Survey of Benton County, Iowa

On site soil locations are depicted in Figure 4-3. Generally, Class I and II soils are classified as prime farm land. Consequently some prime farm land would be removed from production.

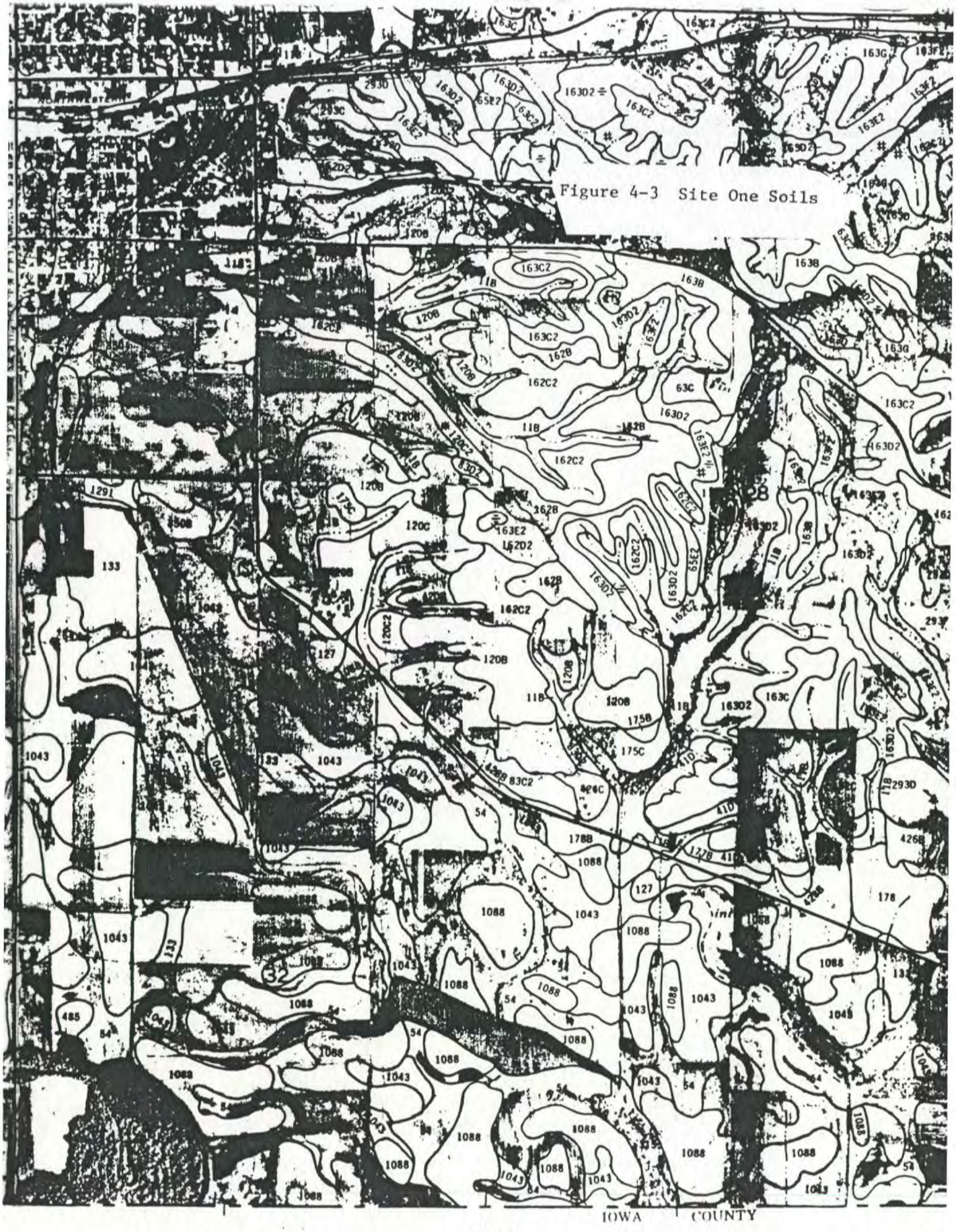


Figure 4-3 Site One Soils

SITE TWO

Site Two is located adjacent to the present corporate boundary of Belle Plaine in Sections 30 and 31, T82N, R12-W at an elevation of 770 feet above sea level. The terrain is described as level.

The site is currently under cultivation. Urban land uses are found to the north. Agricultural land uses are found to the west, east, and south. Urban land uses consist of commercial/industrial development to the north. Residential land uses are found northeast of the proposed north-south runway.

Terrain surrounding the proposed site is described as flat and gently sloping south to the Iowa River. An abandoned railroad is located adjacent to the proposed site. An oxbow is found west of the proposed north-south runway and north of the proposed east-west crosswind runway.

Municipal utilities could be extended to the site. A terminal area could be constructed adjacent to the north-south runway with terminal area access provided from State Highway 21 via 3rd Street. The site would encompass part of a 100 acre site proposed for industrial development.

The concept of an air-industrial park is proposed for consideration. Existing land use to the north as well as the availability of land and utilities may allow such a concept to the developed. In addition, the air-industrial park would have rail service (Chicago Northwestern) and motor carrier access via Highway 21. Reference may be made to Figure 4-4 concerning runway alignment. Figure 4-5 depicts the industrial site proposed for development by the Iowa Electric Light and Power Company.

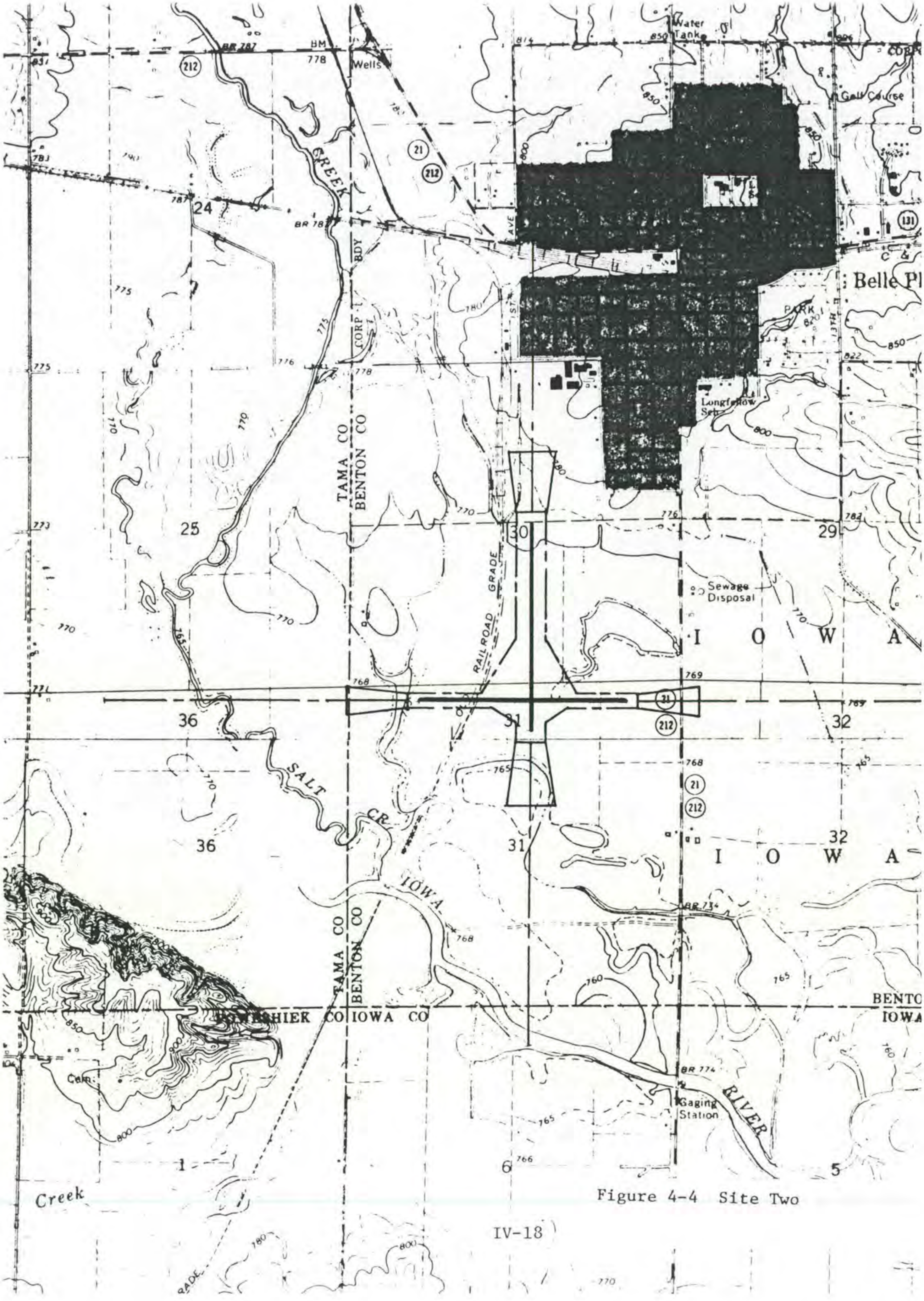


Figure 4-4 Site Two

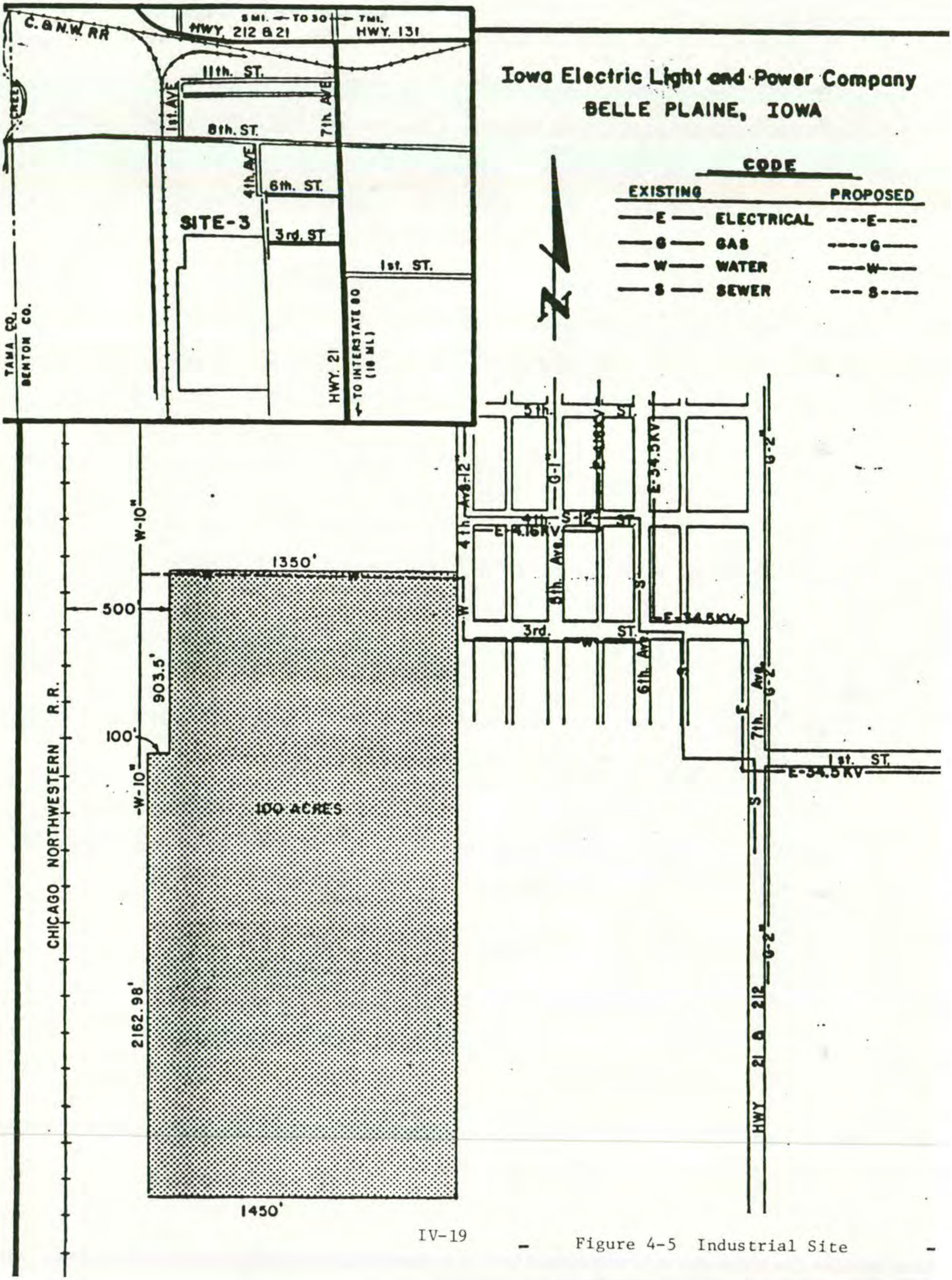


Figure 4-5 Industrial Site

The location of the proposed site adjacent to an urban raises a number of concerns. At present, there are no known structures off the north end of the north-south runway that would represent an obstruction. However, the public should be made aware that should the airport be constructe there would be height limitations imposed on future development in the vicinity of the airport.

Aircraft noise is not expected to have any significant impact upon existing and future land uses. The area in the immediate vicinity of the airport is expected to develop as industrial and commerical uses. Land to the south, west and southeast are expected to be maintained for agricultural uses.

Land acquisition would involve three land owners. Since the largest parcel is available for development, it would appear that acquisition for airport purposes would be less disruptive.

There are no known historic or archealogical sites located on the site. While the area proposed for construction is under cultivation, the approach zones to the south and west would encompass land that supports oxbows and tree cover. The impact upon flora and fauna beyond the area of runway construction is unknown.

The following soil types are found on and in the immediate vicinity of the proposed construction:

1. Bremer silty clay loam, 0-2% slope, II W (1043)
2. Zook silty clay loam, 0-2% slope, III W (54)
3. Nevin silt clay loam, 0-2% slope, I (1088)
4. Wiota silt loam, 1-3% slope, I (127)

The above soils with the exception of the Wiota silt loam were found in Site One.

Wiota silt loam is described as nearly level and gently sloping. The soil is found in alluvium on low stream terraces and is well drained. Surface runoff is high and is described as moderately or poorly suited to most engineering uses.

The engineering properties and soil classification for each of the four major soil types found on Site Two are described in Tables 4-3 and 4-4. Soils as a whole are considered more favorable for development than those of Site One.

TABLE 4-4 ENGINEERING PROPERTIES, SOILS, SITE TWO

Name	Depth Inches	USDA Texture	AASHTO Classification	Liquid Limit %	Plastic Limit %
Wiota	0-16	Silt Loam	A-4	30-40	5-15
		Silty Clay Loam	A-6	-	-
	16-47	Silty Clay Loam	A-7	40-50	15-25
	47-60	Sandy Loam	A-2	20	NP-5
		Loamy Sand	A-3	-	-

Source: SCS Soil Survey of Benton County, Iowa

On site soil types are depicted in Figure 4-6. The Wiota soil is considered prime farm land based upon its capability classification of I.

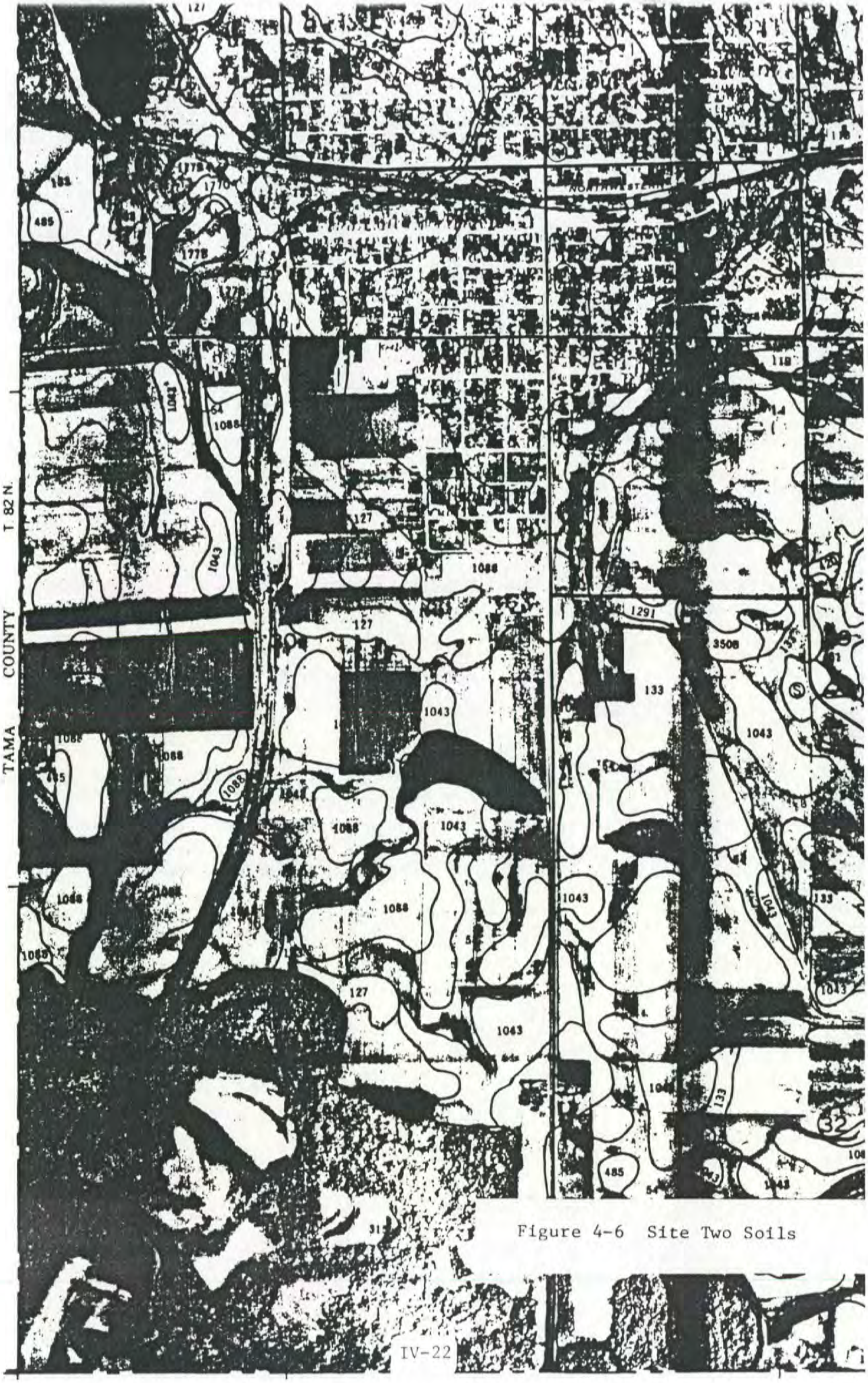


Figure 4-6 Site Two Soils

SITE THREE

Airport Site Three is located in Iowa County, Section 6, T-81N, R-12W. The site lies in a flood prone area of the Iowa River Valley. The terrain rises from an elevation of 770 feet above sea level along the proposed northwest-southeast runway to 920 feet within 5500 feet of the proposed runway threshold to the northwest. The terrain also increases rapidly to the south. To the north and east, the terrain is described as level. Drainage is from south to north and west to east.

There are ten farmsteads in close proximity of the site. There are no urban land uses within 1.5 miles of the site. The site is accessible from Belle Plaine (1.5 miles north) via State Highway 21.

There are no known obstructions in the immediate vicinity of the site based upon the proposed runway alignment depicted in Figure 4-7. Should the orientation of the northwest-southeast runway be moved more to the west, the terrain and nature vegetation may penetrate airport air space.

Six land owners would be impacted by the proposed developed. The proposed runway orientation would also cut across existing crop and property lines.

Natural drainage is from south to north to the Iowa River. The proposed runway orientation would cross two drainage ditches. The proposed construction would be located within 1000 feet of the Iowa River at the nearest point.

Soil types found on Site Three are similar to those found on Sites One and Two.

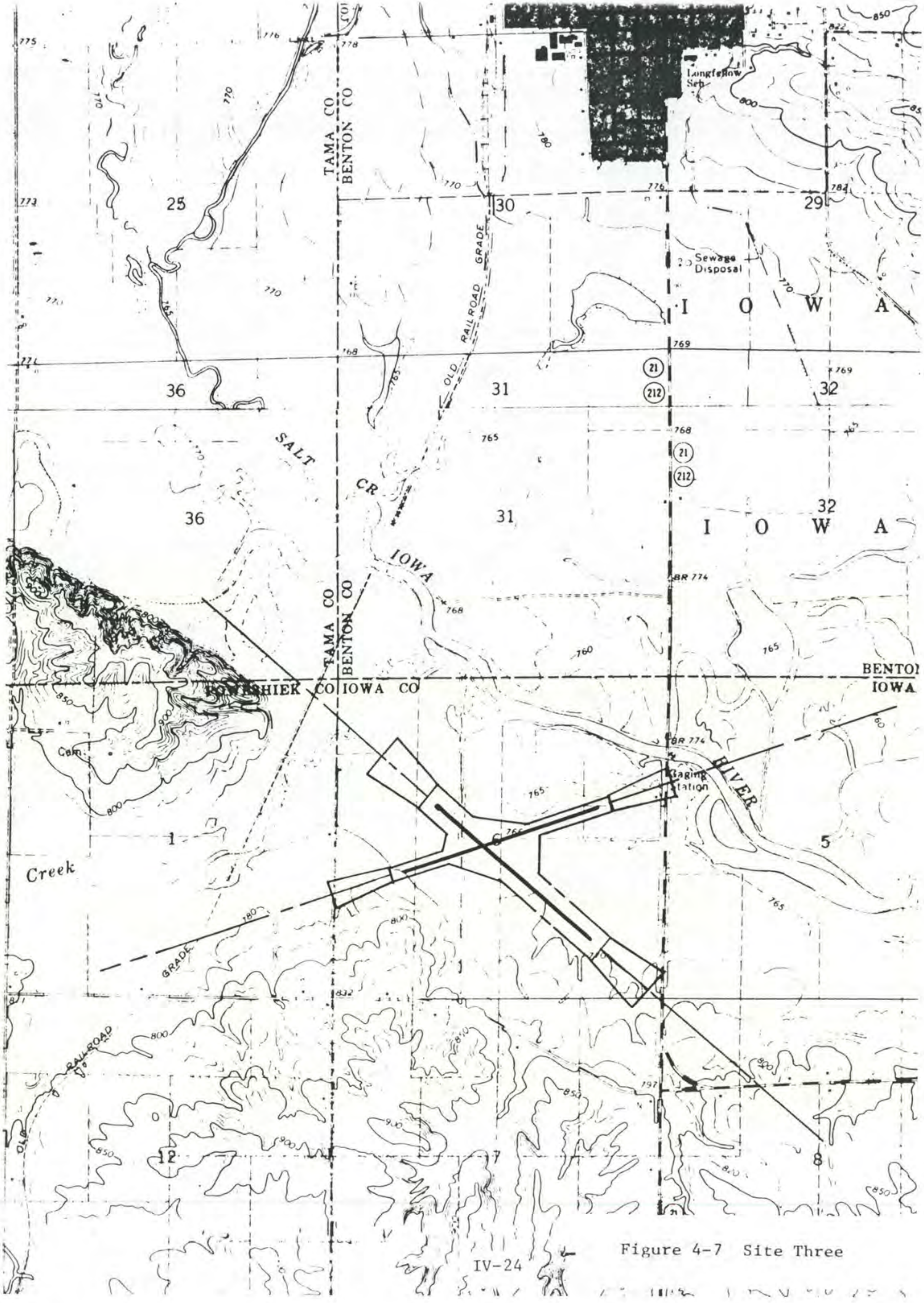


Figure 4-7 Site Three

1. Wiota silt loam, 1-3% slope, I (W A)

2. Zook silty clay loam, 0-2% slope, IIIw (Zk)

3. Nevin silt clay loam, 0-2% slope, I (Ne)

4. Colo silty clay loam, 0-2% slope, Vw (Co)

5. Ely silt loam, 2-5% slope, IIe (sb)

6. Lawler loam, 0-2% slope, IIs (Le)

A summary of each of the above soil types may be obtained from reference to Tables 4-3, 4-4 and 4-5. Figure 4-8 depicts on site location of the various soil types found.

TABLE 4-5 ENGINEERING PROPERTIES, SOILS, SITE THREE

Name	Depth Inches	USDA Texture	AASHTO Classification	Liquid Limit %	Plastic Limit %
Lawler	0-21	Loam	A-6, A-7	35-45	10-20
	21-34	Loam, Sandy Clay Loam	A-6, A-2	15-14	5-20
	34-65	Stratified Sandy Loam to Gravelly Coarse Sand	A-1	-	-

Source: SCS Soil Survey of Benton County, Iowa

IOWA COUNTY, IOWA — SHEET NUMB

Figure 4-8 Site Three Soils

SUMMARY

For consideration of criteria established to evaluate each of the candidate sites, Site Two would appear to best satisfy community needs and yet accommodate the estimated levels of aviation activity through the year 2002. Beyond merely providing an airport facility to satisfy aviation demand, the site would offer an opportunity to promote the development of an air-industrial park concept. Economic development is a major community goal.

Site Two is not without limitations. Encroachment by non-industrial land uses could present problems in the future. The need for clear zone protection does remove a certain amount of land that might otherwise be developed. The clear zone can be used for agricultural purposes or open space. The airport will place restrictions on the height of structures within 9000 feet of the airport. Extension of the north-south runway beyond 3400 feet may be limited due to the relative proximity of the Iowa River to the south.

Wind coverage is sacrificed to some degree because of the north-south alignment of the primary runway. However, this alignment would generally be considered the most prudent choice since it follows existing ownership patterns and land lines.

The most logical location of a terminal area development is east of the north-south runway and north of the existing body of water depicted in Figure 4-4. An alternative crosswind runway alignment to be considered is one located north of the body of water and along the same alignment as the crosswind runway shown in Figure 4-4. This alternative location would allow the terminal area to be constructed near the intersection of the two runways.

Site Three would allow for the best wind coverage. However, the proximity of the site to the Iowa River along with existing crop and fence lines would suggest that development would be more costly. It would also not be practical to assume that municipal services could be extended to the site.

Site One is considered competitive with Site Two. Soils on Site Two are more favorable than Site One. Site One would provide for better wind coverage. Municipal utilities could also be extended. Encroachment by non-compatible land uses would appear less likely at Site One and Three.

Without performing more detailed assessment, potential impacts upon wetland areas and sensitive ecosystems beyond the area of proposed construction for the three candidate sites is unknown.

Development costs (exclusive of land acquisition) are considered equal for all three sites with Site One and Three having a slightly higher cost due to the location of drainage ditches within each site.

An FAA Airspace Determination of Site Two has been made. The proposal was circulated to all known interested parties, and FAA has no objection to the development of Site Two, provided that the existing Belle Plaine Airport is permanently closed upon activation of the proposed new airport. A letter of intent to comply with requirements has been signed by both the lessor and lessee of the existing airport.

DECISION POINT

The Airport Committee has the task of identifying one of the three sites for a more detailed assessment, recommending an alternative site or terminating the site selection (no project alternative) process.

Airport Site Selection:

1. Site One
2. Site Two
3. Site Three
4. Alternative Site
5. No Project

An assessment of development alternatives to include runway alignment and terminal area location will be undertaken for the site selected by the Airport Committee. A cursory overview of environmental consequences will also be performed.

V - AIRPORT LAYOUT PLAN

AIRPORT LAYOUT PLAN

The Airport Layout Plan (ALP) is a graphic presentation to scale of the proposed facility and existing features. It provides pertinent information on dimensional requirements, clearances and facility locations in order to comply with applicable standards.

The ALP is presented on 22" x 36" drawings. Because of the size, the drawings are bound separately from this report. The drawings include:

	Sheet
Cover Sheet	1
Airport Layout Plan	2
Airport Imaginary Surfaces	3
Plan & Profile	4
Terminal Area/Industrial Park	5

VI - DEVELOPMENT SCHEDULE AND COST ESTIMATES

DEVELOPMENT SCHEDULE AND COST ESTIMATES

The improvements which will bring the airport to its ultimate develoment in the next 20 years are divided into three stages for short, intermediate, and long range periods. The stages can then be accomplished through phases, each designated as a project and usually lasting one construction season. The following paragraphs describe the proposed items and schedule of development.

Stage One (1 to 5 Years): Stage One involves development of initial facilities to establish a serviceable airport. The first phase of this development is acquisition of all the necessary land in fee and easement for the primary runway, terminal facilities and airport access.

The second phase involves grading of the initial development items. This includes the primary runway safety area (3800' x 150'), apron area, connecting taxiway, access road and parking lot. Also, rock surfacing is planned for the access road and parking lot.

Third phase development provides the paving and lighting of the runway, connecting taxiway and a portion of the apron area. Navigational aids to be installed with the lighting includes a rotating beacon, lighted wind cone and non-directional radio beacon.

Support facilities included in Stage One development include a buried fuel tank and a six-stall T-hangar. A typical nested T-hangar has a half stall in opposing corners. One of these could be used for the terminal building until activity justifies development of a separate and larger terminal building. The other half stall could be used for storage.

Stage Two (6 to 10 Years): Projects in the second stage of development should be undertaken as demand justifies. The anticipated projects include expansion of the apron to provide additional tie-downs, T-hangar construction and development of a terminal/FBO building.

Stage Three (11 to 20 Years): Projects in the third stage of development may or may not be constructed. They primarily involve improvements to increase operational efficiency and capacity, and to accommodate increased itinerant and based aircraft. These improvements should be constructed as the need dictates.

Third stage projects include land acquisition for and construction of a cross wind runway. This runway will increase the utility of the airport by increasing the wind coverage from 76.1% to 95.0%.

Also included in the third stage is the development of parallel taxiways. Parallel taxiways increase the capacity of the runways by allowing aircraft to be taxiing while other aircraft are using the runway for landings or takeoffs.

Lastly, the third stage of development provides for additional hangar space and tie-down areas.

Related Development: In conjunction with the airport development, certain industrial park improvements are anticipated. The industrial park improvements cannot be funded with FAA or DOT money, however, some economy can be realized by acquiring land and developing utilities concurrently with the airport. Acquisition of the airport property in Stage I will result in creation of land locked and other odd parcels. The land locked parcel would be considered an uneconomic remnant and would require the payment of damages or acquisition of the parcel. If the parcel is acquired in conjunction with the airport property, the necessity of paying damages would be avoided. Similar economy could be realized by acquiring the other planned industrial areas with the airport property and avoiding the damages associated with leaving smaller less economical properties.

Utilities should be developed in conjunction with the airport development. This would provide the necessary utilities for the airport and at the same time make utilities available to the industrial areas. The result would be a more marketable industrial area.

STAGE DEVELOPMENT COSTS

Based on the above described improvements, estimated costs have been calculated for the stage development of the airport. The unit costs used represent an average for current 1985 pricing. Actual project costs may vary depending on several parameters such as construction conditions, specification requirements and time of construction. Future costs can be estimated by comparing Engineering News Record construction cost indexes and applying those to the costs included herein. The ENR Construction Cost Index Value for February 28, 1985 is 4180.75.

The following are the estimated costs for the stage development.

STAGE I DEVELOPMENT (1 TO 5 YEARS)

ITEM NO	DESCRIPTION	QUANTITY	UNIT COST	TOTAL COST
Land Adquisition				
1	Land in Fee	72.7 Acre	1,800.00	130,860.00
2	Land in Easement	20.1 Acre	500.00	10,050.00
3	Fencing	12250 L.F.	3.50	42,875.00
4	Appraisals	L.S.		6,000.00
5	Land Survey & Descriptions	L.S.		5,000.00
6	Land Negotiations	L.S.		4,000.00
7	Legal, Recording & Admin.	L.S.		2,500.00
8	Contingencies	5%		10,115.00
				$211,400.00

ITEM NO	DESCRIPTION	QUANTITY	UNIT COST	TOTAL COST
Runway, Taxiway & Apron Grading				
1	Excavating & Grading	20250 C.Y.	2.50	50,625.00
2	Seeding & Fertilizing	24 Acre	750.00	18,000.00
3	Driveway & Parking Surfacing	600 Tons	12.00	7,200.00
4	Miscellaneous Construction	L.S.		15,000.00
5	Contingencies	10%		9,082.50
6	Engineering, Legal & Admin.	17%		16,992.50
				$116,900.00

ITEM NO.	DESCRIPTION	QUANTITY	UNIT COST	TOTAL COST
Runway, Taxiway & Apron Paving				
1	Subgrade Preparation	30600 S.Y.	.30	9,180.00
2	4" Granular Base	6500 Tons	9.00	58,500.00
3	5" P.C.C. Paving	30600 S.Y.	12.00	367,200.00
4	Shouldering	L.S.		4,000.00
5	Seeding & Fertilizing	5 Acres	750.00	3,750.00
6	Marking	12000 S.F.	.35	4,200.00
7	Tie-Down Anchors	12 Each	50.00	600.00
8	Contingencies	10%		44,743.00
9	Engineering, Legal & Admin.	17%		83,727.00
				$575,900.00
Lighting & Navigational Aids				
1	Basic Edge Lighting System	1 Only	30,000.00	30,000.00
2	VASI	2 Sets	3,500.00	7,000.00
3	REIL's	2 Sets	2,000.00	4,000.00
4	Radio Control	1 Only	2,500.00	2,500.00
5	Electrical Vault	1 Only	2,500.00	2,500.00
6	Rotating Beacon	1 Only	4,000.00	4,000.00
7	Lighted Wind Cone	1 Only	2,500.00	2,500.00
8	Non-Directional Radio Beacon	1 Only	4,000.00	4,000.00
9	Contingencies	10%		5,650.00
10	Engineering, Legal & Admin.	17%		10,650.00
				$72,800.00

ITEM NO.	DESCRIPTION	QUANTITY	UNIT COST	TOTAL COST
Hangar Development				
1	Site Preparation	L.S.		2,500.00
2	6 Stall T-Hangar	6 Stall	12,500.00	75,000.00
3	Taxiway Paving	1200 S.Y.		0.00
4	Contingencies	10%		7,750.00
5	Engineering, Legal & Admin.	17%		14,550.00
				$99,800.00
Buried Fuel Tank				
1	8,000 Gallon Buried Tank	L.S.		8,000.00
2	Dispenser & Miscellaneous	L.S.		3,000.00
3	Contingencies	10%		1,100.00
4	Engineering, Legal & Admin.	17%		2,100.00
				$14,200.00

STAGE II DEVELOPMENT (6 TO 10 YEARS)

ITEM NO.	DESCRIPTION	QUANTITY	UNIT COST	TOTAL COST
Apron Expansion				
1	Excavation & Grading	1900 C.Y.	2.50	4,750.00
2	Subgrade Preparation	5800 S.Y.	.30	1,740.00
3	4" Granular Base	1200 Ton	9.00	10,800.00

ITEM NO.	DESCRIPTION	QUANTITY	UNIT COST	TOTAL COST
Apron Expansion (continued)				
4	5" P.C.C. Paving	5800 S.Y.	12.00	69,600.00
5	Seeding & Fertilizing	1 Acre	650.00	650.00
6	Tie-Down Anchors	12 Each	50.00	600.00
7	Contingencies	10%		8,814.00
8	Engineering, Legal & Admin.	17%		16,546.00
				$113,500.00
Hangar Development				
1	Site Preparation	L.S.		2,500.00
2	6 Stall T-Hangar	6 Stall	12,500.00	75,000.00
3	Taxiway Paving	650 S.Y.	20.00	13,000.00
4	Contingencies	10%		9,050.00
5	Engineering, Legal & Admin	17%		16,950.00
				$116,500.00
Terminal/FBO Building				
1	Site Preparation	L.S.		2,500.00
2	Terminal/FBO Building	6400 S.F.	25.00	160,000.00
3	Contingencies	10%		16,250.00
4	Engineering, Legal & Admin.	17%		30,450.00
				$209,200.00

STAGE III DEVELOPMENT (11 TO 20 YEARS)

Land Acquisition

Land acquisition in Fee and Easement for Crosswind Runway.

Runway Grading

Grading for Crosswind Runway

Runway Paving

Paving 3400' x 60' Crosswind Runway

Lighting

MIRL for Crosswind Runway

Parallel Taxiway

Grade, Pave, and Light Parallel Taxiway

Hangar Development

Develop Additional T-Hangar Stalls

Apron Expansion

Expand apron to provide additional tie-downs.

VII - IMPLEMENTATION

IMPLEMENTATION

There are a number of sources of finances available to the City of Belle Plaine for airport improvement projects. The sponsor should thoroughly investigate alternative sources in the development of individual projects.

Government Grants: The Iowa Department of Transportation currently participates in airport improvement projects through grants of up to 70% of the project cost with the remaining 30% to come from local sources. The D.O.T. has approximately $800,000 to $900,000 per year for such projects. In general, eligible projects include any improvements serving public aviation. Projects not eligible for participation include hangars, aprons within 20 feet of a hangar, parking lots and driveways. The D.O.T. also maintains a reserve for safety equipment on a 50-50 matching basis. The safety program has approximately $60,000 available annually.

The Federal Aviation Administration also participates in similar general aviation airport improvement projects at the rate of 90% of allowable project costs. The appropriation bill allocating this money expires in 1987. At that time Congress must enact a new appropriation bill.

In order to be eligible for FAA funding the airport must be on the National Integrated System of Airports. At the present time Belle Plaine is not included on the list. As a general rule, in order to be included on the list an airport must have at least ten based aircraft.

A second requirement of obtaining FAA funds is that certain projects must have an environmental study. This includes projects for a new airport location, land acquisition, a new runway, a major runway extension, or a project that will accommodate noisier aircraft. Other projects such as lighting improvements, apron construction, and runway, taxiway and apron construction that will not create off-airport impacts are eligible for FAA funds without an environmental study.

It is recommended here that the airport be established utilizing Iowa D.O.T. development funds. As activity and based aircraft increase, efforts should be made to include the airport on the FAA system plan. At that point in time the necessity for an environmental study should be evaluated. It is not recommended that the environmental study be prepared before this since an environmental study has a limited life and at a minimum would need to be updated by the time it is needed.

The amounts and sources of D.O.T. and F.A.A. funds are depicted in Figure 7-1.

Other grants are sometimes available through such agencies as the Economic Development Administration and H.U.D. Such grants for airport improvements are not very common, however, their possibility should not be overlooked.

Private Financing: Private financing may be practical for construction of hangar facilities. Such facilities can be constructed with private capital on airport property with the hangar to be deeded to the City in trade for a long term lease for the facility. The advantage of such an arrangement is that it relieves the City of the burden of financing private hangar facilities while retaining possession and control of all real property on the airport.

Some communities have had successful industrial fund drives, soliciting private funds to help defray the local share of government participation projects. These types of efforts go a long ways towards

FIGURE 7-1

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

AIR CARRIER	1984	1985	1986	1987	1988	1989
Federal (90%) [2]	2,500	2,893	3,119	3,360	3,495	3,633
Local Match (10%) [3]	277	321	346	373	388	403
Total	2,777	3,214	3,462	3,733	3,883	4,036
GENERAL AVIATION & OTHER COMMERCIAL SERVICE						
Construction						
Federal-formula (90%)	1,326	1,512	1,686	1,686	1,686	1,686
-discretionary (90%)	1,000	800	800	800	800	800
Local Match (10%) [3]	258	256	276	276	276	276
Subtotal	2,584	2,568	2,762	2,762	2,762	2,762
State (70%)	849	820	840	865	890	913
Local Match (30%) [4]	364	351	360	370	381	391
Subtotal	1,213	1,171	1,200	1,235	1,271	1,304
Total Construction	3,797	3,739	3,962	3,997	4,033	4,066
Safety						
State (50%) [4]	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.
[2] This amount is the sum of the allocations for 4 locations.
[3] Includes only estimates of local funds needed to match federal and state funds. Does not include 100% locally financed improvements.
[4] State funds reserved for cooperative safety improvements, 50% state; 50% local.

SOURCE: IDOT Improvement Program - 1984 to 1989 showing local support for an airport development and helping to influence local government and funding agency participation.

Revenue Bonds: Revenue bond financing can be used for some airport improvements such as hangars. The advantage of revenue bonds is that it provides a method of financing necessary improvements without a direct burden to the tax payer.

General Obligation Bonds: General obligation bonds have historically been the most common method of financing the local share of government participation projects. The bonds are backed by the taxing power of the municipality. However, the amount a municipality can bond is limited and airport improvement costs must be budgeted along with all other essential public works.

Airport Generated Revenues: The airport itself generates some revenues through F.B.O. and operator's fees, hangar rentals and income from airport farmland. These revenues, however, must first pay for normal operating and maintenance costs of the airport.

Implementation: Development of the proposed improvements will probably involve many of the above sources of funding. Some projects such as planning, engineering and land acquisition, can be accomplished with local funds and later used as a credit toward the local match of a funded project. The following table presents one possible scenario for financing of the proposed Stage One development.

PROJECT	LOCAL SHARE	FEDERAL SHARE	STATE SHARE	TOTAL COST
Land Acquisition	$63,420		$147,980	$211,400
Runway, Taxiway & Apron Grading	35,070		81,830	116,900
Runway, Taxiway & Apron Paving	57,590	$518,310		575,900
Lighting & Navigational Aids	7,280	65,520		72,800
Hangar Development	99,800			99,800
Buried Fuel Tank	14,200			14,200
	$277,360	$583,830	$229,810	$1,091,000

The above table assumes that the airport is established with a turf strip initially. As activity picks up, eligibility for federal funds is established and the paving and lighting are accomplished with federal funding. If the paving and lighting are to be accomplished with state funds, the local share of those projects would be $172,770 and $21,840 respectively. That would make the total local share $407,100.