Airport Development Plan

Chariton, Iowa

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CHARITON MUNICIPAL AIRPORT

AIRPORT DEVELOPMENT PLAN

PREPARED BY
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CHAPTER ONE

COMMUNITY AND AIRPORT BACKGROUND

Airport Planning Process

The City of Chariton retained Professional Design Services of Iowa, Inc. to prepare an Airport Development Plan for the Chariton Municipal Airport. A grant-in-aid was obtained from the Iowa Department of Transportation to carry out a scope of work designed to address the extent, cost, feasibility, and schedule of future airport facility needs.

The primary goal of the Airport Development Plan was to identify future airport development needs which would satisfy aviation demand levels over a twenty-year period in a viable and prudent manner. Plan objectives are noted below and were incorporated into the planning process described in Table 1-1.

OBJECTIVES:

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

2. To establish a realistic schedule for the implementation of the development proposed in the plan with an emphasis placed on the zero to ten-year period.

3. To propose a realistic financial plan to support the implementation schedule.

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

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

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

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

The report is presented in six chapters, the first of which summarizes relevant background information used in the preparations of chapters two through six.

TABLE 1-1: AIRPORT DEVELOPMENT PLANNING PROCESS

1. INVENTORY
   - Existing airport site(s)
   - Airport service area
   - Goals and objectives
   - Socioeconomic characteristics

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

III. BENEFIT/COST ASSESSMENT
   - Demand/Capacity
   - Airport service level
   - Airside, landside
   - Decision Point

IV. FACILITY NEED
   - Wind coverage
   - Runway length, width, strength
   - Taxiway
   - Landing and navigational needs
   - FAR Part 77
   - Terminal area

V. ALTERNATIVES
   - On/Off airport land use
   - Environmental considerations
   - Development alternatives

VI. PLANS
   - ALP
   - Imaginary surfaces
   - Clear zone plan/profile
   - Terminal area plan

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

Citizen Participation on-going

SOURCE: PDS, 1987

Location of the Chariton Municipal Airport with respect to the City of Chariton and other transportation facilities is depicted in Figure 1-1.

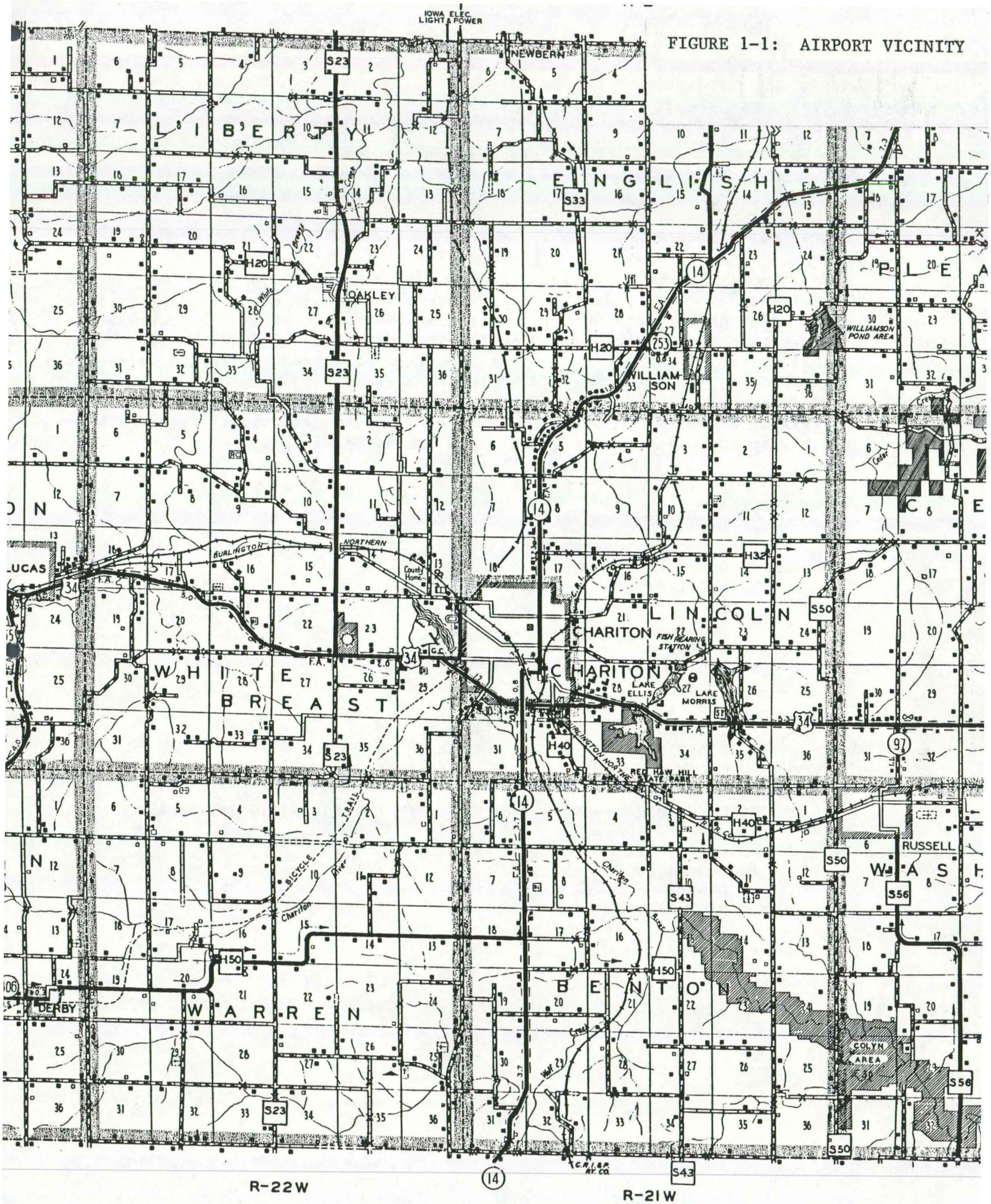


FIGURE 1-1: AIRPORT VICINITY

AIRPORT SERVICE AREA

Political Subdivisions

The airport service area may be described in terms of a primary and secondary service area. The primary airport service area would coincide for the most part with that of Lucas County. A secondary service area extends beyond the primary service area and would include a part of Wayne County. Prior to the construction of the new airport at Osceola, the secondary airport service area extended into Clarke County. Should a new airport at Leon be constructed, those aircraft registered in Decatur County and based at Chariton would most likely be based at Leon. The Leon facility would also serve a part of Wayne County to include parts of Benton and Richman Townships.

The primary airport service area includes the following political subdivisions:

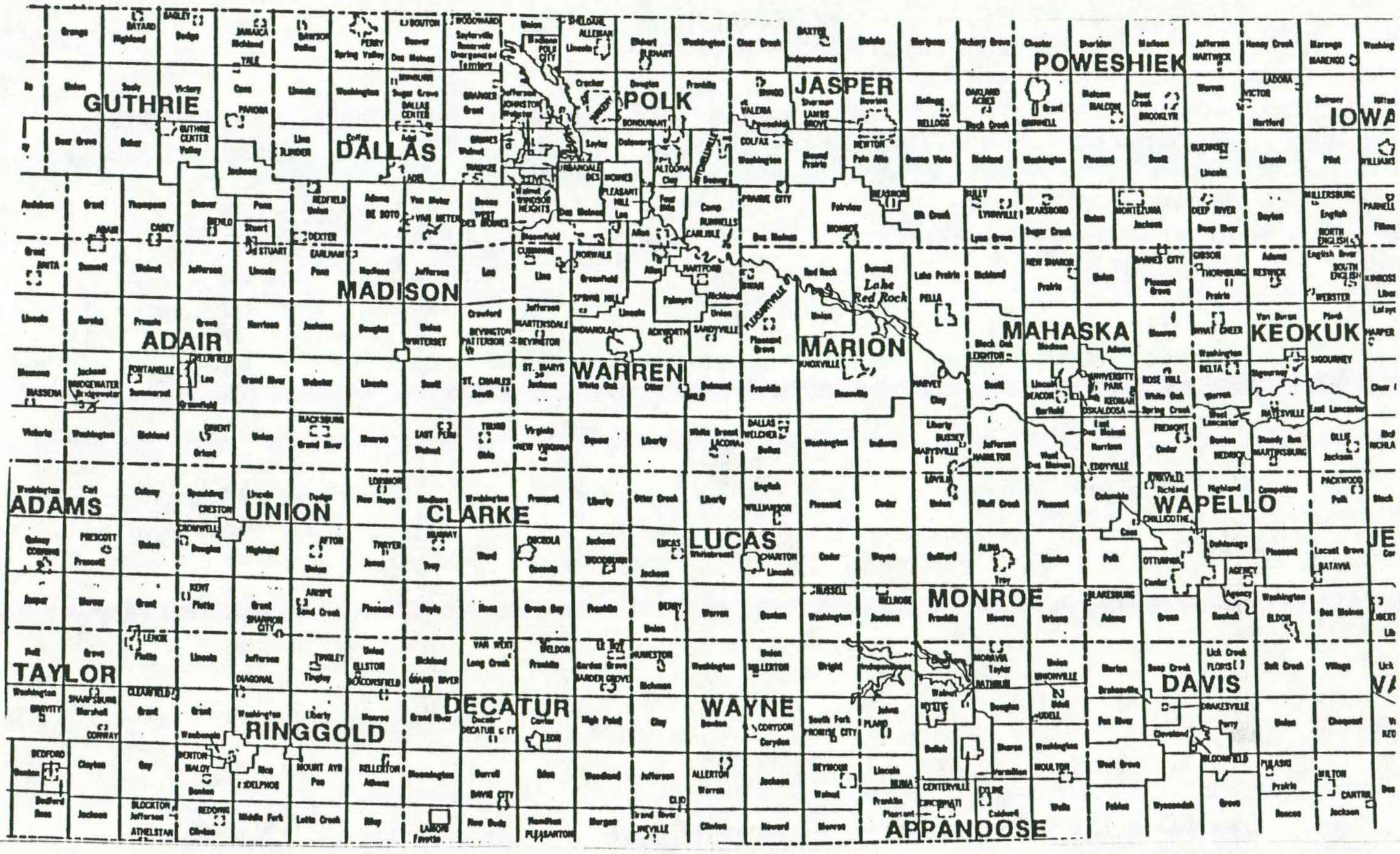
- Lucas County
  - Incorporated Communities
    - Chariton
    - Williamson
    - Lucas
    - Derby
    - Russell
  - Townships
    - Benton
    - Cedar
    - English
    - Jackson
    - Liberty
    - Lincoln
    - Otter Creek
    - Pleasant
    - Union
    - Warren
    - Washington
    - Whitebreast

The secondary airport service area includes the following political subdivisions:

- Wayne County
  - Incorporated Communities
    - Corydon
    - Humeston
    - Millerton
  - Townships
    - Richman (part)
    - Washington
    - Union
    - Wright
    - Corydon
    - Benton (part)

The Centerville Airport serves the southeastern part of Wayne County. Public airport facilities at Albia and Knoxville define the primary airport service area to the east and north. Reference may be made to Figure 1-2 which depicts the primary and secondary airport service areas. The primary emphasis of this study will be on the primary airport service area.

FIGURE 1-2: PRIMARY AND SECONDARY AIRPORT SERVICE AREA - CHARITON MUNICIPAL AIRPORT



The primary airport service area encompasses 432 square miles and had a 1980 population of 10,313 persons.

Population Change

The primary airport service area experienced a population loss each decade beginning in 1930 and extending through 1970. The historic downward trend was reversed in 1980 when the airport service area experienced a population increase of 1.5 percent over the 1970 census count. In 1980, 10,313 persons resided within the primary airport service area.

TABLE 1-2: POPULATION CHANGE, AIRPORT SERVICE AREA, 1930 - 1980

YEAR	POPULATION	YEAR	POPULATION
1930	15,114	1960	10,923
1940	14,571	1970	10,163
1950	12,069	1980	10,313

SOURCE: 1980 CENSUS, Number of Inhabitants, PC80-1-A17

Of the primary service area population, 48.4 percent resided within the City of Chariton. The remaining 51.6 percent of the population was classified as rural of which 1,266 persons resided in places of less than 1,000 population.

Of the twelve townships within the primary airport service area, all but two experienced a population loss between 1960 and 1970. Lincoln Township reported a population increase of 33.2 percent which suggests fringe area growth beyond the corporate boundaries of Chariton.

TABLE 1-3: POPULATION CHANGE, PRIMARY AIRPORT SERVICE AREA, BY POLITICAL SUBDIVISION, 1960 - 1980

TOWNSHIP/INCORPORATED AREA	1960	1970	1980	1960 - 1980 NUMBER	1960 - 1980 PERCENT
Benton Twp.	377	348	322	- 55	- 14.6
Cedar Twp.	374	320	287	- 87	- 23.3
Chariton *	5042	5009	4987	- 55	- 1.1
English Twp.	715	643	617	- 98	- 13.7
Williamson	262	216	210	- 52	- 19.8
Jackson Twp.	606	477	526	- 80	- 13.2
Lucas	357	247	292	- 65	- 18.2
Liberty Twp.	360	311	312	- 48	- 13.3
Lincoln Twp.	533	467	710	+ 177	+ 33.2
Otter Creek Twp.	352	299	250	- 102	- 29.0
Pleasant Twp.	372	323	330	- 42	- 11.3
Union Twp.	436	438	416	- 22	- 5.0
Derby	151	161	171	+ 20	+ 13.2
Warren Twp.	393	285	254	- 139	- 35.4
Washington Twp.	921	836	816	- 85	- 11.4
Russell	577	591	593	+ 16	+ 2.8
Whitebreast Twp.	442	407	486	+ 44	+ 10.0
TOTAL COUNTY	10923	10163	10313	- 610	- 5.9

* RCM, 1982 Community Development Plan: 1980 population of 5,116; Published = 4987

SOURCE: 1980 CENSUS, Number of Inhabitants, PC80-1-A17

The City of Chariton, the principal community within the primary airport service area, experienced a population loss within the period 1940 through 1970. The 1982 Community Development Plan reported a 1980 population of 5,116 or a 1.9 percent increase over the 1970 population of 5,009 persons. The 1970 population of Chariton was 5,754 persons.

Population change within the secondary airport service area for the period 1960 to 1980 is summarized in Table 1-4. Of the three communities, Humeston and Corydon reported slight population increases within the twenty-year period. Rural population like that of the primary airport service area experienced a decrease. In 1980, there were 3,811 persons within the secondary or fringe service area.

TABLE 1-4: POPULATION CHANGE, SECONDARY AIRPORT SERVICE AREA BY POLITICAL SUBDIVISON, 1960 - 1980

TOWNSHIP/INCORPORATED AREA	1960	1970	1980	1960 - 1980 NUMBER	1960 - 1980 PERCENT
Richman Twp. (1)	174	128	108	- 66	- 37.9
Humeston	638	673	671	+ 33	- 5.2
Benton Twp. (2)	181	148	169	- 12	- 6.6
Washington Twp.	452	334	305	- 147	- 32.5
Union Twp.	412	292	280	- 132	- 32.0
Millerton	90	82	72	- 18	- 20.0
Wright Twp.	364	289	257	- 107	- 29.4
Corydon Twp.	1957	1947	1991	+ 34	+ 1.7
Corydon (3)	1709	1745	1796	+ 87	+ 5.0
TOTAL	4230	3841	3811	- 419	- 9.9

(1) One half of township population not including Humeston
(2) One half of township population not including Corydon
(3) Includes population within Benton Township

SOURCE: 1980 CENSUS, Number of Inhabitants, PC80-1-A17

Future population change within the primary airport service area is expected to stabilize over the twenty-year period. Population estimates prepared by the Iowa Census Data Center in 1984 project a slight increase in population through the year 2000.

TABLE 1-5: POPULATION CHANGE, PRIMARY AIRPORT SERVICE AREA, 1980 - 2000

YEAR	POPULATION	YEAR	POPULATION
1980	10,313	1995	10,700
1985	10,400	2000	10,800
1990	10,600		

SOURCE: IOWA CENSUS DATA CENTER, Iowa Population Projections, 7/5/84

Census Bureau estimates released by the Iowa Census Data Center in June, 1986 indicate that the 1985 population was somewhat below the twenty-year projections.

Lucas County reported a net out migration of an estimated 300 persons from 1980 to 1985. Population trends reported by the Des Moines Register based upon U.S. Census Bureau estimates indicate a continued population decrease into 1986. Lucas County reported a population decrease of three percent for the period ending July 1, 1986 and Wayne County reported a 2.6 percent loss. The estimated population within the primary airport service area as of July 1, 1985 was 10,100 or 2.2 percent less than the 1980 population.

The 1982 Community Development Plan prepared for the City of Chariton anticipated that somewhere between 5,100 and 5,200 persons would reside within the community in the year 2000. Consequently, little increase in community population is expected within the next 15 to 20 years.

Population within the primary service area is expected to stabilize and increase slightly while little or no change is expected within the secondary service area.

TABLE 1-6: AIRPORT SERVICE AREA POPULATION, 1985 - 2006

	1980	1985	1986	1987	1991	1996	2006
Primary Service Area	10,313	10,100	9,797	10,000	10,200	10,400	10,400
Secondary Service Area	3,811	3,525	3,423	3,400	3,400	3,400	3,400

SOURCE: PDS, 1987

Income

Table 1-7 summarizes income generated by employment within the primary airport service area. The data represents income reported to Job Service of Iowa and covered by job insurance. Total private sector wages within Lucas County increased by 1.67 million dollars over 1985. All categories of employment reported an increase except construction and finance. The average weekly wage for private sector employment increased from 318.53 dollars to 337.61 dollars for the same period.

Income generated from employment within the governmental sector also recorded an increase from 1985 to 1986. Local government accounted for 67.2 percent of the total income reported, followed in turn by the State and Federal Government.

TABLE 1-7: TOTAL YEARLY AND AVERAGE YEARLY WEEKLY WAGES, LUCAS COUNTY, 1985-1986

	YEARLY WAGES		AVG. WEEKLY WAGES	
	1985	1986	1985	1986
PRIVATE SECTOR				
Agriculture-Mining	238,373	356,132	229.20	297.77
Construction	1,723,455	1,688,495	380.96	338.24
Manufacturing	4,201,296	4,598,117	244.09	281.61
Transportation	2,175,816	2,317,200	431.37	484.36
Trade	23,439,744	24,547,403	356.90	378.86
Finance	2,040,055	1,887,699	316.39	295.14
Service	2,985,859	3,087,354	193.99	201.26
Subtotal	36,804,598	38,482,400	318.53	337.61
GOVERNMENT				
Federal	1,034,234	1,054,210	389.98	405.46
State	2,407,192	2,516,644	333.03	350.70
Local	7,103,825	7,304,850	275.98	284.94
Subtotal	10,545,251	10,875,704	296.05	307.12
TOTAL	47,349,849	49,385,104	313.23	330.38

SOURCE: JOB SERVICE, Job Insurance by Major Industry Group - Covered Total Yearly Wages, 1985 and 1986

It should be noted that the above table represents wages paid to those employees covered by job insurance. Income generated by retail and wholesale trade accounted for nearly (49.2%) of income generated followed in turn by local government with 14.8 percent and manufacturing with 9.3 percent of the 49,385,104 dollars generated in 1986.

Labor Force

Average annual employment has recorded a modest increase each year except in 1984. In 1986, 4,700 persons were employed compared with 4,260 in 1982. Within the period 1982 through 1986, residents unemployed in terms of numbers has varied annually. In 1986, six percent of the resident civilian labor force was unemployed.

The agricultural labor force has continued to decrease every year since 1976. In 1976, 890 persons were employed in agriculture compared with 500 in 1986 representing a 43.8 percent decrease. The non-agricultural wage and salary labor force experienced a modest increase from 1976 through 1986. Table 1-8 summarizes selected characteristics for the period 1982 through 1986.

TABLE 1-8: LABOR FORCE BY PLACE OF RESIDENCE, ANNUAL AVERAGE, 1982 - 1986

	1982	1983	1984	1985	1986
Resident Civilian Labor Force	4620	4670	4990	5000	5000
Resident Unemployed	360	320	340	380	300
Percent Unemployed	7.7	6.9	6.9	7.6	6.0
Resident Total Employment	4260	4350	4650	4620	4700
Non-agricultural wage and salary	2930	3010	3400	3390	3460
Self employed, unpaid family	520	550	730	720	750
Agriculture	810	790	520	510	500

SOURCE: JOB SERVICE, CPS Labor Force Summary, 1982 - 1986

There is a relationship between economic variables that support the likelihood for the existence of another variable. In this situation, the demand for air travel is often measured by the number of people employed by industry for that area or region. In the past there has been a consistent correlation between the type of employment and the demand for air travel.

Travel tendency as measured by employment within the Chariton Airport Service Area is summarized in Table 1-9.

TABLE 1-9: EMPLOYMENT, LUCAS COUNTY, 1982 - 1986

	1982	1983	1984	1985	1986
High Travel					
Manufacturing	290	300	320	340	320
Services and Mining	380	390	380	380	390
Public Administration	710	700	690	690	690
Subtotal	1380	1390	1390	1410	1400
Medium Travel					
Construction	90	70	80	90	70
Finance, Insurance, and Real Estate	130	130	130	130	130
Wholesale Trade	150	140	130	150	100
Retail Trade	1090	1120	1130	1270	1160
Subtotal	1460	1460	1470	1640	1460
Low Travel					
Agriculture	810	790	520	510	500
Transportation, Communication, and Public Utilities	160	150	150	150	140
Subtotal	970	940	670	660	640
TOTAL	3810	3790	3530	3710	3500

SOURCE: JOB SERVICE, CPS Labor Force Summary, 1982 - 1986

A research organization, the ENO Foundation, classified travel tendency by three categories.

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

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

Low Travel - Agriculture, communications, and utilities.

The number of persons employed in the high travel industries has remained stable with annual variation noted within the period 1982 through 1986. Employment within the medium travel industries has also remained somewhat stable over the five-year period although there was a decrease in employment in the retail, wholesale, and construction sectors. Employment within the low travel industries has been downward.

By place of work, 92.4 percent of the airport service area residents were employed within the airport service area. Slightly over two percent of the service area work force lived in Monroe County followed in turn by Wayne County with 1.6 percent. Table 1-10 summarizes the place of residence of the Chariton Aiprort service area work force.

TABLE 1-10: PLACE OF WORK BY PLACE OF RESIDENCE, PRIMARY AIRPORT SERVICE AREA, 1980
(Work in Lucas County and Live in the Following Counties)

COUNTY/STATE	NUMBER EMPLOYED	PERCENT
Adair/Iowa	17	0.4
Benton/Iowa	3	---
Clarke/Iowa	16	0.4
Davis/Iowa	10	0.2
Floyd/Iowa	12	0.3
Guthrie/Iowa	4	---
Lucas/Iowa	3716	92.4
Marion/Iowa	26	0.6
Monroe/Iowa	91	2.3
Story/Iowa	26	0.6
Warren/Iowa	23	0.6
Wayne/Iowa	66	1.6
Sedgwick/Kansas	11	0.2
TOTAL	4021	100.0

SOURCE: BLS SPECIAL TABULATION, 1980

As noted in the above table, a majority of those persons employed within the Chariton Municipal Airport Service Area also lived within the service area.

Table 1-11 identifies the place of work for those persons who live within the primary airport service area. Approximately 2.4 percent of the service area residents were employed in Marion County followed in turn by Polk County with 2.1 percent.

TABLE 1-11: PLACE OF RESIDENCE BY PLACE OF WORK, PRIMARY AIRPORT SERVICE AREA, 1980
(Live in Lucas County and Work in the Following Counties)

COUNTY/STATE	NUMBER EMPLOYED	PERCENT
Macon/Illinois	11	0.2
Appanoose/Iowa	2	---
Clarke/Iowa	29	0.6
Davis/Iowa	10	0.2
Decatur/Iowa	12	0.3
Jasper/Iowa	20	0.4
Jefferson/Iowa	10	0.2
Lucas/Iowa	3716	83.3
Marion/Iowa	106	2.4
Monroe/Iowa	39	0.9
Polk/Iowa	89	2.1
Wapello/Iowa	16	0.4
Warren/Iowa	26	0.7
Wayne/Iowa	51	1.1
Adair/Iowa	3	---
Douglas/Nebraska	15	0.3
Not Reported	304	6.9
TOTAL	4459	100.0

SOURCE: BLS SPECIAL TABULATION, 1980

Table 1-12 summarizes from the Community Quick Reference sheets prepared by the Iowa Development Commission, major employers within the primary and secondary airport service areas. The Hy-Vee Food Stores, Inc. is the largest employer.

TABLE 1-12: MAJOR EMPLOYERS

CITY	NAME	PRODUCT/SERVICE	NO. EMPLOYED
Chariton	Hy-Vee Food Stores, Inc.	office/warehousing	644
Chariton	Johnson Machine Shop	steel fabrication	130
Chariton	Nestaway, Inc.	vinyl coated racks	80
Chariton	Chariton Aluminum Products	T.V. antennaes	70
Corydon	Neeley Mfg. Co., Inc.	clothing bags	46
Corydon	Deflecta Shield Corp.	bug shields for cars	65
Corydon	Voltmaster's Co., Inc.	battery manufacturer	90
Corydon	American Diesel, Inc.	rebuilds trucks/services Ruan Trucks	17
Corydon	Shivver's, Inc.	grain dryer manufacturer	52
Corydon	Wayne County Hospital	health care	58

SOURCE: IOWA DEPARTMENT OF ECONOMIC DEVELOPMENT, Community Quick Reference, 1986

Retail Sales

A regional comparison of retail sales within an eight county area for the years 1982 through 1986 is presented in Table 1-13. As could be expected, Marion County accounted for the largest share of sales followed in turn by Warren County. With the exception of Marion and Warren Counties, the remaining counties reported little change to a modest decrease.

Retail sales in Lucas County decreased by six percent from 1982 to 1986. Wayne County reported a 14.4 percent decrease for the same period. Monroe, Marion, and Warren Counties reported increases, with Warren County reporting a 10.6 percent gain.

TABLE 1-13: TAXABLE RETAIL SALES BY COUNTY, FY1982 - FY1986

COUNTY	1982	1983	1984	1985	1986
Lucas	35,479,922	33,786,864	34,098,078	34,066,914	33,339,715
Wayne	21,524,349	20,026,522	17,966,390	17,780,060	18,432,802
Monroe	26,850,579	26,348,331	27,733,397	27,266,238	27,771,159
Marion	101,690,599	104,278,653	107,850,812	111,754,415	116,986,110
Warren	68,111,920	69,169,951	72,009,804	73,868,665	75,344,430
Clarke	35,400,973	33,104,387	33,769,564	32,874,024	34,915,804
Decatur	22,478,174	21,782,099	21,437,843	21,202,687	21,265,839

SOURCE: IOWA DEPARTMENT OF REVENUE, Retail Sales and Use Tax Report, 1982 - 1986

Agriculture

The Iowa Department of Agriculture reported 740 farms within Lucas County in 1985, down 1.3 percent from 1984. The average farm in 1985 contained 345 acres. The average dollar value per acre of farmland in Lucas County was placed at 457 dollars in 1985 compared with 632 dollars per acre in 1984.

Summary

The economic structure of the airport service area will have an impact upon future aviation activity at the Chariton Municipal Airport.

- Agriculture
- Retail
- Wholesale
- Manufacturing
- Services - private and public

City of Chariton

The City of Chariton is located approximately 53 miles south of Des Moines and 27 miles east of Interstate Highway 35. The City is the principal community within the airport service area. Nearly fifty percent of the service area population resides within the City of Chariton.

The community provides goods and services to an agricultural hinterland that coincides with Lucas County. In addition to personal services and retail businesses, the local economy is further diversified by non-retail employers to include Nestaway, Inc., Johnson Machine Shop, and Chariton Aluminum products. As was noted in Table 1-12, the Hy-Vee Food Stores, Inc. is the largest private sector employer within the airport service area.

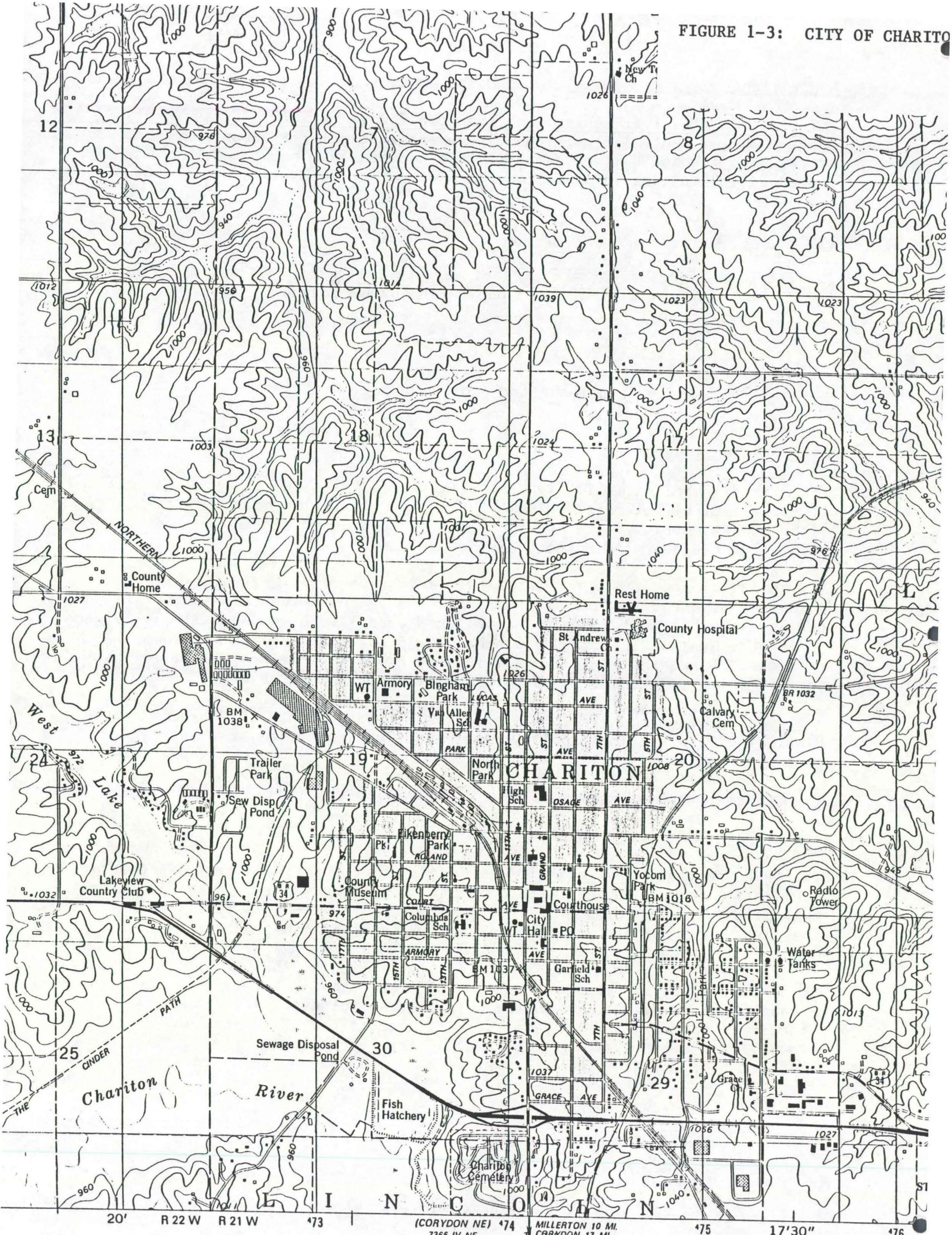
A Community Development Plan was prepared for the City in 1982 by Engineering Plus. The Plan set forth policy statements for the following areas of community concern:

- Community Growth
- Economic Development
- Land Use
- Fringe Area Growth
- Circulation
- Public Facilities
- Environmental Quality

The 1982 Community Development Plan did not specifically address the Chariton Municipal Airport. A review of community development policies and land use recommendations would suggest that continued improvement to facilities at the Chariton Municipal Airport is consistent with Plan recommendations.

The community is served by the main east-west line of the Burlington Northern. North-south rail service is provided by Chicago and Northwestern. State Highway 14 provides access to the City in a north-south direction while U.S. Highway 34 provides access in a east-west direction. Reference may be made to Figure 1-3. Des Moines International is the nearest commercial service airport. The Chariton Municipal Airport serves general aviation aircraft.

FIGURE 1-3: CITY OF CHARITON



The distance and length of time goods are in transit to major metropolitan areas are summarized in Table 1-14.

TABLE 1-14: DISTANCE AND SHIPPING TIME TO SELECTED METRO AREAS

CITY	MILES	DAYS BY MOTOR FREIGHT AND RAILROAD	CITY	MILES	DAYS BY MOTOR FREIGHT AND RAILROAD
Atlanta	950	2	Los Angeles	1750	3
Chicago	350	1	Milwaukee	400	1
Cleveland	650	2	Minneapolis	300	1
Denver	670	2	New Orleans	1000	2
Des Moines	50	1	New York	1100	2
Detroit	700	2	Omaha	150	1
Houston	950	2	St. Louis	325	1

SOURCE: DEPARTEMENT OF ECONOMIC DEVELOPMENT, Community Quick Reference, 1986

Community utility information is summarized in Table 1-15.

TABLE 1-15: COMMUNITY UTILITIES

UTILITIES

Electricity
Suppliers: ....( ) municipal (X) private ( ) co-op
Name(s) of suppliers:.............*Iowa Southern Utilities*

Water
Water supplied by: ....(X) municipal ( ) private
Name of supplier:........................*City of Chariton*
Source of city water: ....(X) lakes ( ) reservoir(s) ( ) river(s) ( ) well(s)
Elevated storage capacity:.............*2,000,000* gallons
Capacity of water plant: ....*3,000,000* gallons per day
Average consumption: ....*400,000* gallons per day
Peak consumption: ....*600,000* gallons per day

Natural Gas
Name of local distributor:............*Iowa Electric Light & Power Co.*
Pipeline source: ....*Northern Natural Gas Co.*

Sanitation
Type of sewage treatment plant: ( ) primary (X) secondary ( ) tertiary
Percent of community served by sewer: ....*95* percent

AVERAGE LOAD	PEAK LOAD	DESIGN CAPACITY
400,000	*600,000*	*1,000,000*

(Specify above in "gallons per day.")

Telephone
Name of system: ...*Continental Telephone System of Iowa*

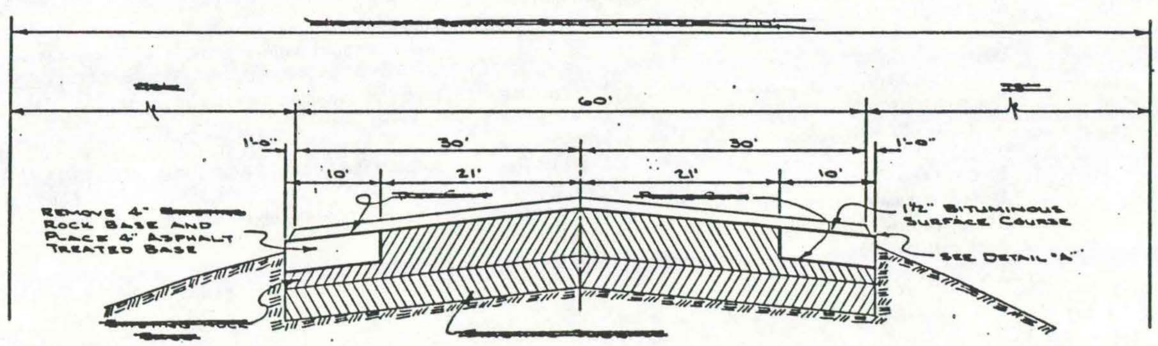
SOURCE: DEPARTMENT OF ECONOMIC DEVELOPMENT, Community Quick Reference, 1986

Existing Development

The Chariton Municipal Airport is located approximately three miles west of the Central Business District. Access to the terminal area from Chariton is provided via U.S. Highway 34. The site consists of 120 acres owned in fee by the City and lies at an elevation of 1,249 feet above sea level. The airport latitude is 41 21′ 13" N. The longitude is 93 21′ 44" W. Reference may be made to Figure 1-5.

The primary runway, RW 17/35, is 2,800 feet in length and 60 feet in width. Reference to record drawings indicated that the runway was increased in width from 42 feet to 60 feet. At the same time a 1 1/2 inch bituminous surface course was laid over the entire runway. A 50 x 80 foot turn-a-round was constructed on RW 17. Construction consisted of 6 inch compacted salvage rock, 4 inch asphalt treated base, and a 1 1/2 bituminous surface course. A typical runway section from the Record Drawings completed by Garden and Assoc. in 1977 is shown in Figure 1-4.

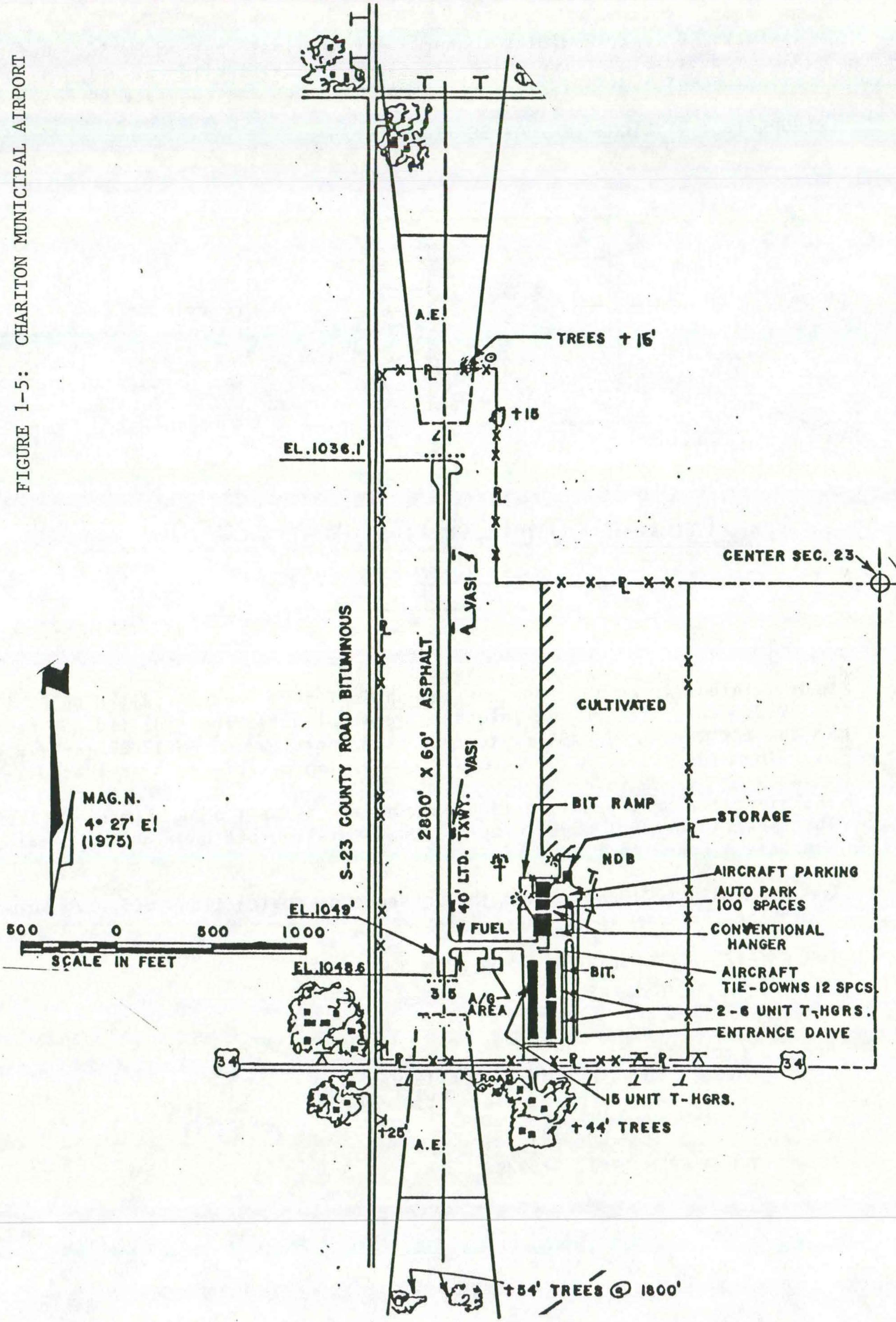
FIGURE 1-4: TYPICAL RUNWAY SECTION, RW 17/35, 1977



TYPICAL COMPLETED RUNWAY SECTION

SCALE - 1" = 10' HORIZONTAL
1" = 1' VERTICAL

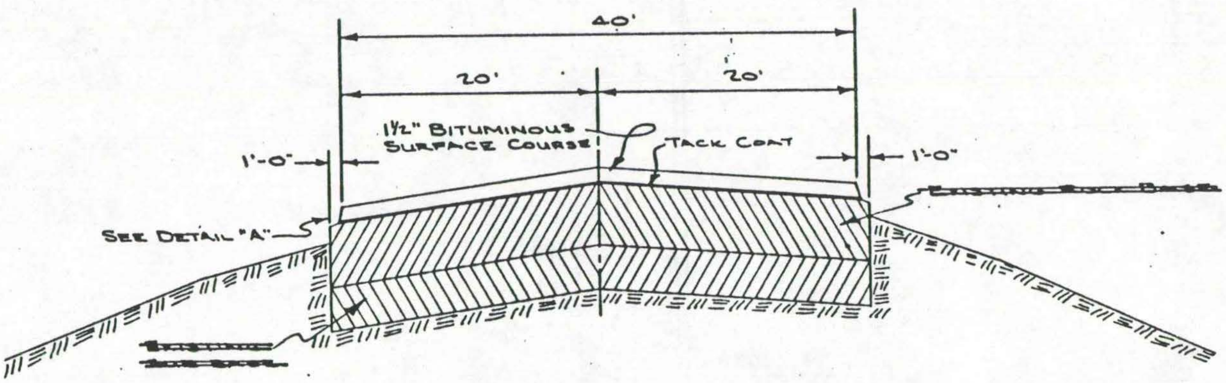
FIGURE 1-5: CHARITON MUNICIPAL AIRPORT



SOURCE: FAA FORM 5010

A taxiway, 40 feet in width, connects the terminal area to RW 35. Reference may be made to Figure 1-6 which depicts a typical section as well as to record drawings completed in 1977. NPI runway markings are in place on RW 17/35.

FIGURE 1-6: TYPICAL TAXIWAY SECTION, 1977



TYPICAL COMPLETED TAXIWAY SECTION

SCALE : 1" = 10' HORIZONTAL
1" = 1' VERTICAL

Medium intensity runway edge and threshold lights were installed on RW 17/35 in 1978. The existing low intensity runway lights were modified and relocated to the taxiway. A SAVASI system was also installed on RW 17/35 in 1978 along with the MIRL system. The runway light system may be radio activated.

The airport also supports a lighted wind tee as well as a segmented circle. The airport does not have in operation a rotating beacon light. The airport supports a non-directional radio beacon (NDB).

FAA Form 5010 (3/13/86) noted the presence of obstructions off each runway end. These are noted in Table 1-16.

TABLE 1-16: OBSTRUCTIONS - FAA FORM 5010

	RUNWAYS	
	17	35
Obstruction	Trees	Road
Height above runway end	15 feet	15 feet
Distance from runway end	550 feet	500 feet
Obstruction slope	23:1	20:1

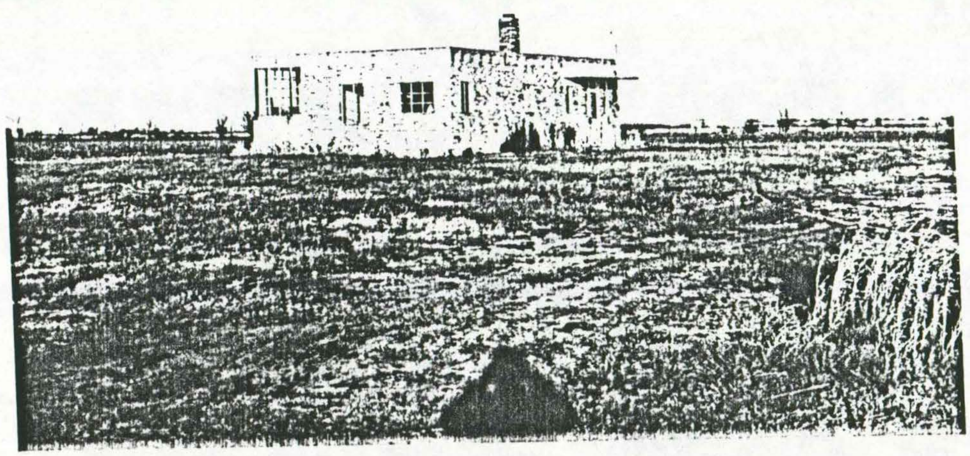
SOURCE: FAA FORM 5010, 3/13/86

A tall structures ordinance was adopted by the City of Chariton and Lucas County in 1978 for the purpose of controlling the height of structures in the immediate vicinity of the airport.

The terminal is located adjacent to U.S. Highway 34. Access is provided by a gravel drive to a vehicle parking lot. The terminal area supports landside facilities to include aircraft tiedowns, and storage space, an aircraft maintenance facility, FBO offices, Whitfield Flying Service, as well as a structure used at one time as a terminal building. The structure contains approximately 960 square feet of space.

Hangar space consists of tee type hangars, together with conventional hangar facilities. Reference may be made to Figures 1-7 and 1-8. There are four conventional hangars and three tee-type structures.

UNIT	SIZE	USE/CAPACITY
One	50′ x 44′	Conventional
Two		Conventional
Three	60′ x 60′	Conventional, FBO shop, Whitfield Flying Service (3+/-)
Four		Conventional, Corporate, Hy-Vee (1+/-)
Five	30′ x 210′	Tee-Type (6+/-)
Six	30′ x 187′	Tee-Type (6+/-)
Seven	30′ x 410′	Tee-Type (15+/-)



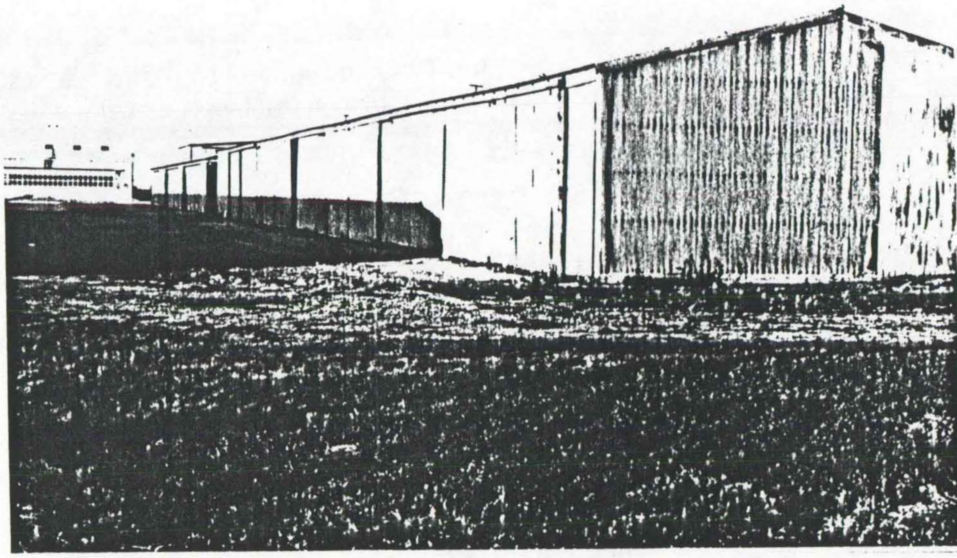
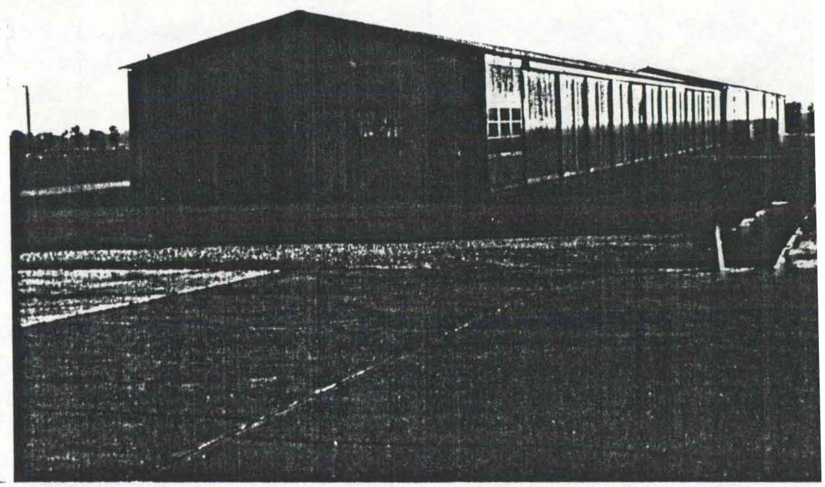
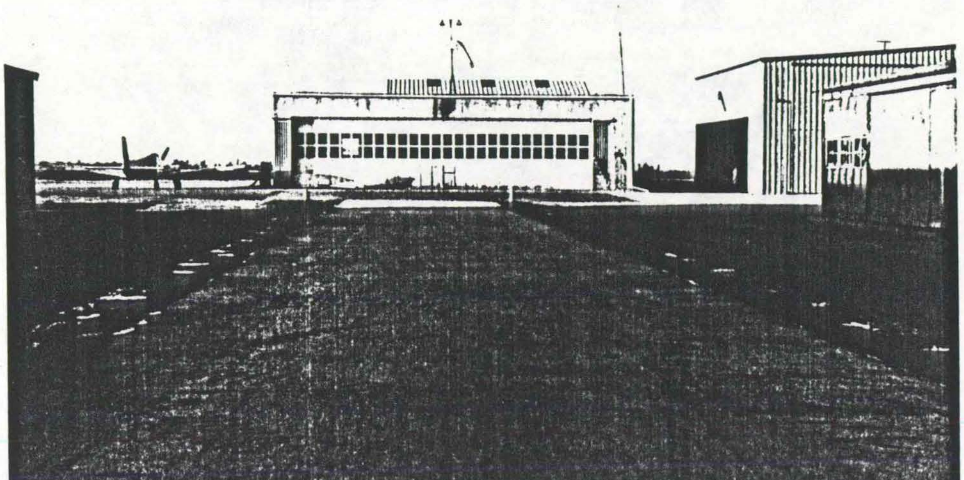


FIGURE 1-7: TERMINAL BUILDING





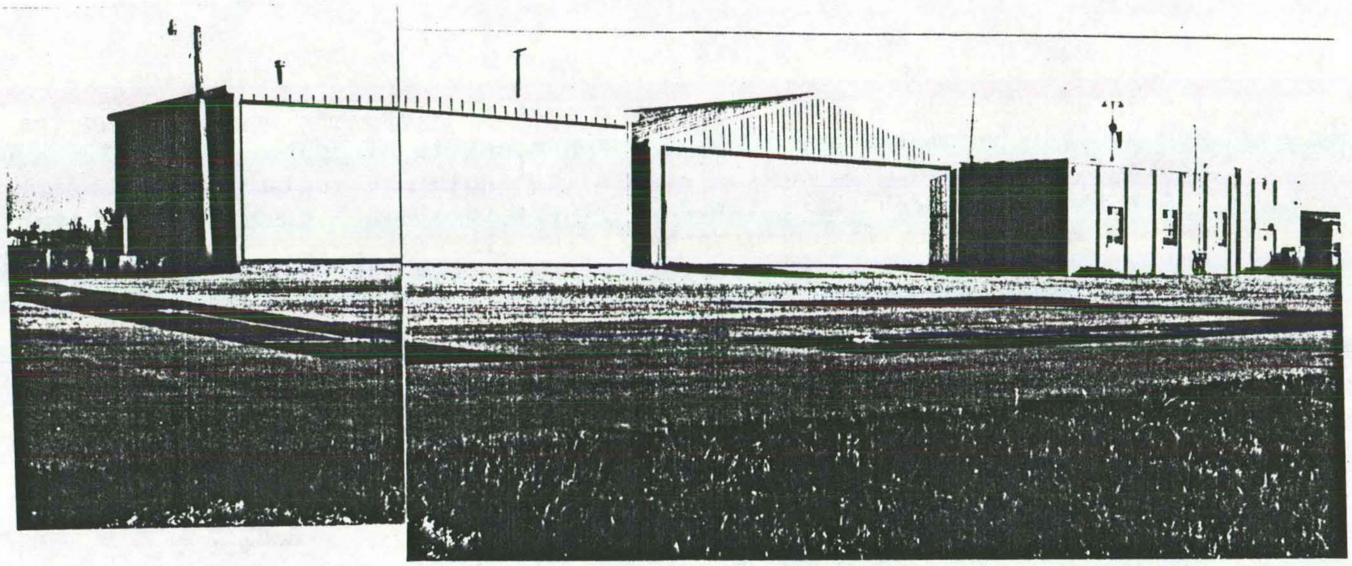
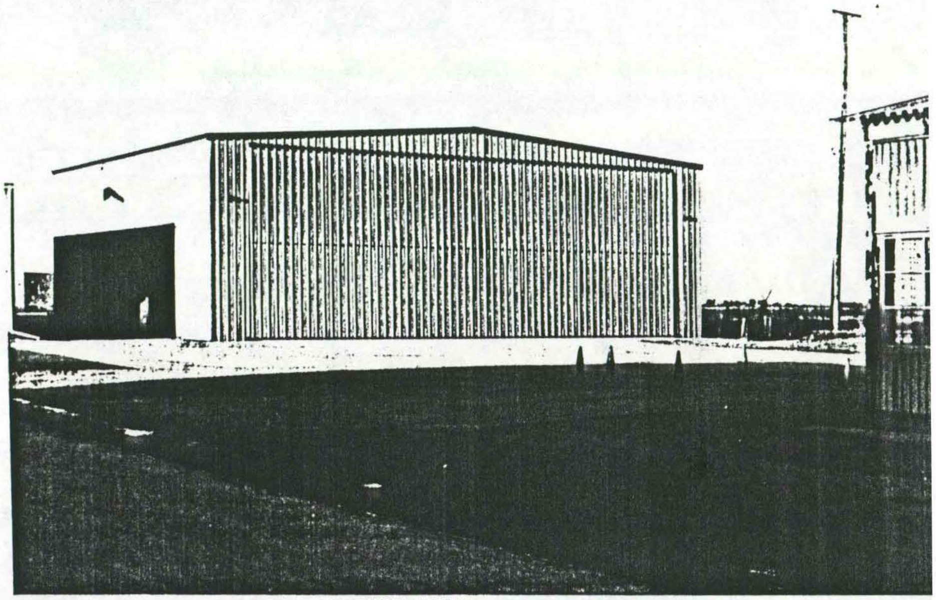
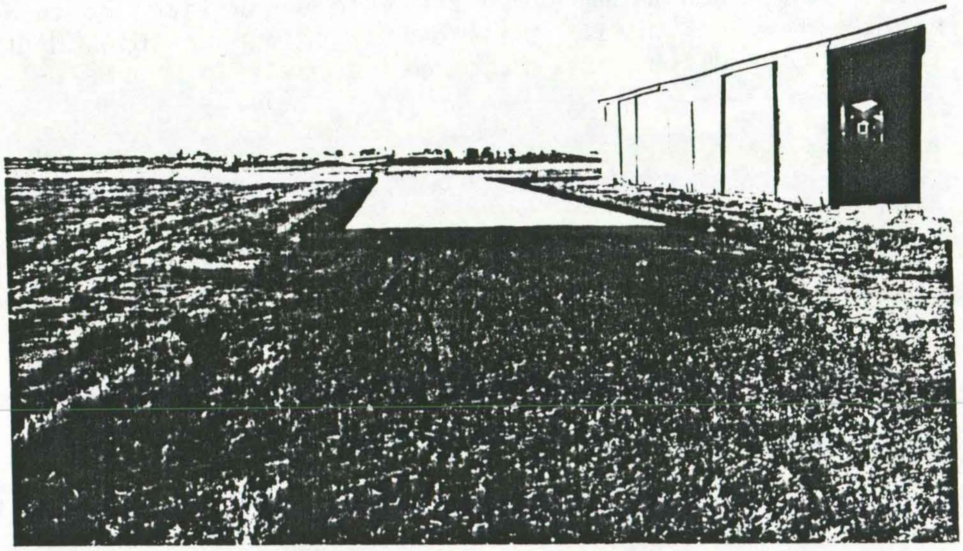


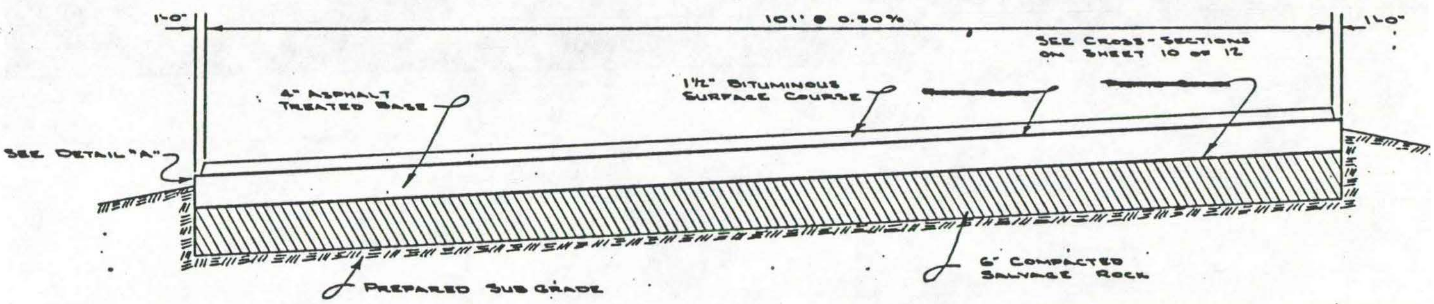
FIGURE 1-8: TERMINAL BUILDING





The apron area supports five improved surface tiedowns located along the west and north edge of the apron. The apron consists of approximately 270 square yards extending in width 101 feet and in length 240 feet. The apron is connected to RW 17/35 by a taxiway 40 feet in width and 450 feet in length. The apron also provides queuing space for aircraft refueling as well as access to two conventional hangars located north of the FBO shop. A typical apron section is depicted in Figure 1-9.

FIGURE 1-9: APRON SECTION, 1977



TYPICAL COMPLETED APRON SECTION

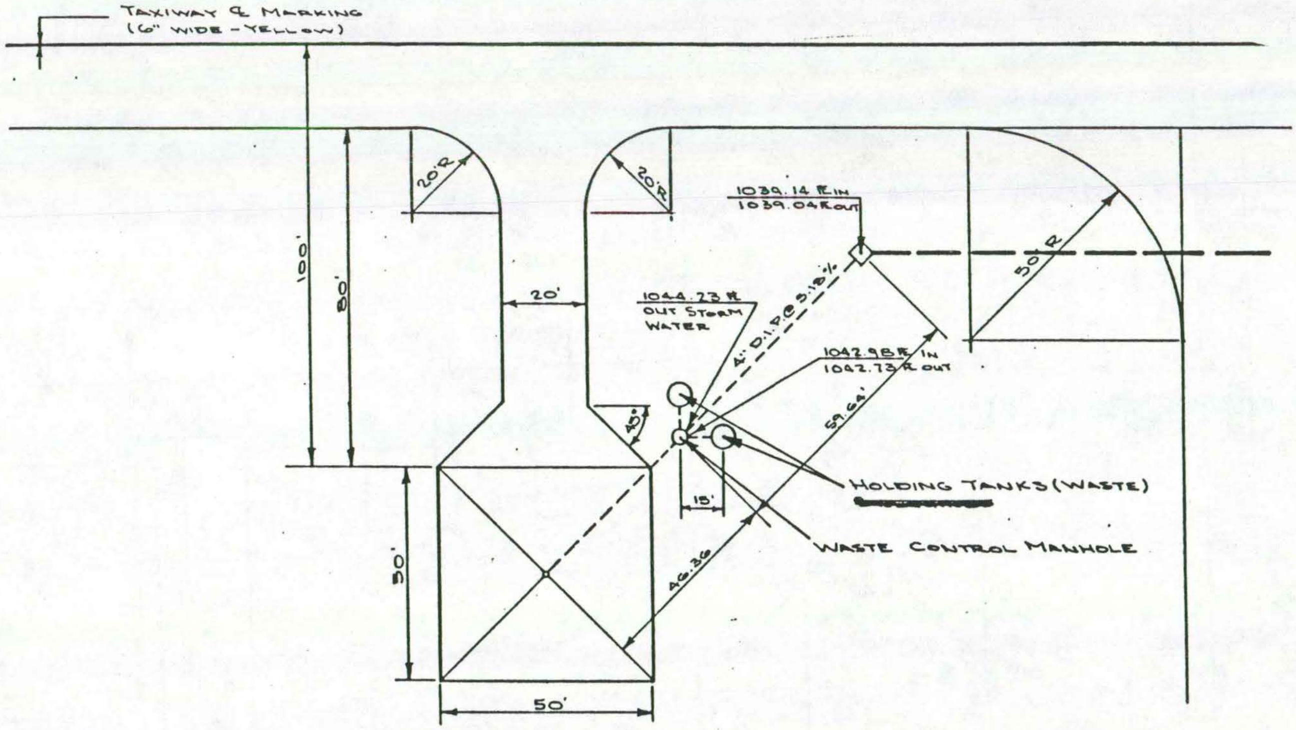
SCALE - 1" = 10' HORIZONTAL
1" = 1' VERTICAL

An apron to service agricultural aircraft was also constructed in 1977. The apron, 50' x 50', provides two waste holding tanks for the collection of chemicals and waste water. The apron is depicted in plan view in Figure 1-10. The apron consists of a six inch P.C.C. slab sloped to the center and connected to the holding tanks by a four inch drain.

A 10,000 gallon underground fuel storage tank was installed in 1987 for jet fuel.

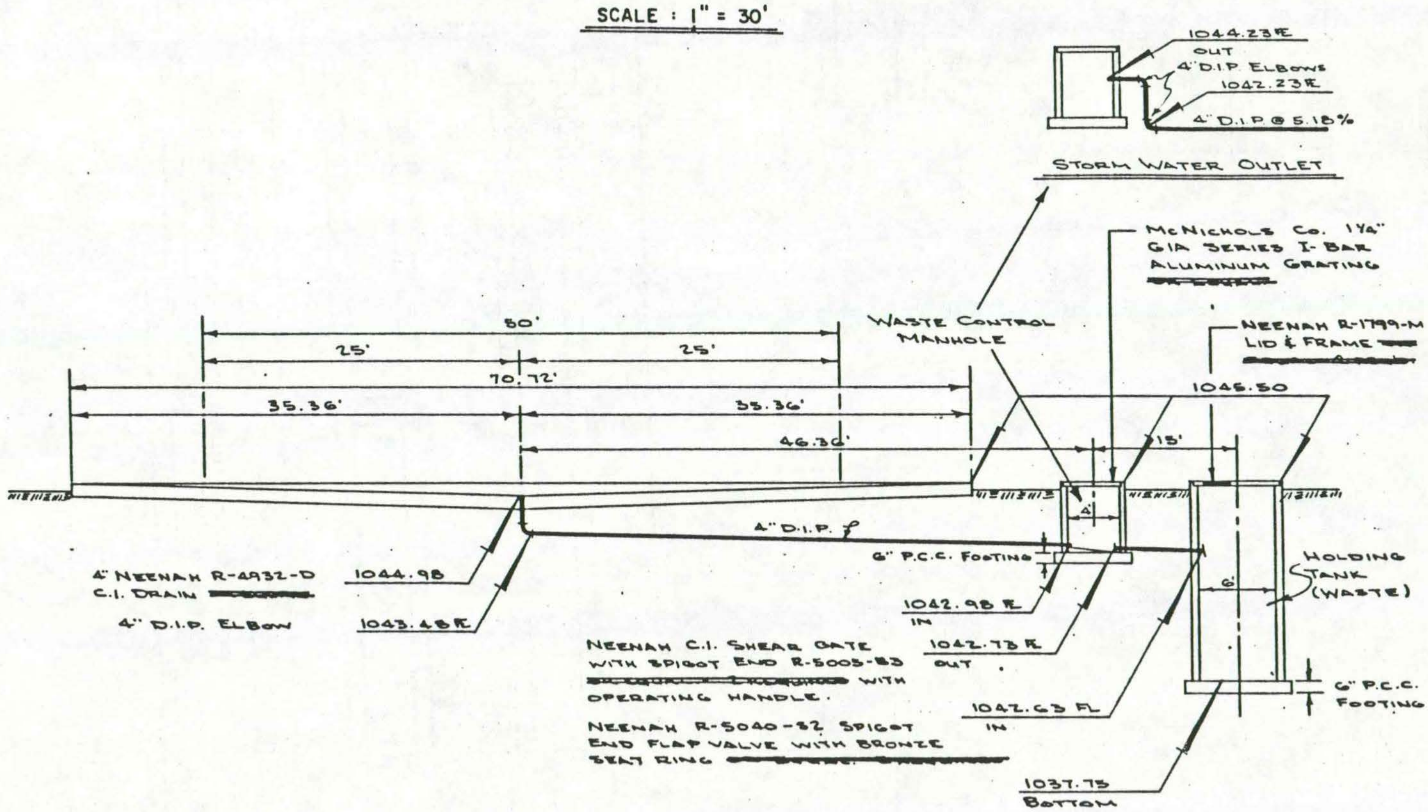
Subsurface drainage is provided throughout the terminal area by a 6 inch perforated P.V.C. A 12 inch storm sewer collects subsurface and surface drainage within the terminal area. The storm sewer crosses U.S. Highway 34 and outlets into an open ditch. Reference may be made to Figure 1-11.

FIGURE 1-10: AGRICULTURAL APRON, 1977



PLAN VIEW - APRON AREAS AND TAXIWAY

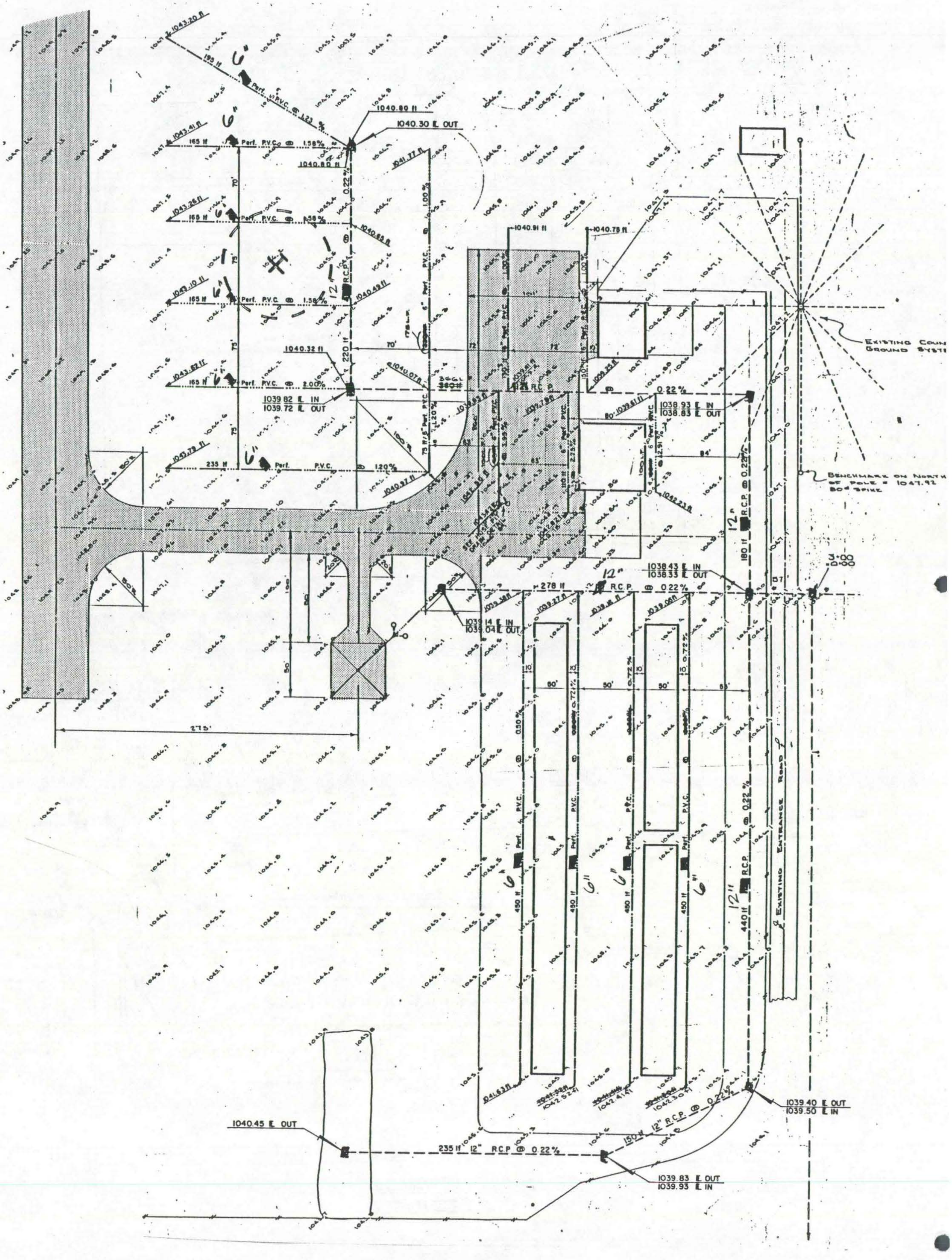
SCALE : 1" = 30'



AGRICULTURAL APRON SECTION

SCALE : 1" = 10' HORIZONTAL
1" = 5' VERTICAL

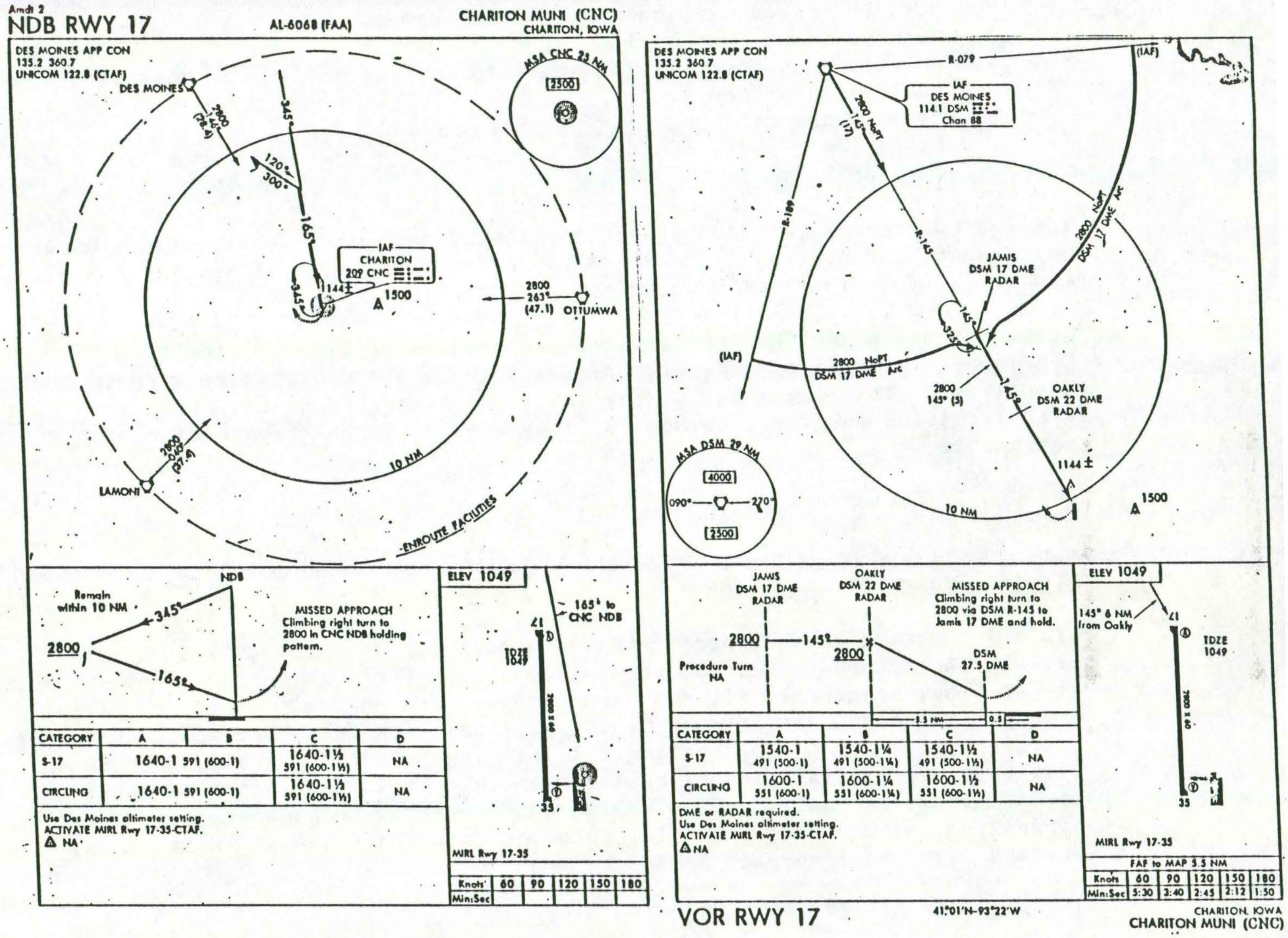
FIGURE 1-11: TERMINAL AREA DRAINAGE



Instrument Approaches

A non-precision instrument approach may be executed to RW 17 by utilizing the Chariton Non-Directional Radio Beacon and/or the Des Moines VOR.

FIGURE 1-12: PUBLISHED INSTRUMENT APPROACH



CATEGORY	A	B	C	D
S-17	1640-1 591 (600-1)		1640-1½ 591 (600-1½)	NA
CIRCLING	1640-1 591 (600-1)		1640-1½ 591 (600-1½)	NA

CATEGORY	A	B	C	D
S-17	1540-1 491 (500-1)	1540-1¼ 491 (500-1¼)	1540-1½ 491 (500-1½)	NA
CIRCLING	1600-1 551 (600-1)	1600-1¼ 551 (600-1¼)	1600-1½ 551 (600-1½)	NA

Knots	60	90	120	150	180
Min:Sec	5:30	3:40	2:45	2:12	1:50

Published procedures for instrument approaches outline the required flight paths and altitudes for practice or actual instrument approaches. The approach to RW 17 is illustrated in Figure 1-12. If the pilot does not sight the runway before or at the published minimum descent altitude (MDA), or loses sight of the runway environment at any time below the MDA, a missed approach must be executed. The missed approach is illustrated in Figure 1-12.

Fixed Base Airport Operation (FBO)

The City of Chariton entered into an FBO lease agreement with Whitfield Flying Service in February, 1985. Conditions of the lease relevant to the operation of the Chariton Municipal Airport are summarized herein. The Lessee is responsible for:

1. Maintenance of grounds to include mowing.
2. Operation of the ag. apron and collecting required fees.
3. Maintenance of parking ramp and tie downs.
4. Maintenance of runway lights.
5. Operation and rental of hangars to include mailing of notices and collection of rents.
6. Maintenance of lounge and restroom areas.
7. Operation of base radio and communication equipment from 9:00 A.M. to 5:00 P.M.

The leased premises are to be used for the purpose of providing for aircraft maintenance and repair, aircraft sales and rentals, sale of aircraft gasoline and oil, flight instruction, and air taxi services.

Compensation to the FBO for services rendered is provided by the City of Chariton. In addition, the City of Chariton pays for utilities used in the operation of the runway and administration building. The City also maintains a public telephone and provides for the maintenance and repair of radio equipment.

The FBO is also required to maintain liability insurance.

Airport Financial Condition

Table 1-17 summarizes airport revenue sources for the period 1983 through fiscal year 1986/87. Revenue from airport operations is derived from the sale of gasoline, hangar rental, and farm income. The more stable source of revenue is derived from hangar rent. Fuel sales produce varying amounts of actual revenue after substracting out the expenditure for fuel. Over the five-year period, the airport realized an average annual income of 2,884 dollars from fuel sales. Farm revenue, after removing expenses for seed and harvesting, also varied annaully producing an average annual income of 2,305 dollars over the five-year period.

TABLE 1-17: AIRPORT REVENUE, 1983 - 1986/87

	YEARS				
RECEIPTS	FY86/87	1986	1985	1984	1983
Hangar Rent	6,290.00	4,768.00	5,710.00	5,830.00	6,235.00
Gasoline	40,405.49	37,117.48	49,856.58	30,454.41	36,710.46
Farm	4,360.98	6,653.42	6,943.46	3,861.25	2,800.09
Misc.	---	---	---	1,690.66	---
TOTAL	51,056.47	48,538.90	62,510.04	41,836.32	45,745.55

SOURCE: CITY OF CHARITON, September, 1987

Table 1-18 summarizes airport expenditures for the period 1983 through FY1986/87. The single largest expenditure is compensation for services provided by the FBO. Expenditures for line items referenced as "gasoline" and "seed and harvest" typically produce revenues in excess of cost. The remaining line items vary annually and are required to maintain an adequate level of service. Airport expenditures in each of the five years exceeded airport revenues. An average annual subsidy totaling 13,085 dollars was requried throughout the five-year period.

TABLE 1-18: AIRPORT EXPENDITURES, 1983 - 1986/87

EXPENDITURE	1986/87	1986	1985	1984	1983
Electricity	2,430.51	2,680.50	2,915.51	3,374.05	2,826.01
Telephone	460.80	455.90	471.58	487.64	418.80
Heating Fuel Oil and Gas	2,114.50	4,070.25	3,634.00	4,052.48	2,568.61
Water	254.15	411.90	716.25	661.50	576.75
Gasoline	36,332.08	28,411.05	44,755.46	32,663.96	37,959.53
State Gas Tax	---	---	---	---	---
Insurance	2,028.68	5,988.00	131.70	1,909.00	1,913.00
Federal Excise Tax	4,104.24	3,072.12	3,742.80	4,418.80	1,213.40
Seed and Harvest	1,572.03	1,050.65	3,459.19	2,428.74	2,593.84
Maintenance & Repair	2,276.07	3,331.37	9,665.96	2,175.89	2,552.42
New Equipment and Improvement	593.57	3,443.75	---	---	---
Airport Operator	7,200.00	7,200.00	7,400.00	6,000.00	6,000.00
Miscellaneous	198.06	152.70	92.00	120.00	---
TOTAL	59,564.87	60,268.19	78,346.45	58,292.06	58,640.36

SOURCE: CITY OF CHARITON, September, 1987

The general obligation bond for the 1978 airport improvement projects was retired in 1987. At the present time there is no outstanding debt for airport improvements.

Airport Sufficiency Rating

The Iowa Department of Transportation annually rates each airport in the state system. A numerical rating for each airport is obtained by comparing structural, safety, and service features to specified design criteria. A rating below 50 percent of maximum indicates that the item is below tolerable standards and should be considered for improvement.

TABLE 1-19: AIRPORT SUFFICIENCY RATING, CHARITON MUNICIPAL AIRPORT, 1986

	MAXIMUM POSSIBLE RATING	ACTUAL SUFFICIENCY RATING
STRUCTURAL ADEQUACY		
Runway		
Wearing Surface	8.0	5.9
Base / Subbase	10.0	7.2
Drainage	6.0	5.4
Taxiways / Aprons	6.0	4.8
TOTAL STRUCTURAL RATING	30.0	23.3
SAFETY		
Runway		
Length	5.0	1.5
Width	4.0	2.3
Surface Condition	9.0	6.3
Primary Surface Geometrics	11.0	9.5
Approach Obstructions	7.0	4.5
Turnarounds / Taxiways	4.0	2.7
TOTAL SAFETY RATING	40.0	26.8
SERVICE		
Runway		
Length	8.0	2.4
Lighting	5.0	3.2
Capacity	4.0	4.0
Airfield Lighting	5.0	3.5
Aprons - Terminals / Parking	4.0	4.0
Land Area	4.0	2.0
TOTAL SERVICE RATING	30.0	19.1
TOTAL BASIC RATING	100.0	69.2
TOTAL ADJUSTED RATING	100.0	61.3
SYSTEM LEVEL ADJUSTED RATING	100.0	57.2

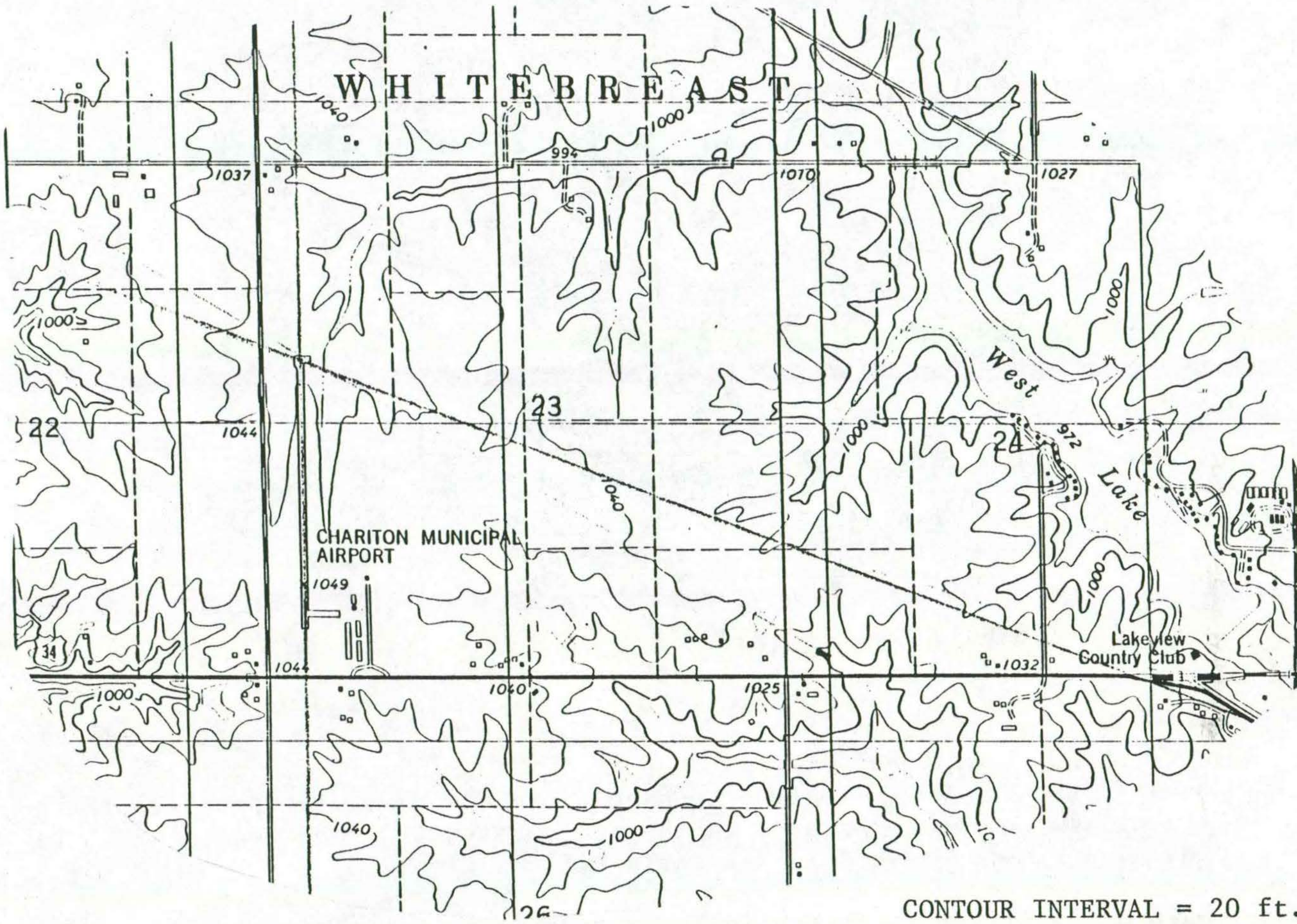
SOURCE: IOWA DEPARTMENT OF TRANSPORTATION, Airport Sufficiency Ratings, 1986

Physical Features

Generalized topographic conditions are depicted in Figure 1-13. The airport site is located on an upland divide extending in a north/south direction. The area is disected by tributaries of the Chariton River and White Breast Creek. The upland divide has sufficient width in an east/west direction to accommodate a second runway. The area, as a whole, may be described as level with modest relief encountered in the immediate area of the natural drainage patterns. The site slopes from south to north and west to east.

Topographic conditions are such that an extension may be placed on RW 17. The site could also accommodate a second runway having an orientation of North 0 degrees to North 90 degrees West. It should be noted that an extension of RW 17 will encounter some change in terrain as it crosses the upper reaches of a tributary creek to the Chariton River. Topographic conditions would allow consideration of a number of runway alignment alternatives.

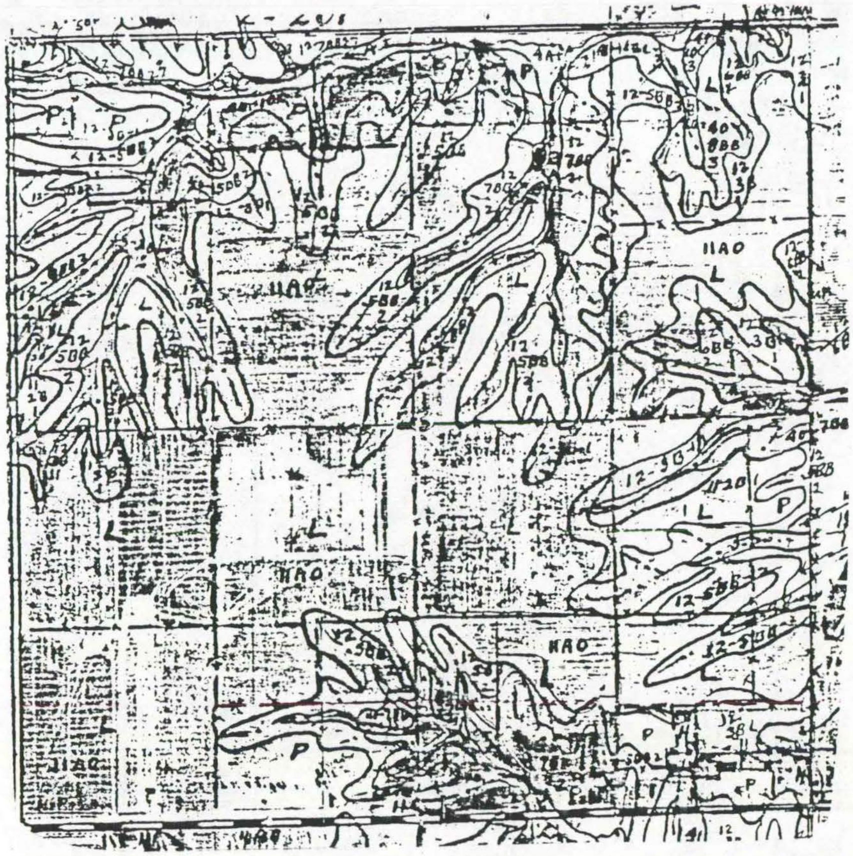
FIGURE 1-13: TOPOGRAPHIC CONDITIONS



CONTOUR INTERVAL = 20 ft.

An updated soil survey of Lucas County is currently being undertaken by the Soil Conservation Service. Data and field mapping from this update is not available. Generalized soil types were, however, obtained from a 1937 survey. Reference may be made to Figure 1-14 which depicts soil types found on and in the immediate vicinity of the airport.

FIGURE 1-14: GENERALIZED SOILS



SOURCE: SCS SOIL SURVEY, 1937

Soils consist, for the most part, of the following types:

Haig (11) (362)

Grundy (12) (364)

An extension to RW 17 would encounter a variety of soil types associated with the natural drainage located in the northwest quarter of Section 23. Soils (Haig) are more uniform in the south half Section 23.

Haig soils (11) were formed in loess under a native vegetation of tall prairie grasses. These soils are located on nearly level to flat upland divides and are poorly drained. Slopes range from zero to two percent. Permeability is slow with surface runoff classified as very slow to none. The seasonally high water table ranges from one to three feet.

Haig soils generally have severe limitations for buildings designed to accommodate light industrial and commercial uses. Limitations are noted as follows:

- Slow permeability
- High water table
- High shrink-swell potential

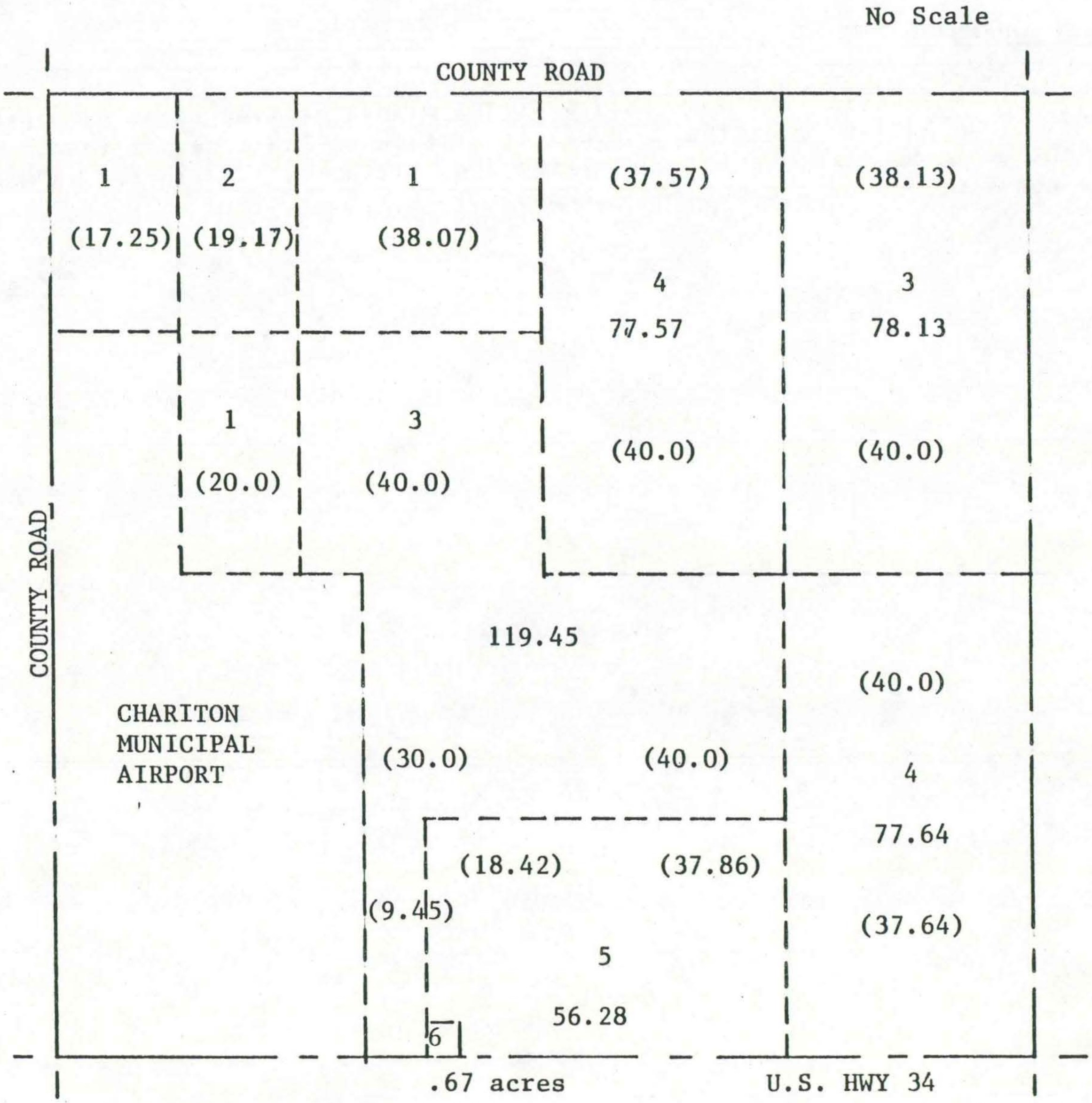
The AASHTO classification for the Haig soils is A-7-6.

Grundy soils (12) consist of somewhat poorly drained soils formed in loess on uplands and terraces. Slopes range from zero to nine percent. The seasonally high water table ranges from one to three feet. Permeability is rated as slow. These soils like the Haig soils have severe limitations when used as sites for commercial buildings. The AASHTO classification is A-6 and A-7.

Land Ownership

Figure 1-15 depicts land ownership patterns within Section 23 as of September, 1987. The Chariton Municipal Airport is located on 120 acres of land. An extension to RW 17/35 would require the acquisition of land in fee as would the construction of a crosswind runway.

FIGURE 1-15: PROPERTY OWNERSHIP - SECTION 23



1. Helen A. & Donald E. Willis
2. Craig Willis
3. Mark & Margaret Grimm
4. Victoria K. Good, Malinda S. Good, Patricia A. Good, Martha V. Good
5. Roleit Hunter, Donna Hunter
6. Michael C. & Connie R. Hunter

AIRPORT SYSTEMS

State Systems of Airports

The 1985 Iowa Aviation System Plan includes all 112 public owned airports in Iowa. These airports provide access to the national system of airports by scheduled commercial carriers, air taxi, and general aviation aircraft. Of the 112 airports, eleven are classified as commerical airlines. The remaining 101 airports are served by air taxi and accommodate general aviation aircraft ranging in size from a single engine aircraft to jet aircraft.

The state system of airports consists of five service classifications which are defined as follows:

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

Each of the 112 airports within the system were placed in a service classification. The 1985 Iowa Aviation System Plan also developed design standards for each of the service classifications. In other words, for the airport to provide a given level of service, the airport must support facility development that will accommodate the level of aviation activity defined by the service classification.

The state system airports are listed by service and design classification in Table 1-20.

TABLE 1-20: IOWA AIRPORT SERVICE AND DESIGN CLASSIFICATION

Type Service	Commercial Service		General Aviation Airports				
Service Classification	Commercial Service I	Commercial Service II	General Aviation I	General Aviation II		General Aviation III	
Design Classification	General Transport	Basic Transport	Basic Transport	General Utility	Basic Utility-II	Basic Utility-I Paved	Basic Utility-I Turf
	Cedar Rapids	Burlington	Algona	Atlantic	Albia	Corning	Akron
	Des Moines	Clinton	Ames	Boone	Audubon	Cresco	Allison
	Sioux City	Dubuque	Carroll	Chariton	Bloomfield	Milford	Anita
	Waterloo	Fort Dodge	Council Bluffs	Charles City	Centerville	New Hampton	Bedford
		Mason City	Creston	Cherokee	Clarion	Onawa	Belmond
		Ottumwa	Davenport	Clarinda	Eagle Grove	Osage	Eldora
		Spencer	Denison	Decorah	Emmetsburg	Rockwell City	Grundy Center
			Forest City	Estherville	Greenfield	Sibley	Guthrie Center
			Iowa City	Fairfield	Humboldt	Waukon	Hartley
			Keokuk	Fort Madison	Ida Grove		Hawarden
			Marshalltown	Grinnell	Iowa Falls		Keosauqua
			Muscatine	Hampton	Manchester		Lake Mills
			Newton	Harlan	Mapleton		Lamoni
				Independence	Maquoketa		Manning
				Jefferson	Oelwein		Monona
				Knoxville	Osceola		Mount Ayr
				Le Mars	Pella		Northwood
				Monticello	Rock Rapids		Paullina
				Mount Pleasant	Sac City		Primghar
				Orange City	Sioux Center		Sully
				Oskaloosa	Tipton		Toledo
				Perry	Vinton		Traer
				Pocahontas	Washington		Wall Lake
				Red Oak	Waverly		Woodbine
				Sheldon	West Union		
				Shenandoah	Winterset		
				Spirit Lake			
				Storm Lake			
				Webster City			

SOURCE: 1985 IOWA STATE AVIATION SYSTEM PLAN

The Chariton Municipal Airport was identified as a General Aviation II airport in terms of service classification. The Chariton Municipal Airport should also support facility development as outlined in Table 1-21. Knoxville was also placed within the same service classification. Albia, Centerville, and Osceola were classified as General Aviation II airports that are designed to Basic Utility Stage II standards. Ottumwa, because of scheduled service, was identified as a Commercial Service II airport.

Table 1-21 summarizes minimum development standards by service classification. Development standards/guides for Chariton (GAII) suggest that an adequate level of service would be provided by a primary runway facility 4,000 feet in length and 75 feet in width. A turf crosswind runway 3,400 feet in length and 150 feet in width would supplement service.

TABLE 1-21: IOWA AIRPORT DESIGN GUIDES

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

* Critical Aircraft: Aircraft which requires the greatest runway development.

SOURCE: 1985 IOWA AVIATION SYSTEM PLAN

Consideration may be given to hard surfacing the crosswind runway thereby exceeding the minimum level of service provided by a turf facility. At low activity airports, the benefit/cost associated with the hard surfacing of the crosswind runway may be questionable since less than 15 percent of the operations would typically be conducted on that runway. For planning purposes, ultimate development of the crosswind runway should be contemplated, but may be considered a low priority improvement unless aviation activity would merit construction.

National Plan of Intergrated Airports

The Federal airport system consists of those airports; public, civil, and joint use (military/civil) within the U.S. and its territories considered necessary to provide a system of airports adequate to anticipate and meet the needs of the nation's civil aeronautics. Criteria for inclusion in the NPIAS is as follows:

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

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

Basic Utility Stage I	Serves small engine aircraft generally under 3,500 pounds gross weight with approach speeds below 91 knots, and wingspans less than 49 feet. Typically these aircraft are used for personal, training, or agricultural flying. Precision instrument approach operations are not anticipated. (Approach Category A) (Design Group I)
Basic Utility Stage II	Serves small single engine and light twin engine aircraft generally under 6,000 pounds with approach speeds below 121 knots, and wingspans less than 49 feet. Typically, these aircraft are used for personal, some business, and some charter flying. Precision instrument approach operations are not usually anticipated. (Approach Categories A and B) (Design Group I)

General Utility Stage I	Serves single and twin engine aircraft under 12,500 pounds requiring greater runway lengths than provided at Basic Utility airports. Approach speeds are less than 121 knots and wingspans are less than 49 feet. These aircraft are typically used for business and charter flying. Precision instrument approach operations are not usually anticipated. (Approach Categories A and B) (Design Group I)
General Utility Stage II	Serves large aircraft up to 60,000 pounds with approach speeds of less than 121 knots and wingspans of less than 79 feet, as well as large aircraft with approach speeds of less than 91 knots and wingspans of less than 118 feet. These aircraft range from typical corporate aircraft (including jets) to commuter airline aircraft. This airport class is capable of handling precision instrument approach operations. (Approach Categories A and B) (Design Groups I, II, and III) The GU II airport is primarily designed to accommodate airplane Design Groups I and II.
Transport	Serves virtually all aircraft including jet airliners. It serves large (up to 60,000 pounds) and heavy (up to 300,000 pounds) aircraft. This airport class is capable of handling precision instrument approach operations. (Approach Categories C, D, and E)

Airports recording substantial use (500 annual itinerant operations) by aircraft with an approach speed of 121 knots or more should be designed to standards set forth in FAA AC 150/5300-12, Airport Design Standards-Transport Airports. Transport category airports are further subdivided by aircraft size and weight. Turbojet airplanes - 60,000 pounds or less maximum certified take off weight:

A. 75% Fleet at 60% useful load
B. 75% Fleet at 90% useful load

For reference, selected aircraft listed in Appendix ii of FAA AC 150/5300-4B, Chg. 6 are noted by approach speed and design group.

FAA design standards applicable to the Onawa Municipal Airport are noted in Table 1-19.

TABLE 1-22: FAA DESIGN STANDARDS

ITEM	DIM 1/	NONPRECISION & VISUAL RUNWAY — AIRPLANE DESIGN GROUP			PRECISION INSTRUMENT RUNWAY — AIRPLANE DESIGN GROUP			
		I 2/ Wingspan < 49'	I Wingspan < 49'	II Wingspan < 79'	I 2/ Wingspan < 49'	I Wingspan < 49'	II Wingspan < 79'	III Wingspan < 118'
Runway								
Length	A	- Refer to chapter 4 -						
Width	B	60 ft 18 m	60 ft 18 m	75 ft 23 m	75 ft 23 m	100 ft 30 m	100 ft 30 m	100 ft 30 m
Runway Safety Area 3/								
Length Beyond Runway End 4/	2C	240 ft 72 m	240 ft 72 m	300 ft 90 m	600 ft 180 m	600 ft 180 m	600 ft 180 m	600 ft 180 m
Width	C	120 ft 36 m	120 ft 36 m	150 ft 45 m	300 ft 90 m	300 ft 90 m	300 ft 90 m	300 ft 90 m
Taxiway								
Width	D	25 ft 7.5 m	25 ft 7.5 m	35 ft 10.5 m	25 ft 7.5 m	25 ft 7.5 m	35 ft 10.5 m	50 ft 15 m
Taxiway Safety Area								
Width		49 ft 15 m	49 ft 15 m	79 ft 24 m	49 ft 15 m	49 ft 15 m	79 ft 24 m	118 ft 36 m
Separation Distance:								
Runway Centerline to:								
Parallel Runway Centerline		700 ft 210 m	700 ft 210 m	700 ft 210 m	- Refer to AC 150/5300-12 -			
Parallel Taxiway Centerline 5/	E	150 ft 45 m	225 ft 67.5 m	240 ft 72 m	200 ft 60 m	250 ft 75 m	300 ft 90 m	350 ft 105 m
Building Restriction Line and Aircraft Parking Area 6/	F	125 ft 27.5 m	200 ft 60 m	250 ft 75 m	7/ 7/	7/ 7/	7/ 7/	7/ 7/
Runway Centerline and End to:								
Object		- Refer to paragraph 16 -						
Property Line	G	- Refer to paragraph 19 -						
Taxiway Centerline to:								
Parallel Taxiway Centerline		69 ft 21 m	69 ft 21 m	103 ft 31.5 m	69 ft 21 m	69 ft 21 m	103 ft 31.5 m	153 ft 46.5 m
Parked Aircraft and Object	H	- Refer to paragraph 16 -						
Taxilane Centerline to:								
Parked Aircraft and Object		- Refer to paragraph 16 -						

1/ Letters are keyed to those illustrated in figure 7-2

2/ These dimensional standards are for facilities which are to serve only small airplanes.

3/ This runway safety area standard applies to all runways and runway extensions, that are constructed or upgraded after February 24, 1983. For other runways, the maximum feasible length and width of runway safety area should be provided.

4/ These distances may need to be increased to keep the stopway within the runway safety area.

5/ The location of a parallel taxiway may be adjusted such that no part of an aircraft (tail, wing tip) on taxiway centerline penetrates the obstacle free zone (OFZ).

6/ Objects located outside of the building restriction lines may penetrate the airport imaginary surfaces defined in Subpart C of FAR Part 77 where an FAA aeronautical study has determined that the specific penetration will not result in a hazard to air navigation.

7/ The building restriction line for a Category I ILS runway precludes any part of a building, tree, or parked aircraft from penetrating surfaces originating 300 feet (90 m) from runway centerline and sloping laterally outward 4 (horizontal) to 1 (vertical).

SOURCE: FAA AC 150, 5300-4, chg. 7 (9/23/83)

Area Airport Facilities

Table 1-23 summarizes existing conditions for selected airports that are part of the state aviation system. These airports both complement and compete with the Chariton Municipal Airport. A new airport supporting a runway 4,000 feet in length and 75 feet in width is under construction at Osceola.

TABLE 1-23: AREA AIRPORTS - KNOXVILLE, CENTERVILLE, AND ALBIA

	KNOXVILLE	CENTERVILLE	ALBIA
Ownership	Public	Public	Public
Elevation	927	1028	963
Longitude	93-07-00W	92-54-00W	92-45-46W
Latitude	41-18-00N	40-41-01N	40-55-40N
Acreage	161	178	63
Runway	15/33	15/33	13/31
Length	3,081	3,500	2,500
Width	75	50	50
Surface	Concrete	Concrete	Asphalt
Gross Weight (000)	28,000 sw	18,000 sw	15,000 sw
Lighting	LIRL	MIRL	LIRL
Marking	NPI	Basic	Basic
REIL	---	---	---
VASI/PAPI	---	---	---
Runway	---	8/26	---
Length	---	2,600	---
Width	---	75	---
Surface	---	Turf	---
Gross Weight (000)	---	---	---
Lighting	---	---	---
Marking	---	---	---
REIL	---	---	---
VASI/PAPI	---	---	---
Beacon	Yes	Yes	Yes
Wind Indicator	Yes	Yes	Yes
Based Aircraft			
S.E.	30	13	10
M.E.	2	1	0

SOURCE: FAA FORM 5010, 1986 and 1987

FORECAST OF AVIATION ACTIVITY

CHAPTER TWO

FORECAST OF AVIATION DEMAND

INTRODUCTION

Forecast Methodology

The forecast of aviation activity provides a basis by which to evaluate present facility service capabilities against immediate and long range aviation activity. Consequently, unmet needs that exist can be identified and the service level of the facility improved. Facility improvements must be evaluated within the context of benefits and costs. The forecast of aviation activity then provides a basis by which to:

- Identify unmet facility needs.
- Examine benefits and costs.
- Identify a point in time when a specific improvement may be contemplated.

Consideration should be given to distinguishing the difference between present activity and potential activity or demand. The forecast of aviation demand should be based upon the potential demand within the airport service area. In estimating potential demand, consideration must be given to a number of variables which influence demand within the airport service area.

- Aircraft ownership (registered aircraft)
- Pilots
- Population change, income
- Labor force characteristics
- Major industrial and business users
- Existing airport facilities and services (FBO)
- Area airport facilities and services, state system

Economic activity within the airport service area, along with airport facilities and services are the more important variables influencing aviation demand. Aircraft ownership is influenced by socioeconomic trends within the service area while the decision to base an aircraft at one airport or another is influenced by facility development and services.

For example, aircraft storage facilities and unit cost, together with services provided by the Fixed Base Operator (FBO), are important considerations in basing an aircraft. Touch and go operations generated by student traffic may be largely due in part to efforts by the FBO in promoting aviation.

Itinerant aircraft operations are influenced by economic activity within the airport service area. The decision to travel or transport an item from one point to another is based upon a number of factors.

- Distance and accessibility, isolation
- Trip purpose and cost
- Commodity, value
- Availability of other modes

The airport service area was defined in Chapter One and coincides for the most part with the geographic area of Lucas County. The forecast of aviation demand is based upon potential activity that exists within the airport service area.

National Trends

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

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

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

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

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

Active single-engine and multi-engine piston aircraft are expected to grow 2.4 percent per year while turbine powered aircraft are expected to grow at 5.8 percent. A seven percent annual rate of growth was estimated for turbine rotorcraft. Some 7,300 aircraft per year are expected to be added to the national general aviation fleet between 1984 and 1985. In 1986, there were 271,611 registered general aviaiton aircraft. Of this total, 41,009 were multi-engine aircraft; 122,941 were single eingine (4-place and over), and 87,988 were single engine (3-place or less). The balance were helicopters, balloons, gliders, etc.

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

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

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

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

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

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

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

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

* Turboprop and turbojet aircraft averaged a greater number of flight hours per aircraft than other aircraft types with 414 hours and 252 hours, respectively. Twin-engine turboprops with 13 or more seats flew almost 1,112 hours per aircraft. In contrast, single piston powered aircraft with fewer than 4 seats averaged approximately 140 hours.

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

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

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

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

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

* The general aviation aircraft fleet consumed an estimated 1.201 million gallons of fuel during 1984: 462 million gallons of aviation gasoline and 739 million gallons of jet fuel.

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

Nationwide air carrier activity and routes have experienced considerable fluctuation within recent years due in part to fare wars, consolidation of routes to high density markets and more "point-to-point" services offered by "low-cost" carriers. The FAA expects air carrier operations to grow on an annual average of two percent through 1996. Revenue passenger enplanements are projected to increase from 356 million in FY84 to 531 million by 1996.

The Airline Deregulation Act of 1978 has had an impact, not only upon service nationwide, but also in the State of Iowa. Commuter airlines are now serving points once dominated by the certificated air carrier. Continued growth in the commuter airline industry is anticipated. Passenger enplanements by commuter airlines is expected to reach 54.2 million by 1996 compared to 20.3 million enplanements in 1984. Commuters are defined as those operators of small aircraft with 60 seats or less, which perform at least five scheduled round trips per week between two points and/or carry mail.

While this study is primarily concerned with general aviation and air taxi traffic, the foregoing provides an overview of aviation activity anticipated nationally.

Iowa Trends

Aviation activity in Iowa has also experienced considerable change. Table 2-3 summarizes the number of aircraft registered in the State of Iowa from FY74 through FY86. As noted, the number of aircraft experienced a continual increase to 1979 when 3,530 aircraft were registered in the State. Beginning in 1980, the number of aircraft registered has experienced a continual decrease with 3,079 aircraft registered in FY84, 2,962 in FY85, and 2,926 in FY86.

TABLE 2-3: REGISTERED AIRCRAFT, IOWA, FISCAL YEAR 1974 - 1986

YEAR	AIRCRAFT	YEAR	AIRCRAFT
1974	2,565	1981	3,417
1975	2,620	1982	3,335
1976	3,144	1983	3,099
1977	3,308	1984	3,079
1978	3,492	1985	2,962
1979	3,530	1986	2,926
1980	3,492		

SOURCE: IDOT, AERONAUTICS DIVISION, 1986 (Airworthy Aircraft)

Annual changes in aircraft ownership parallel economic changes. As the Gross State Product in real terms begins to grow in a positive direction, the number of aircraft will also increase. Statewide changes in the number of registered aircraft is expected to increase within the period from 1986 to 1990 at a rate well below the national rate. The period, 1990 to 2005, is expected to produce a more dramatic increase. An estimated 3,250 aircraft are expected to be registered in the State in 1990 increasing to 3,875 by 2000 and 4,200 in 2005. These 1985 State Aviation System Plan estimates are well below the estimates presented in the 1982 State Aviation System Plan.

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

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

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

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

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

The Gross State Product (GSP) is a measure of aggregate economic activity in Iowa. Table 2-4 summarizes the Gross State Product in current dollars and by constant 1982 dollars. Since 1979 the GSP, in constant dollars, has decreased coinciding with Iowa's economic recession. A slight improvement was noted beginning in 1984 and continuing through 1985.

TABLE 2-4: GROSS STATE PRODUCT, IOWA, 1975 - 1985

YEAR	CURRENT $	CONSTANT $	ANNUAL % CHANGE IN CONSTANT 82$
1975	17.28	28.96	
1976	19.52	30.70	6.01
1977	21.44	32.10	4.36
1978	23.84	33.92	5.67
1979	26.39	34.94	3.01
1980	28.06	34.10	-2.40
1981	29.68	32.88	-3.58
1982	31.45	32.29	-1.80
1983	31.98	31.32	-3.00
1984	34.76	32.70	4.41
1985	36.78	33.30	1.83

NOTE: In Billion Dollars

SOURCE: DEPARTMENT OF ECONOMIC DEVELOPMENT, June, 1987

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

The ratio of registered aircraft to 10,000 population in Iowa experienced a decrease from 11.98 aircraft per 10,000 population in 1980 to an estimated 10.59 aircraft per 10,000 population in 1985. The ratio of aircraft to population is expected to increase as the economy of the State improves. By 1990, the ratio of registered aircraft to population will increase to 11.15 reaching 12.1 by 1995 which is only a slight increase over the 1980 ratio of 11.98 aircraft per 10,000 population. An estimated 13.06 aircraft per 10,000 population will exist by 2000 increasing to 14 in 2005. Reference may be made to Table 2-5.

TABLE 2-5: REGISTERED AIRCRAFT, IOWA, 1980 - 2005

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

SOURCE: IDOT, Iowa State Aviation System Plan, 1985

Provisional Estimates of Population, released by the Iowa Census Data Center, placed the State's 1985 population at 2,884,000 persons. The number of registered aircraft per 10,000 population for the State, based upon the 1985 population estimate was 10.27; slightly less than projected in the State Aviation System Plan.

The 1985 Iowa Aviation System Plan projects an increase in the number of aircraft operations conducted within Iowa. General aviation operations accounted for 89 percent of the total activity in 1984. The number of general aviation operations are expected to increase from 1,879,000 in 1985 to 2,893,000 in 2005.

The Iowa Department of Transportation has, in the past, conducted visual counts at general aviation airports. Recently, IDOT has developed a program to count aircraft operations at non-tower airports using sound-actuated counters. The counting program, to be conducted at 72 airports, will provide better data for estimating traffic at non-tower facilities. Presently, the most accurate data is obtained from tower airports. Results of the IDOT counting program available to date are summarized in Table 2-6.

TABLE 2-6: AIRCRAFT OPERATIONS, SELECTED AIRPORTS, 1985 - 1987

	FIXED WING FLEET OPERATIONAL MIX (PERCENTS)			
AIRPORT	SINGLE ENGINE	MULTI ENGINE	JET	ESTIMATED* TOTAL ANNUAL OPERATIONS (ARRIVALS AND DEPARTURES)
Algona	93.6	6.4	0	8290
Atlantic	94.9	5.0	.1	8146
Boone	93.1	6.8	.1	15766
Carroll	92.3	7.0	.7	5648
Cherokee	86.9	13.1	0	8240
Denison	94.3	4.7	1.0	7820
Independence	93.1	6.9	0	4116
Jefferson	91.6	8.4	0	3268
Manchester	93.7	6.3	0	1596
Monticello	94.4	5.6	0	7694
New Hampton	86.4	13.6	0	1086
Newton	67.7	31.4	.9	12120
Orange City	60.2	39.8	0	2070
Perry	97.9	1.0	.2	6850
Red Oak	91.4	8.6	0	7440
Spencer	64.3	35.1	.6	11814
West Union	86.5	12.7	.8	3088

* Does not include rotorcraft operations as it is usually not possible to differentiate between rotorcraft arrivals, departures, hovering and ground operations using the RENS aircraft activity counter.

SOURCE: IDOT, July 1, 1987

Counts have also been made at Chariton.

So as to better assess potential activity at the Chariton Municipal Airport, historic general aviation activity at the five tower airports in Iowa was summarized for the years FY79 through FY86. Air carrier, air taxi, and military operational activity was also noted for FY86. Reference may be made to Tables 2-7 and 2-8.

TABLE 2- 7: GENERAL AVIATION OPERATIONS, TOWER LOCATIONS, FY1979-FY1985

	FISCAL YEAR						
	1979	1980	1981	1982	1983	1984	1985
<u>CEDAR RAPIDS</u>							
Local	52,945	43,848	34,391	31,317	24,801	26,730	29,475
Itinerant	51,864	50,498	48,910	37,228	37,645	36,681	35,636
Total	104,179	94,346	83,301	68,545	62,446	63,411	65,111
<u>DES MOINES</u>							
Local	52,945	45,805	33,974	28,016	25,083	22,200	21,828
Itinerant	107,460	103,458	94,351	80,841	77,395	75,478	75,643
Total	160,405	149,263	128,325	108,857	102,478	97,678	97,471
<u>DUBUQUE</u>							
Local	25,945	29,288	28,410	25,384	22,683	19,064	18,873
Itinerant	34,961	33,543	33,683	26,801	25,188	24,690	24,332
Total	60,636	62,831	62,093	52,185	47,871	43,754	43,205
<u>SIOUX CITY</u>							
Local	27,037	18,250	14,351	9,615	12,203	9,755	10,036
Itinerant	40,930	36,564	34,529	24,038	26,947	26,212	26,557
Total	67,968	54,814	48,880	33,653	39,150	36,967	36,593
<u>WATERLOO</u>							
Local	38,217	38,879	32,716	17,809	15,308	15,270	14,444
Itinerant	41,595	39,633	37,106	25,645	23,599	22,999	21,375
Total	79,812	78,512	69,822	43,454	38,907	38,269	35,819
<u>TOTAL</u>	473,000	439,766	392,421	306,694	290,852	279,079	278,199
Local	41.5	40.1	36.7	36.6	34.4	33.3	34.0
Itinerant	58.8	59.9	63.3	63.4	65.6	66.7	66.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

SOURCE: FEDERAL AVIATION ADMINISTRATION, 1986

General aviation operations at the five tower airports in Iowa decreased by 41 percent from 1979 through 1985. In FY79 there were 473,000 general aviation operations conducted at the five tower airports. In FY85, the number of general aviation operations at the same five tower airports totaled 278,199, reflecting a decrease of 198,801 operations from FY79.

The downward trend was reversed in FY86, when 282,590 general aviation operations were recorded at the five tower airports. General aviation operations recorded a 1.5 percent increase over FY85.

TABLE 2-8: AIRCRAFT OPERATIONS, FISCAL YEAR 1986, TOWER AIRPORTS

	TOTAL	AIR CARRIER	AIR TAXI	GENERAL AVIATION	MILITARY
CEDAR RAPIDS					
Itinerant	69,863	10,184	23,958	35,248	473
Local	26,215	0	0	26,119	96
Total	96,078	10,184	23,958	61,367	569
DES MOINES					
Itinerant	122,801	28,595	24,927	70,879	4,400
Local	29,797	0	0	27,735	2,062
Total	158,598	28,595	24,927	98,614	6,462
DUBUQUE					
Itinerant	31,213	4,437	4,220	22,280	276
Local	21,831	0	0	21,741	90
Total	53,044	4,437	4,220	44,021	366
SIOUX CITY					
Itinerant	40,695	2,566	7,521	27,012	3,596
Local	19,925	0	0	14,984	4,491
Total	60,621	2,566	7,521	41,996	8,537
WATERLOO					
Itinerant	32,765	4,972	3,285	21,118	3,390
Local	17,831	0	0	15,474	2,357
Total	50,596	4,972	3,285	36,592	5,747
STATE TOTAL					
Itinerant	297,337	50,754	63,911	176,537	12,135
Local	115,599	0	0	106,053	9,546
Total	412,936	50,754	63,911	282,592	21,861

SOURCE: FEDERAL AVIATION ADMINISTRATION, June, 1987

The number of local operations as a percent of total operations conducted at the five tower airports decreased annually from 1979 through 1985. In 1986 however, the number of local operations by general aviation aircraft increased. Of the total general aviation operations conducted in FY86, 62.5 percent were itinerant, while the remaining 37.5 percent were local operations.

In FY86, there were 650 aircraft based at the five tower airports, of which Des Moines accounted for 32.6 percent of the total, followed in turn by Cedar Rapids with 25.5 percent; Sioux City, 20 percent; Waterloo, 13.7 percent; and Dubuque with 8.2 percent of the total. The based aircraft at the five tower airports averaged 438 operations per based aircraft in FY86.

Regional Trends

An eight county area was selected for a more indepth comparative assessment than that provided from by a review of statewide trends. Table 2-9 summarizes registered general aviation aircraft by county for the period 1979 through 1986. There were 207 registered general aviation aircraft within the eight county area as of December 31, 1979. The number of registered aircraft from 1979 through 1987 remained fairly stable with a modest increase taking place from 1979 through 1983 followed in turn by a modest decrease. As of May, 1987, there were 214 registered general aviation aircraft within the eight county area.

TABLE 2-9: REGISTERED AIRCRAFT, 1979 - 1987, EIGHT COUNTIES

COUNTY	1979	1980	1981	1982	1983	1984	1985	1986	1987 (1)
Appanoose	15	15	13	13	11	11	11	13	14
Clarke	15	15	13	11	10	10	8	8	10
Decatur	12	16	19	18	18	18	18	12	12
Lucas	14	13	14	14	14	15	13	12	12
Marion	61	62	59	60	61	57	50	48	46
Monroe	21	19	22	22	22	23	21	18	19
Warren	59	63	65	73	78	78	78	80	89
Wayne	10	11	11	9	7	8	5	8	8
TOTAL	207	214	216	220	221	220	204	206	214

SOURCE: FAA, Census of U.S. Civil Aircraft, Dec. 31, 1979 - 1986
(1) IDOT, AIR AND TRANSIT DIVISION, May, 1987

The number of aircraft based at public owned airports within the eight county area for the period 1976 through 1986 is summarized by airport in Table 2-10. It should be noted that there are no public owned airports in Warren or Wayne County. The number of aircraft based at the seven public owned airports like that of registered aircraft showed a modest increase to 1981 followed in turn by a slight decrease. In 1986 there were 109 aircraft based at the seven public airports. In addition to the public airports, there are a number of aircraft based at private owned facilities.

TABLE 2-10: BASED AIRCRAFT, PUBLIC AIRPORTS, 1976 - 1986

PUBLIC AIRPORTS	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Albia	5	5	6	6	5	9	9	8	9	9	6
Centerville	12	12	12	12	12	13	13	14	9	9	14
Chariton	31	31	31	31	31	35	34	31	31	30	33
Knoxville	31	31	31	32	40	43	40	38	40	40	34
Lamoni	3	3	3	3	1	4	4	4	4	3	3
Osceola	11	11	11	11	11	6	4	6	5	5	8
Pella	9	9	11	11	11	12	11	10	12	12	11
TOTAL	102	102	105	106	111	122	115	111	110	108	109

SOURCE: IDOT, OFFICE OF ADVANCED PLANNING, June, 1987

Throughout Iowa, the number of aircraft based at public owned airports has generally increased. Large numbers of aircraft registered in Warren County are likely to be based at public airports outside the eight couty area to include Des Moines International and Winterset - Madison County.

Of the 109 based aircraft reported in 1986 within the eight county area 30.3 percent were based at the Chariton Municipal Airport, while 31.2 percent were based at Knoxville. Some 61.5 percent were based at Chariton and Knoxville with the balance based at the remaining five public airports within the eight county area. The airport service areas of Chariton and Knoxville obviously extend beyond the geographic area of the county in which they are located.

Future numbers of based aircraft within the eight county area are expected to be representative of trends statewide. Public airport utilization is expected to increase as the number of private facilities open to the public decrease. The number of aircraft registered within the eight counties is expected to show little change with Warren County because of its proximity to the Des Moines metropolitan area realizing the more dramatic increases over the twenty-year planning period.

Chariton Airport Service Area

As previously defined, the primary airport service area coincides for the most part with that of Lucas County. The number of aircraft registered within Lucas County from 1979 through May, 1987 remained fairly stable. In 1979, there were 14 registered as of May, 1987, according to the IDOT Annual Aircraft Registration Records, seven reported a Chariton mailing address, three a Russell mailing address, and one each in Leon and Derby. Within the secondary service area were five additional aircraft of which one reported a Russell mailing address and the remaining four a Corydon mailing address. As of May, 1987, there were a total of 17 aircraft registered in the primary and secondary airport service areas. Reference may be made to Tables 2-11 and 2-12.

Historic trends with the secondary service area have been subject to greater annual change than that noted within the primary service area. There were eleven aircraft registered in Wayne County in 1980 decreasing to five in 1985. In 1987 there were eight registered in the County of which five were included in the secondary service area.

TABLE 2-11: REGISTERED AIRCRAFT BY TYPE, 1982 - 1986, PRIMARY SERVICE AREA

		PISTON				TURBOPROP	TURBOJET
		SINGLE ENGINE		MULTI-ENGINE			
	TOTAL	1-3	4 PLUS	1-6	7 PLUS	---	---
1986	12	4	5	---	3	---	---
1985	13	4	6	---	3	---	---
1984	15	4	8	---	3	---	---
1983	14	4	7	---	3	---	---
1982	14	4	7	---	3	---	---

SOURCE: FAA, Census of U.S. Civil Aircraft, Dec. 31, 1982-1986

Historically, aircraft registered within the primary service area consisted of single and multi-engine piston powered aircraft. There were no turboprop or turbojet aircraft registered within the five year period.

Those aircraft currently registered in the primary and secondary airport service areas are noted by model and owner address in Table 2-12.

TABLE 2-12: REGISTERED AIRCRAFT, AIRPORT SERVICE AREA, 1987

LUCAS COUNTY - PRIMARY SERVICE AREA

ID NUMBER	MODEL	ADDRESS OF OWNER
1261R	Bellanca 0433	Chariton
200HV	Piper PA31-325	Chariton
2271M	Piper PA34-200T	Chariton
35057	Piper J3 65	Chariton
3737A	Piper PA 22	Russell
38581	Piper PA-28-161	Leon
50EP	VERI-EZE	Russell
501DM	Piper PA 34-200T	Chariton
5724V	Beech V35	Chariton
6529W	Piper PA-28-140	Derby
9187M	Cessna 182P 11	Chariton
95046	Piper PA-28-140	Russell

WAYNE COUNTY - SECONDARY SERVICE AREA

3807F	Great Lake 2T1A	Corydon
5800R	Cessna 172	Corydon
79949	Cessna 172K	Corydon
86864	Cessna 172	Corydon
9839D	PA 22-150	Russell

SOURCE: IDOT, AIR AND TRANSIT DIVISION, May, 1987

In 1980 there were 12.6 registered aircraft per 10,000 population within the primary airport service area compared with a State ratio of 14.12. In 1986, there were an estimated 12.4 registered general aviation per 10,000 population within the State of Iowa. Within the primary airport service area there were an estimated 12.24 registered aircraft per 10,000 population.

The number of registered aircraft within the primary airport service area is expected to experience only a modest increase over the twenty-year planning period. The number of registered aircraft is expected to increase from 12 in 1987 to 15 in 2006. The actual number of aircraft registered in any given year will likely fall within a range of one to two aircraft above and below the trend line. Reference may be made to Table 2-13.

TABLE 2-13: REGISTERED AIRCRAFT, PRIMARY AIRPORT SERVICE AREA, 1987 - 2006

YEAR	POPULATION	REGISTERED AIRCRAFT BASE LINE	REGISTERED AIRCRAFT TREND LINE
1987	10,000	12	12
1991	10,200	12	12
1996	10,400	12	13
2006	10,400	12	15

SOURCE: PDS, 1987

The mix of registered aircraft is expected to consist for the most part of piston powered aircraft of which the majority will be single engine aircraft. The number of twin engine piston powered aircraft is expected to remain stable. There is, however, a high probability that a turboprop aircraft could be registered and based at the Chariton Municipal Airport sometime within the twenty-year period.

The number of aircraft based at the Chariton Municipal Airport remained unchanged from 1976 through 1980 when 31 aircraft were based at the facility. The number of based aircraft increased to 35 in 1981 dropping to 30 in 1985. The number of aircraft based at the facility in 1986 was 33. Of the 33 based aircraft, 28 were single-engine and five were twin-engine aircraft.

When comparing aircraft ownership with the number of based aircraft, it is obvious that the Chariton Municipal Airport is able to attract aircraft from beyond its primary service area. The reasons for Chariton's unique position can be attributed to the level of service provided as well as the absence of public airport facilities in Warren and Wayne Counties. The level of service provided by airport facilities in Clarke and Decatur Counties have also contributed to the number of aircraft based at Chariton. The new airport at Osceola will have some impact upon the number of aircraft based at Chariton, as would the construction of a public airport at Leon.

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 aricraft in the county."

SOURCE: SASP, 1978 (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 lose their historical dominance.

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

SOURCE: SASP, 1978 (p. 39)

The number of based aircraft may be most influenced by the new airport at Osceola provided services are provided and hangars are constructed. There are no known plans to construct a public owned facility in Warren or Wayne Counties. The proposed facility at Leon is awaiting funding for land acquisition. Future numbers of based aircraft at Chariton are expected to remain stable over the next twenty years. Chariton is expected to maintain its attractiveness with some loss of based aircraft to Osceola as that facility develops. The loss is expected to be off-set by an increase in registered aircraft.

Historically, there has been in excess of two based aircraft for each registered aircraft. As noted in Table 2-14, the ratio of based aircraft to registered aircraft has fallen within a range of 2.07 (1984) to 2.75 (1986) based aircraft for each registered aircraft.

TABLE 2-14: BASED AND REGISTERED AIRCRAFT, 1979 - 1986

YEAR	BASED (1)	REGISTERED (2)	RATIO OF BASED TO REGISTERED AIRCRAFT
1986	33	12	2.75
1985	30	13	2.31
1984	31	15	2.07
1983	31	14	2.21
1982	34	14	2.43
1981	35	14	2.50
1980	31	13	2.38
1979	31	14	2.21

SOURCE: (1) IDOT
(2) FAA

The number of aircraft expected to be based at Chariton over the twenty-year planning period are noted in Table 2-15. Some annual changes will take place as is evident in Table 2-14 with no significant increase in the number of based aircraft expected. This scenario is based upon the following assumptions:

1. No increase in the service level at Knoxville or Albia that would provide an incentive for relocating aircraft.
2. The proposed airport at Leon would not be constructed in the near term; and if constructed, the runway would consist only of a turf facility.
3. No public owned airport would be constructed in Wayne County.
4. No public owned airport would be constructed in Warren County.
5. The City of Chariton is able to retain Whitfield Flying Service and/or another FBO/Air Taxi Operator.
6. The Osceola Municipal Airport is unable to attract an FBO and provides only minimal services to based aircraft.

Construction of the proposed airport at Leon would have the most dramatic impact upon the number of aircraft based at Chariton.

TABLE 2-15: BASED AIRCRAFT, 1987 - 2006

		BASED AIRCRAFT	
YEAR	BASED/REGISTERED	LOW	HIGH
1987	2.35/2.75	30	33
1991	2.35/2.50	28	30
1996	2.30/2.35	30	31
2006	2.00/2.35	30	35

SOURCE: PDS, 1987

AIRCRAFT OPERATIONS

Annual, Itinerant, and Local Operations

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

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

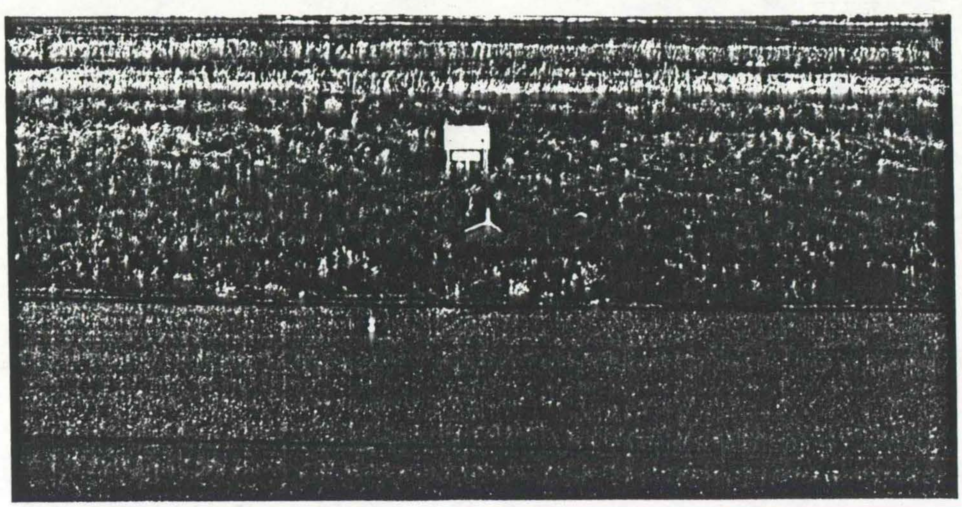
1. Operates within the local traffic pattern or within sight of the control tower;
2. is known to be departing for or arriving from local practice areas; or
3. executes simulated instrument approaches of low passes at the airport.

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

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

Aircraft operations are a function of the following elements:

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



SOUND ACTUATED COUNTER AT CHARITON MUNICIPAL AIRPORT

Current Operations

The Iowa DOT has maintained a sound actuated counter at Chariton Municipal Airport since July 22, 1987. Data from the counting program is summarized in Table 2-16 and Figure 2-1. The count period extended from July 22 through October 27, 1987. Over the 98 day period, 1,500 departures were recorded. Assuming that arrivals equaled departures, 3,000 aircraft operations were conducted. Average day operations were computed at 30.6.

Saturday and Sunday accounted for 37.8 percent of the total operations with the balance, 62.2 percent, conducted on weekdays. Sunday represented the average peak day with 23.8 percent of the total operations being recorded. Peak distribution occurred between 4:00 and 6:00 p.m. A majority of operations, 87.4 percent, were conducted by single engine aircraft. Twin engine aircraft accounted for 11.7 percent of the total activity followed in turn by jet aircraft with 0.8 percent.

TABLE 2-16: AIRCRAFT ACTIVITY, CHARITON, JULY 22 - OCTOBER 27, 1987

Hours of Monitoring = 2,435	% Singles During the Weekdays = 80.98
Total Departures = 1,500	% Singles During the Weekends = 98.05
Departures per Hour = 0.62	% Twins = 11.73
% Departures on Sunday = 23.82	% Twins During the Weekdays = 17.74
% Departures on Monday = 15.10	% Twins During the Weekends = 1.77
% Departures on Tuesday = 13.80	% Jets = 0.80
% Departures on Wednesday = 10.30	% Jets during the Weekdays = 1.18
% Departures on Thursday = 10.89	% Jets during the Weekends = 0.18
% Departures on Friday = 12.11	% Helicopters = 0.07
% Departures on Saturday = 13.97	% Helicopters During the Weekdays = 0.11
% Singles = 87.41	% Helicopters During the Weekends = 0.00

SOURCE: IDOT, November, 1987

The airport also recorded minimal helicopter activity. Table 2-17 summarizes aircraft operational activity for the 98 day counting period average day and estimated activity aver a 365 day period of time.

TABLE 2-17: OPERATIONAL CHARACTERISTICS, 1987

	98 DAYS	AVG. DAY	365 DAYS
Total Operations	3,000	30.6	11,169
Single Engine	2,622	26.8	9,782
Twin Engine	352	3.6	1,314
Jet	24	0.24	88
Helicopter	2	0.02	7

	98 DAYS	AVG. BY DAY OF WEEK
Saturday	419	29.9
Sunday	715	51.1
Monday	453	32.4
Tuesday	414	29.6
Wednesday	309	22.1
Thursday	327	23.4
Friday	363	25.9

SOURCE: IDOT, November, 1987

Assuming that conditions similar to those occuring between July 22 and October 27, 1987 existed throughout the year, total annual operations would have totaled 11,169. Of these, 1,314 would have been conducted by twin engine aircraft, 88 by jet aircraft, and 7 by helicopter.

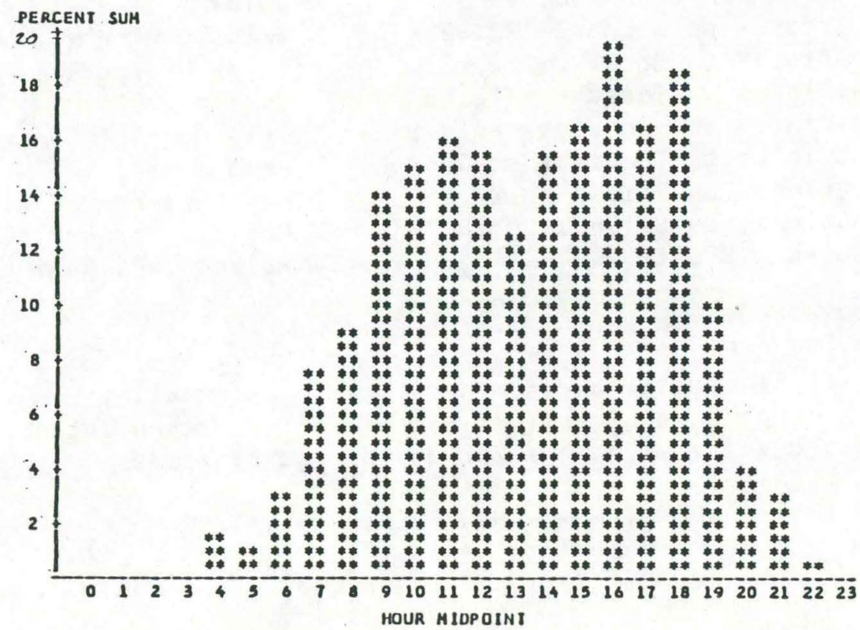
The average Sunday would have produced 51 aircraft operations, followed in turn by 29.9 operations for the average Saturday. The average Thursday generated 22 operations, while the average Monday produced 32.

Historically, activity would tend to decrease within the winter months and increase in the summer months. Activity at Chariton was not available by month, but is recorded by season. The summer season extends from June 21 through September 21. The fall season extends from September 22 through December 21.

July 22 - September 21	868 departures - Chariton
September 22 - October 27	632 departures - Chariton

Figure 2-1 shows the hourly distribution of aircraft operations within the 98 day period. Approximately 20 percent of the activity occured at 1600 hours.

FIGURE 2-1: AIRCRAFT ACTIVITY, CHARITION, JULY 22 - OCTOBER 27, 1987
% HOURLY DISTRIBUTION BAR CHART OF SUMS



SOURCE: IDOT, November, 1987

Activity increased at 0900 hours decreasing slightly at noon and gradually increasing throughout the afternoon to 1600 hours. Activity decreased significantly at 1900 hours.

The data obtained from the 98 day counting period would indicate the following:

* Activity on Saturday and Sunday suggests that a large percentage of the operations are for pleasure flying as would those conducted within the early evening hours during the summer counting period. Touch and go activity may also be concentrated within this period.

* Approximately 40 percent of the total operations are thought to be local operations. This estimate would reflect conditions at the five tower airports (FY86) where 37.5 percent were local operations.

Future Operations

Future aviation activity will be influenced to a large extent by the local economy within the airport service area. The cost of owning, maintaining, and operating an aircraft will also influence activity.

The estimate of total annual aircraft activity is an important factor in the development of airport facilities. At rural general aviation airports, the total number of aircraft operations may not be nearly as important as the number of operations by certain classes of aircraft. Generally, airport capacity at rural airports is not a major issue. The emphasis most always is upon the service level provided by various airside components of which runway length is most often discussed.

TABLE 2-18: ANNUAL OPERATIONS, 1987 - 2006

YEAR	TOTAL ANNUAL (1)	ANNUAL LOCAL (2)	ANNUAL ITINERANT (3)
1987	11,200	4,200	7,000
1991	12,711	4,767	7,944
1996	14,211	5,329	8,882
2006	17,244	6,467	10,778

(1) 53% increase in operational activity over 20 years
(2) 37.5% increase in operational activity over 20 years
(3) 62.5% increase in operational activity over 20 years

SOURCE: PDS, 1987

Total annual aircraft operations are expected to increase from 11,200 in 1987 to 12,711 in 1991. Total annual operations may approach 17,244 in the year 2006.

Annual itinerant aircraft operations are expected to increase from 7,000 in 1987 to 10,778 by 2006. Local operations are expected to increase as well over the next 20 years where 6,467 local operations are expected in 2006.

Future operational mix is noted in Table 2-19. The majority of operations are expected to be conducted by single engine piston aircraft. Itinerant traffic generated by local industry may find more activity by heavy twin engine aircraft as well as an increase in jet activity. Twin engine operations are expected to make up 20 percent of the total operations in 2006 representing an eight percent increase over the twenty-year planning period. Jet operations may increase from 0.8 percent of the activity in 1987 to 1.5 percent in 2006.

TABLE 2-19: OPERATIONAL MIX, 1987 - 2006

	SINGLE ENGINE		TWIN ENGINE		JET	
YEAR	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER
1987	87.0	9,767	12.0	1,344	0.8	90
1991	85.0	10,804	14.0	1,780	1.0	127
1996	83.0	11,795	16.0	2,274	1.0	142
2006	78.5	13,536	20.0	3,449	1.5	259

SOURCE: PDS, 1987

The forecast of aviation activity represents a trend line along which actual occurrences are anticipated.

AIR PASSENGERS/FREIGHT

Commuter Airline/Air Taxi

The Airline Deregulation Act of 1978 provided for the phase out of the Civil Aeronautics Board (CAB) control over pricing market entry and market exit. Consequently, there has been a pronounced effect upon air service in Iowa with the communities of Ottumwa and Clinton being served at present by commuter air carriers. Commuters also serve Fort Dodge, Mason City, Dubuque, and Burlington.

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

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

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

The nearest scheduled service is provided at the Des Moines International Airport. Carriers include United, TWA, Northwest, Continental, American, America West, and Midway. Commuters at Des Moines International are Air Midwest, Great Lakes, and Iowa Airways.

The most appropriate service level for the Chariton Airport service area is the air taxi. Presently there is an air taxi operator located at the Chariton Airport.

The Chartion Municipal Airport may generate up to 8,084 passenger enplanements and 32 tons of air freight by the year 2006. An increase in itinerant aircraft operations would contribute to future enplanements as well as air freight activity. Such may be induced in part by increased industrial activities in Lucas County.

TABLE 2-20: AIR PASSENGERS AND FREIGHT, 1987 - 2006

YEAR	PASSENGER ENPLANEMENTS	AIR FREIGHT (IN TONS)
1987	5,250	21
1991	5,958	24
1996	6,662	27
2006	8,084	32

SOURCE: PDS, 1987

Airport Capacity

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

Conditions:

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

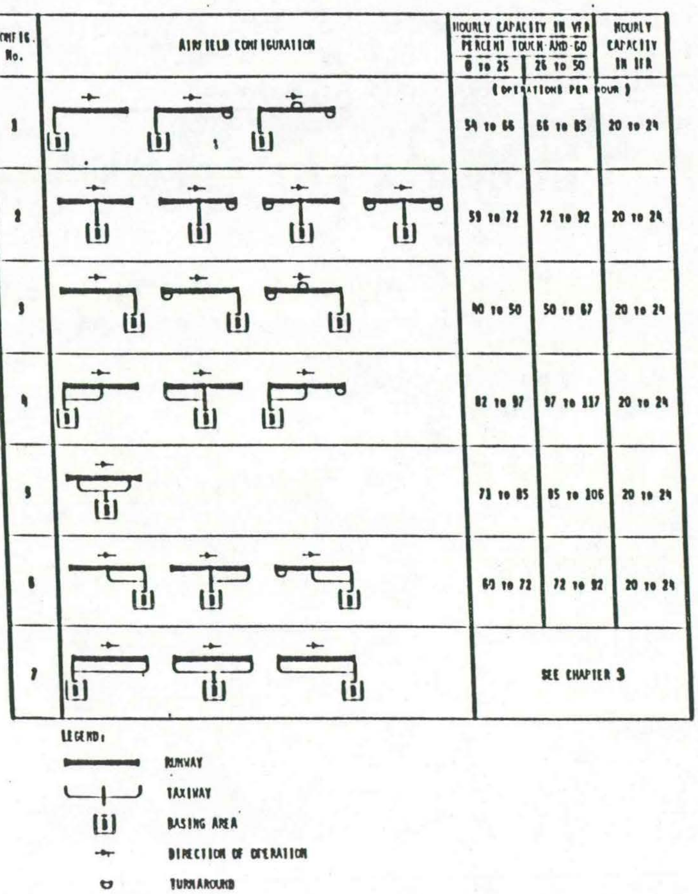
Variables:

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

Configurations one and three, as shown in Figure 2-2, are descriptive of the existing airport. The illustrations reveal that under IFR conditions, 20 to 24 operations per hour could be conducted. Hourly operational capacity will vary under VFR conditions subject to the number of touch and go operations and direction of the operation. The existing airport with a single runway could accommodate in excess of 100,000 annual aircraft operations.

FIGURE 2-2: HOURLY CAPACITY - SINGLE RUNWAY

9/23/83 AC 150/5060-5



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

LEGEND:
- RUNWAY
- TAXIWAY
- BASING AREA
- DIRECTION OF OPERATION
- TURNAROUND

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

Airport Service Level

Airplanes with the following characteristics at present represent the largest share of operational activity at the Chariton Municipal Airport.

Approach Speed	Less than 121 knots
Wingspan	Less than 49 feet
Gross Weight	Less than 12,500 pounds

There is also occassional activity by aircraft with a wingspan up to but not including 79 feet. Representative of such aircraft are the following:

Aero Commander	680, 720, 500, 600
Beechcraft	E-18, B-80, E-90, C-90
Cessna	441

The above aircraft have the following characteristics:

Approach Speed	Less than 121 knots
Wingspan	Less than 79 feet
Gross Weight	Less than 12,500 pounds

The airport service level at the Chariton Municipal Airport should accommodate those aircraft with the above characteristics. Consequently, facility development at the Chariton Municipal Airport should be representative of a General Utility Stage I airport designed to meet Airplane Design Group II standards. Reference may be made to Figure 2-3 which depicts the Airplane Design Group concept developed by the FAA.

The Wisconsin Department of Transportation grouped current aircraft into sets based upon approach speed, wingspan, weight, and engine classification. Using FAA criteria, the type of airport required to serve that set of aircraft was identified. Reference may be made to Table 2-21 which identifies the aircraft set by a four digit code. The fourth number designates the airport type which should serve that aircraft. The Chariton Municipal Airport, if designed to Airplane Design Group II standards, would serve those airplanes within those sets ending with a numerical designation of 1, 2, or 3.

The Chariton Municipal Airport would serve, in addition to those previously noted, the following representative twin engine models.

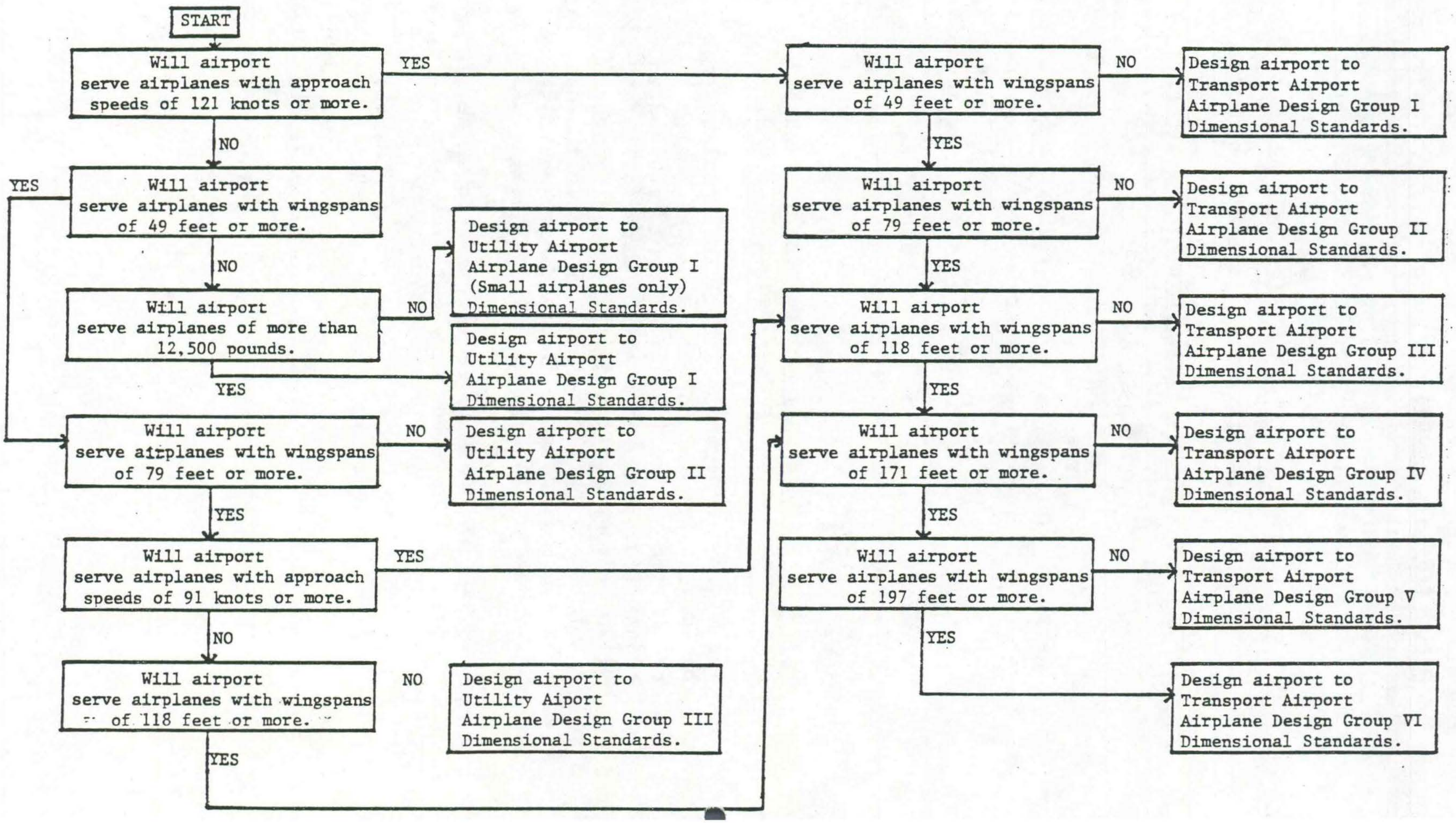
Aero Commander	690-A, 690
Beechcraft	D-50-A, 58-P, BE-60, F-90, G-18, 58TC, 95, C-45, D-55
Cessna	310-G, 410, 305, 414, 402, 310-R, 401, 404, 411, 421-C
Mitsubishi	MU-2B-36A, MU-2-6, MU-2
Piper	PA-31-325, PA-31-T, PA-31-310, PA-31, PA601
Rockwell	681-B

FIGURE 2-3: AIRPLANE DESIGN GROUP CONCEPT

CHARITON MUNICIPAL AIRPORT
* Approach Speed: Less than 121 knots
* Wingspan: Less than 79 feet

DESIGN
* Utility Airport (General Utility Stage I)
* Airplane Design Group II

DESIGN AIRCRAFT
* Beech 18
* PA-31



The Chariton Municipal Airport would not be designed to serve the following representative aircraft:

Dehavilland	DHC7
Fairchild	C-123
Beechcraft	300, 200
Falcon	50
King Air	200
Rockwell	Sabre 60
Short Bros.	330, 360
Dassault/SUD	Fan Jet Falcon
Hawker Siddeley	DH-125-3-AR, DH-125-400A

AIRCRAFT SETS

For airport design purposes, all aircraft have been grouped into sets which reflect commonality in size or operating characteristics. The aircraft sets are coded according to the following 4-digit identification:

1st column designates the aircraft's approach speed category:

- A =< 91 knots
- B = 91-120 knots
- C = 121-140 knots
- D = 141-166 knots
- E => 166 knots

2nd column designates the aircraft's wing span design group:

- 1 =< 49'
- 2 = 49'-78'
- 3 = 79'-117'
- 4 = 118'-170'
- 5 = 171'-196'
- 6 = 197'-262'

3rd column designates the aircraft's weight and engine classification:

- A =< 12,500 lbs./single engine
- B =< 12,500 lbs./multiple engine
- C = 12,500 lbs.-59,999 lbs.
- D = 60,000 lbs.-300,000 lbs.
- E => 300,000 lbs.

4th column designates the airport type which should serve the particular aircraft:

- 1 = Basic Utility Stage I
- 2 = Basic Utility Stage II
- 3 = General Utility Stage I
- 4 = General Utility Stage II
- 5 = Transport
- 0 = Local Service

The following listing groups individual aircraft models by aircraft set designation.

TABLE 2-21: AIRPORT TYPE AND ASSOCIATED AIRPLANES

SOURCE: WISCONSIN DEPARTMENT OF TRANSPORTATION, Wisconsin Airport System Plan: 1986-2010, December, 1986

A1A1 (2.5)

PLANE MAKE	MODEL
ABCO	SPECIAL
ACRO SPORT	II
ADVENTURE FARRIS	P51D
AERO COMMANDER	112
AERO COMMANDER	100
AERO COMMANDER	100-180
AERO COMMANDER	112-A
AERO COMMANDER	S-2
AEROCAR	III
AERONCA	50-L
AERONCA	65-TL
AERONCA	50-C
AERONCA	C-3
AERONCA	65-TC
AERONCA	50-F
AERONCA	65-LA
AERONCA	K
AERONCA	65-CA
AERONCA	0-58-B
AERONCA	65-LB
AERONCA	7-EC
AERONCA	0-58-B
AERONCA	65-TAL
AERONCA	7-DC
AERONCA	65-C
AERONCA	7-AC
AERONCA	15-AC
AERONCA	11
AERONCA	7-CCM
AERONCA	15
AERONCA	6
AERONCA	7
AERONCA	11-CC
AERONCA	11-AC
AERONCA	11-BC
AERONCA	7-BCM
AEROTEK-PITTS	S-2A
AIR TRACTOR	301-A
ALON	A-2A
AMERICAN EAGLET	231
B/G DART	150
BAKENG-HURD	DOUBLE DUCE
BAKER	SPECIAL 001
BARNEY OLDFIELD	BABY GREAT LAKE
BARRACUDA	CA-2
BECKHAM-SHEAHAN	CASSUTT M
BEDE	BD-4
BEDE	BD-5B
BEDE	BD-5
BEDE-HALEY	BD-5
BEDE-MCCOOK	BD-4
BEDE-THOMPSON	BD-5 JET
BEE AVIATION	HONEY BEE
BEECHCRAFT	B-17-L
BEECHCRAFT	D-17-S
BEECHCRAFT	E-33-C
BEECHCRAFT	F-33-A
BEECHCRAFT	D-45
BEECHCRAFT	B-24-R
BEECHCRAFT	A-23-19
BEECHCRAFT	C-24-R
BEECHCRAFT	E-17-L
BEECHCRAFT	C-33-A
BEECHCRAFT	A-24-R
BEECHCRAFT	A-36-TC
BEECHCRAFT	A-23-24
BEECHCRAFT	A 23-19
BEECHCRAFT	E-33-A
BEECHCRAFT	A-23-A
BEECHCRAFT	M-35
BEECHCRAFT	G-17-S
BEECHCRAFT	A-19
BEECHCRAFT	S-35
BEECHCRAFT	33
BEECHCRAFT	23
BEECHCRAFT	XPU-22A

A1A1 (2.5)

PLANE MAKE	MODEL
BEECHCRAFT	B-33
BEECHCRAFT	H-35
BEECHCRAFT	F-33
BEECHCRAFT	J-35
BEECHCRAFT	A-33
BEECHCRAFT	K-35
BEECHCRAFT	G-35
BEECHCRAFT	N-35
BEECHCRAFT	BE-77
BEECHCRAFT	P-35
BEECHCRAFT	35
BEECHCRAFT	E-33
BEECHCRAFT	C-33
BEECHCRAFT	U-35-B
BEECHCRAFT	B-19
BEECHCRAFT	V-35
BEECHCRAFT	A-23
BEECHCRAFT	V-35-A
BEECHCRAFT	D-35
BEECHCRAFT	V-35-B
BEECHCRAFT	77
BEECHCRAFT	V-35-B-TC
BEECHCRAFT	A-36
BEECHCRAFT	B-24
BEECHCRAFT	E-35
BEECHCRAFT	A-35
BEECHCRAFT	F-35
BEECHCRAFT	B-77
BEECHCRAFT	36
BEECHCRAFT	C-24
BEECHCRAFT	B-23
BEECHCRAFT	A-24
BEECHCRAFT	C-35
BEECHCRAFT	C-23
BEECHCRAFT	B-35
BELLANCA	14-13
BELLANCA	17-30-A
BELLANCA	17-30-A
BELLANCA	17-30
BELLANCA	17-30A
BELLANCA	14-19-2
BELLANCA	7-ACA
BELLANCA	14-19-3
BELLANCA	14-13-2
BELLANCA	CH-300
BELLANCA	7-ECA
BELLANCA	7-KCAB
BELLANCA	8
BELLANCA	14
BELLANCA	8-GCBC
BELLANCA	7-GCBC
BELLANCA	8-KCAB
BELLANCA	17
BELLANCA	7
BLAIR-FLOOD	SIDEWINDER
BOEING	N-2-S-4
BOEING	A-75
BOEING	A-75-N-1
BOEING	E-75-N-1
BOEING	A-75-L-3
BOEING	B-75-N-1
BOEING	A-75-L-300
BOEING	E-75
BOEING	PT-17-A
BOEING-JONES	75
BOWERS FLY BABY	1-A
BOWERS-HAUGE	FLY-BABY
BREEZY	RUL
BREEZY	RUL-1
BUCKER	BU-133
BUCKER	BU-133-L
BUCKER-JUNGMANN	CASA 1.131
BUD	A
BURNS	BA-42
BUSHBY-ARMSTRONG	MUSTANG II
BUSHBY-CARLSON	MIDGET MUSTANG

A1A1 (2.5)

PLANE MAKE	MODEL
BUSHBY-GRIMM	MUSTANG II
BUSHBY-KROGMAN	MUSTANG II
BUSHBY-LAREAU	MIDGET MUSTAN
BUSHBY-MACHUS	MUSTANG II
BUSHBY-MALICK	MUSTANG II
BUTT	ALPHA
CA-61/ANDERSON	MINI-ACE
CANADAIR	F-86 MK.5
CANADIAN	T-33
CANADIAN CAR & FOUNDRY	HARVARD MKIV
CASSUTT	II
CASSUTT	II-M
CASSUTT	III-M
CASSUTT	D
CASSUTT-CORE	SPORT RACER
CASSUTT-ELG	III-M
CENTRAIR	PEGASUS 101-A
CESSNA	152-II
CESSNA	
CESSNA	180-K
CESSNA	P-210
CESSNA	175-A
CESSNA	R-182RG
CESSNA	182-RG
CESSNA	182-B
CESSNA	A-185-F
CESSNA	182-E
CESSNA	172-C
CESSNA	182-C
CESSNA	172-A
CESSNA	T-210-F
CESSNA	170-B
CESSNA	150-D
CESSNA	170
CESSNA	172-M
CESSNA	150-M
CESSNA	182-D
CESSNA	150-L
CESSNA	210
CESSNA	150-H
CESSNA	210-M
CESSNA	207
CESSNA	172-N
CESSNA	U-206-F
CESSNA	172-P
CESSNA	206
CESSNA	172-RG
CESSNA	U-206
CESSNA	172-XP
CESSNA	205-A
CESSNA	175
CESSNA	TU-206-F
CESSNA	L-19
CESSNA	205
CESSNA	175-B
CESSNA	TU-206-C
CESSNA	177
CESSNA	180-J
CESSNA	177-A
CESSNA	T-41-B
CESSNA	177-B
CESSNA	195-B
CESSNA	177-RG
CESSNA	140
CESSNA	180
CESSNA	195
CESSNA	180-A
CESSNA	T-210-M
CESSNA	180-C
CESSNA	190/195
CESSNA	180-D
CESSNA	T-210
CESSNA	180-E
CESSNA	190
CESSNA	180-F
CESSNA	172-K

LANE MAKE	MODEL
ESSNA	180-H
ESSNA	188-A
ESSNA	180-I
ESSNA	R-172-XP
ESSNA	210-L
ESSNA	188
ESSNA	210-J
ESSNA	P-206-B
ESSNA	210-H
ESSNA	185-A
ESSNA	210-G
ESSNA	A-188-B
ESSNA	210-D
ESSNA	185
ESSNA	210-B
ESSNA	170-A
ESSNA	210-A
ESSNA	182
ESSNA	150-J
ESSNA	182-G
ESSNA	U-206-G
ESSNA	182-A
ESSNA	U-206-A
ESSNA	150-E
ESSNA	TU-206-G
ESSNA	182-Q
ESSNA	150-C
ESSNA	150-B
ESSNA	T210L
ESSNA	182-P
ESSNA	140-A
ESSNA	172-E
ESSNA	T-41
ESSNA	182-N
ESSNA	172-F
ESSNA	172-H
ESSNA	172-I
ESSNA	182-M
ESSNA	R-182
ESSNA	P-210-N
ESSNA	P-206-C
ESSNA	182-L
ESSNA	C-38
ESSNA	172-B
ESSNA	172
ESSNA	182-K
ESSNA	150-G
ESSNA	150-F
ESSNA	172-D
ESSNA	182-J
ESSNA	TR-182
ESSNA	150
ESSNA	120
ESSNA	182-H
ESSNA	172-G
ESSNA	182-R
ESSNA	R-172-K
ESSNA	A-185-E
ESSNA	182-F
ESSNA	A-152
ESSNA	U-206-C
ESSNA	A-150-M
ESSNA	150-A
ESSNA	A-150-L
ESSNA	172-L
ESSNA	A-150-K
ESSNA	152
ESSNA	210-N
ESSNA	T-210-L
ESSNA	TU-206-E
ESSNA	P-206-A
ESSNA	150-K
GS-PETERSON	HAWK
GS-PETERSON	650
HAMPION	7
HAMPION	7-EC
HAMPION	7-GCAA

PLANE MAKE	MODEL
CHAMPION	7-FC
CHAMPION	7-GCB
CHAMPION	7-ECA
CHAMPION	7-KCAB
CHAMPION	7-GC
CHAMPION	7-HC
CHAMPION	7-GCBC
CHANCE-VOUGHT	F4U-4
CHESTER	SPECIAL
CHRISTEN-BOYD	EAGLE II
CHRISTEN-DOYLE	EAGLE II
CHRISTEN-HUMPHREY	EAGLE II
CHRISTEN-JOHNSON	EAGLE
CHRISTEN-ROSS	EAGLE II
CHURCH	JC-1
CLANCY	SKYBABY
CLOYD-HOMEBUILT	SH-2
COMMONWEALTH	185
CONSOLIDATED	BT-13
CORBEN	C-1
CORBEN	E-JR ACE
CORBEN	BABY ACE
CORBEN-FUCHS	JUNIOR ACE E
CORBEN-GRUNSKA	BABY ACE D
CORBEN-LAMBERT	BABY ACE D
CORBEN-OLSEN	BABY ACE
CUBBER II	C-1
CULVER	V
CULVER	LCA
CURTISS-WRIGHT	C-1 ROBIN
CURTISS-WRIGHT	CW-1
CURTISS-WRIGHT	D-52
CURTISS-WRIGHT	E-8-75
CURTISS-WRIGHT	E-4000
CURTISS-WRIGHT	4000
CURTISS-WRIGHT	E-8-90
CURTISS-WRIGHT	TRAVEL AIR 12
CURTISS-WRIGHT	TRAVEL AIR 16-E
CYGNET	2F-2A
DART	GK33
DAVIS	DA-2-A
DAVIS	D-1-W
DAVIS	D-2
DAVIS-VAN BELKOM	DA-2
DICKAU	ESPERANZA
DIXON	FORMAL VEE
DREWS	B-1-A
DYKE-WHITE	DELTA JD-2
EAA	ACRO SPORT
EAA	POBER PIIIE
EAA-BEYERSDORF	BIPLANE P-2
EAA-CHOMO	EAA BIPLANE
EAA-ERICKSON	ACROSPORT II
EAA-GORES	ACRO SPORT II
EAA-GUNDERSON	BIPLANE AG-1
EAA-KNUTSON	AERO-SPORT II
EAA-MASSOPUST	ACRO SPORT II
EAA-MEADE	BIPLANE GAM-1
EAA-RODER	ACRO SPROT-15
EAA-UNERTL	BIPLANE P-1
ELMENDORF	A-1
ERCOUPE	415-E
ERCOUPE	415
ERCOUPE	415-D
ERCOUPE	415-G
ERCOUPE	415-C
ERCOUPE	415-CD
ERCOUPE-ALON	A-2A
ERCOUPE-ALON	A-2
ERCOUPE-FORNEY	F-1
ERCOUPE-MOONEY	M-10 CADET
ESTUPINAN	HOVEY WD-A
EVANS-DION	VP-1
EVANS-KEMMER	VP-1
EVANS-MOCKRUD	VP-1
EVANS-SHAFFER	VP-1
FAIRCHILD	24-W-41-A

PLANE MAKE	MODEL
FAIRCHILD	FC-2-W-2
FAIRCHILD	24-W-46
FAIRCHILD	24-C-8-F
FAIRCHILD	24-C-8-A
FAIRCHILD	24-C-8-C
FAIRCHILD	24-J
FAIRCHILD	24-W-40
FAIRCHILD	M-62-A-4
FAIRCHILD	24-W
FAIRCHILD	M-62C
FAIRCHILD	24-R-46
FAIRCHILD	M-62-A-3
FAIRCHILD	M-62-C
FAIRCHILD	PT-26
FAIRCHILD	M-62-A
FAIRCHILD	PT-26A
FIKE	D
FLAGLOR	SCOOTER
FLAGLOR-DURLEY	SCOOTER
FOCK WULF	F W 190
FOCKE-WULF REPLICA	FW-190
FOKKER	D 6 1/2
FOKKER	D-VI
FOKKER	DR-1 TRI-PLAN
FORSGREN	LF-1
FRANKLIN SPORT	90
FULWILER-DERJAEGE	WWI
GANTZER	NESMITH-COUGAR
GDISIS	GLASAIR
GOLDWING-PETERSON	GOLD DUSTER ST
GREAT LAKES	2T-1A-2
GREAT LAKES	2-T-1-A
GREAT LAKES	2T-1A
GREAT LAKES	2T-1A-E
GREAT LAKES	2-T
GREAT LAKES-ADAMS	2T-1
GRIFFIN-PITTS	S-1C
GROB	G-109
GRUMMAN	J-2-F-6
GRUMMAN	G-164
GRUMMAN	AF-2S
GRUMMAN	G-164-A
GRUMMAN AMERICAN	AA-5B
GRUMMAN AMERICAN	AA-5A
GRUMMAN AMERICAN	AA-1C
GRUMMAN AMERICAN	AA-1B
GRUMMAN AMERICAN	AA-1A
GRUMMAN AMERICAN	AA-1
GRUMMAN AMERICAN	AA-5
GRUMMAN-AMERICAN	AA-5-A
GRUMMAN-AMERICAN	AA-5-B
GUMM	MINICAB-MOD
GUNDERSON	TRAINER
GUPPY-MINTZLAFF	SNS-2
HALBERSTADT-SWANSON	D IV
HARLOW	PJC-2
HATZ	CB-1
HATZ-SCHMUNK	CB-1
HATZ-STRUB	LB-1
HATZ-VANDERGEEST	CB-1
HAWK	3
HEATH	PARASOL
HEATH-BAUMER	PARASOL
HEATH-DEANGELO	PARASOL
HEGY/CHUPAROSA	R C H I
HELIO COURIER	H-391
HOLLANDER-CASSUTT	III-M
HOWARD	DGA-15-J
HOWARD	DGA-15-P
HU-GO CRAFT	VPS
INMAN	ACRO SPORT I
INTERSTATE	S-1-A
JEANIES	TEENIE
JEWETT-LOURDES	0
JEWETT-MULLIKEN	Q-2
JEWETT-SAVELS	Q-2
JEWETT-SWANNINGSON	QUICKIE

PLANE MAKE	MODEL
JEWETT-UNGERECHT	Q-2
JEWETT-WOLETZ	QUICKIE
JOHNSON	MINICOUPE
JOHNSON	D-I-L
JOHNSON	ROCKET 185
JURCA	MJ-5J2
KIRK-LUMLEY	COTTONTAIL
KOSTLEVY	FHK HAWK
LAIRD	SPECIAL
LAIRD	LC-DW500
LAKE	LA-4-200
LAKE	LA-4
LAPAN	XT-400
LINCOLN	PT-K
LITTLE ABBIE	KW-1
LOCKHEED	VEGA-5-C
LOVING-OMERNICK	LOVINGS LOVE
LUSCOMBE	8-C
LUSCOMBE	8-E
LUSCOMBE	8
LUSCOMBE	8-I
LUSCOMBE	8-F
LUSCOMBE	11-A
LUSCOMBE	T-8-F
LUSCOMBE	8-A
LUTON-SPONEM	MINOR
MARANDA-TURNER	AMF-5-14-D
MAULE	M-4
MAULE	M-5-235C
MAULE	M-4-210-C
MAULE	M-5
MAULE	M-4-220C
MAULE	M-5-220-C
MEADOWCROFT	CHINNOK
MESSERSCHMITT	ME-109-C4K
MESSERSCHMITT	BO-209
METKE	1-MOD
MEYER	LITTLE TOOT
MEYERS	OTW
MEYERS	200-A
MIDGET MUSTANG	M-1
MIDGET MUSTANG	MM-1
MIGNET	HM-293
MONG SPORT	MS-2
MONG SPORT	MS-2-K
MONNETT	MONEX
MONNETT	SONERAI II
MONNETT	MONI
MONNETT-BECK	MONI
MONNETT-BUTLER	SONERAI II
MONNETT-CULVER	SONERAI-II
MONNETT-DENIL	SONERAI II
MONNETT-EISENBRANDT	SONERAI II
MONNETT-GABLE	SONERAI II
MONNETT-KAMKE	MONI
MONNETT-KEIP	SONERAI II
MONNETT-KLUDY	SONERAI I
MONNETT-LARSON	SONERAI II
MONNETT-LASEURE	SONERAI II
MONNETT-LAVIN	SONERAI IIL
MONNETT-MALZAHN	SONERAI II
MONNETT-MANGAN	SONERAI II
MONNETT-MAREK	MONI
MONNETT-MCCOY	SONERAI-I
MONNETT-MIRACLE	SONERAI II
MONNETT-NELSEN	SONERAI II
MONNETT-NIELSEN	SONERAI ILL
MONNETT-NOVAK	SONERAI II
MONNETT-ROBERTS	SONERAI II
MONNETT-SIKORA	SONERAI II
MONNETT-SONERIA	SONERIA II LTS
MONNETT-TAPPON	SONERAI II
MONNETT-WARNING	MONI
MONNETT-WOOD	SONERAI II
MONOCOUPE	110 SPECIAL
MONOCOUPE	110
MONOCOUPE	90-A

PLANE MAKE	MODEL
MONOCOUPE	113
MOONEY	M-20-E
MOONEY	M-20-G
MOONEY	M-20-D
MOONEY	M-18
MOONEY	M-20-B
MOONEY	M-20-A
MOONEY	M-20-F
MOONEY	M-20-J
MOONEY	M-20-C
MOONEY	M-20-K
MOONEY	M-18-L
MOONEY	M-20
MORANE-SAULNIER	181
NAVION	NAVION
NAVION	L-17-B
NAVION	G-1
NAVION	B
NAVION	A
NAVY	N3N-3
NICHOLAS BEAZLEY	NB-8-G
NORTH AMERICAN	SNJ-5
NORTH AMERICAN	XP-51
NORTH AMERICAN	P-51D
NORTH AMERICAN	AT-6D
NORTH AMERICAN	P-64
NORTH AMERICAN	NAVION E
NORTH AMERICAN	P-51-D
NORTH AMERICAN	T-28C
NORTH AMERICAN	T-28
NORTH AMERICAN	HARYARD MK-4
NORTH AMERICAN	T-28-A
NORTH AMERICAN	AT-6
NORTH AMERICAN	T-28-B
NORTH AMERICAN	AT-6-G
NORTH AMERICAN	NAVION
NORTH AMERICAN	AT-6-A
NORTH AMERICAN	P-51
NORTH AMERICAN	F-51D
OLAH	CASSUTT III-M
OLDFIELD SPECIAL	BABY GREATLAKES
OLDFIELD-LARSON	BABY GREATLAKES
OLDFIELD-TRIDLE	BABY GREATLAKES
OWEN	S-1
PARKER	JP-001
PAZMANY-FLYNN	PL-4
PAZMANY-RODENCAL	PL-4
PAZMANY-THOMAS	PL-2
PEEREIA-MAHLER	OSPREY II
PEREIRA-BOREMANS	OSPREY II
PEREIRA-RICHARTZ	OSPREY II
PEREIRA-SCHAEFER	OSPREY II
PEREIRA-SCHIFFERER	OSPREY II
PEREIRA-SCHIFFERER	O SPREY II
PEREIRA-TROWBRIDGE	OSPREY II
PEREIRA-WILSON	OSPREY II
PERTH AMBOY	BIRD BK
PETE MYERS SPCIAL	MI
PHEASANT	OLB
PIEL-BENTLEY	CP 750 BERYL
PIEL-BORREMANS	CP-311 EMERAU
PIEL-FOBES	SUPR EMERAUDE
PIEL-GULTCH	EMERAUDE 301A
PIEL-MCCONNELL	CP-304-A EMERAU
PIEL-WEAVER	CP-301
PIERERA-SCHAEFER	OSPREY II
PIETENPOL	AIRCAMPER
PIETENPOL	GN-1
PIETENPOL-BEESON	AIRCAMPER
PIETENPOL-CHALLIS	CHAFFINCH
PIETENPOL-KNIGHT	AIR CAMPER
PIETENPOL-LOEHNDORF/DU	AIRCAMPER
PIETENPOL-MARTALOCK	AIR CAMPER
PIETENPOL-MOCK	AIR CAMPER
PIETENPOL-SWENSON	AIRCAMPER
PIPER.	PA-28-200-R
PIPER	140

PLANE MAKE	MODEL
PIPER	140
PIPER	PA-36-300
PIPER	PA-28R-201
PIPER	PA-28-181
PIPER	PA-28-180-B
PIPER	PA-28-160
PIPER	PA-36-285
PIPER	PA-28-235
PIPER	PA-28-161
PIPER	PA-28-235 C
PIPER	PA-32-301
PIPER	PA-28-235-B
PIPER	PA-28-151
PIPER	PA-28-235-C
PIPER	PA-32-300-E
PIPER	PA-28-235-D
PIPER	PA-28-180-F
PIPER	PA-28-235-F
PIPER	PA-32-300-C
PIPER	PA-28-236
PIPER	PA-25-260-C
PIPER	PA-28R-180
PIPER	PA-32-300
PIPER	PA-28R-200
PIPER	PA-28-180-D
PIPER	PA-28-180-C
PIPER	PA-32-260-C
PIPER	PA-32-260
PIPER	PA-28-160-B
PIPER	PA-28RT-201T
PIPER	PA-32-260-B
PIPER	PA-28-140-C
PIPER	PA-28-140
PIPER	PA-28-180-G
PIPER	PA-28R-201T
PIPER	PA-28-180-E
PIPER	PA-38-112
PIPER	PA-28-160-C
PIPER	E-2
PIPER	PA-28-140-B
PIPER	PA-28-140-D
PIPER	PA-28-180
PIPER	PA-25-235-D
PIPER	PA-28-140-E
PIPER	PA-28RT-201
PIPER	PA-22-150
PIPER	J-3-C-85
PIPER	PA-20-115
PIPER	PA-18A-150
PIPER	PA-25-235
PIPER	J-3-F-60
PIPER	PA-18-135
PIPER	J-3-C-75
PIPER	PA-18-150
PIPER	J-3-F-65
PIPER	PA-18-95
PIPER	J-4-A
PIPER	PA-18-A
PIPER	PA-24-250
PIPER	PA-18-S
PIPER	PA-14
PIPER	PA-18A-135
PIPER	PA-24-260
PIPER	PA-22-108
PIPER	L-4
PIPER	PA-20-150
PIPER	PA-20-135
PIPER	PA-25-150
PIPER	PA-18-105 SPE
PIPER	PA-24-400
PIPER	PA-18-125
PIPER	PA-22-160
PIPER	PA-22-20 CONV
PIPER	PA-24-260-C
PIPER	J-5-A
PIPER	PA-20-125
PIPER	PA-22-125

A1A1 (2.5)

LANE MAKE	MODEL
IPER	PA-22-125
IPER	J-3-L-65
IPER	PA-24-180
IPER	PA-18-105
IPER	PA-18A-135 RS
IPER	J-4-E
IPER	PA-24-260-B
IPER	PA-22-20
IPER	J-3-C-65
IPER	PA-22-135
IPER	PA-25-235-C
IPER	PA-36
IPER	PA-28
IPER	PA-15
IPER	PA-18
IPER	PA-12
IPER	J-3
IPER	PA-17
IPER	PA-22
IPER	PA-24
IPER	J-5
IPER	PA-39
IPER	PA-20
IPER	J-2
IPER	PA-11
IPER	PA-25
IPER	PA-16
IPER	PA-38
ITCAIRN	PA-39
ITTS	S-1S
ITTS	S1S
ITTS	SC-1
ITTS	SPECIAL
ITTS	S-2A MOD
ITTS-BARNEY	S-1C
ITTS-BAUMGARTNER	S-1
ITTS-EAA	S-2
ITTS-FERGUS	SC-1
ITTS-GARCIA	S-1
ITTS-GRIFFIN	S-1C
ITTS-HEGY	S-1C
ITTS-HEIRONIMUS	S-1S
ITTS-HINCHCLIFFE	S-1
ITTS-KILLOUGH	S-1S
ITTS-KING	S-1S
ITTS-LIND	S-1D
ITTS-MERRICK	S-1
ITTS-MILES	S-1C
ITTS-MUMM	S-1C
ITTS-OTTERBACK	S-1
ITTS-POBEREZNY	P-6
ITTS-POBEREZNY	P-7
ITTS-SCHLAMER	51E
ITTS-SCHMIDT	S-1S
ITTS-SHEA	S-1C
ITTS-SWEET	SA-1
ITTS-WERNER	S-2E
ITTS-WHEELER	S-1
ITTS-WOOLAWAY	S-1C
OBER SPORT	P-5
OBER SPORT	P-12
OLTER	GEIST
OPER SPORT	P-5
ORTERFIELD	LP-65
ORTERFIELD	35-70
ORTERFIELD	CP-65
RINCE	BUSH-HOPPER I
USHER	WOODS-CHAPTER
	112-1
	112-A
AND	KR-2
AND ROBINSON	KR-1
AND-ANDREW	KR-1
AND-BAK	KR-2
AND-BE[illegible]US	KR-2

A1A1 (2.5)

PLANE MAKE	MODEL
RAND-LUDTKE	KR-2
RAND-THOMA	KR-2
RAND-TIMLER	KR-2
RAND-TIMLER	KR-1
RAND-WARNELL	KR-1
REARWIN	9000
REARWIN	8135-T
REARWIN	7000
REARWIN	8135 CLOUDSTER
REARWIN	8500
REARWIN	8500
REARWIN	8135
REARWIN	175
REPLICA-NIEUPORT	NIEUPORT
REPUBLIC	RC-3
REPUBLIC-DOWNER	RC-3
REZICH BROTHERS	SPECIAL
RICHARD	190A
ROCKWELL	112-A
ROCKWELL	112-TC
ROCKWELL	112
ROCKWELL	114
RUTAN	VARIVIGGEN
RUTAN	VARIEZE
RUTAN-AMS/OIL	68
RUTAN-COX	VARIEZE
RUTAN-ESH	LONG-EZ
RUTAN-HILLESHEIM	VARIEZE
RUTAN-LEMASTER/PAGE	VARI-EZE
RUTAN-PALMER	VARI-EZE
RUTAN-PASCARELLA	VARI EZE
RUTAN-PAVLOVICH	VARIEZE
RUTAN-RADTKE	VARIEZE
RUTAN-ZABLER	VARIEZE
RYAN	ST-3
RYAN	SCW-145
RYAN	NAVION B
RYAN	ST-3-KR
RYAN	NAVION
RYAN	A
RYAN	SCW
SAWYER	GLASAIR
SCORPION	SCORPIAN 133
SCOTT	XS-1
SH/KLAPMEIER	GLASAIR
SHAFOR	GANAGOBIE
SKY HOPPER	22
SKY HOPPER	10
SLO-JO	SJ-165
SMITH GREGORIE	MINIPLANE DSA-1
SMITH MINIPLANE	DSA-1
SMITH-GREGORIE	MINIPLANE DSA-1
SMITH-KLEIN	MINIPLANE
SMITH-MINIPLANE	DSA R-1
SMITH-MINIPLANE	DSA-1
SMITTYS TERMITE	JT-1
SMYTH-PIEPER	SIDEWINDER
SMYTH-RAICOS	SIDEWINDER
SNOW	600
SNOW	AIR TRACTOR
SNOW	600S2C
SNOW	S-2-C
SNOW	AT-301
SNOW	S-2
SOUTH BAY	CA-61
SOUTHWORTH TANDEM	S-1 TEDDYBEAR
SPARTAN	C-3165
SPARTAN	EXECUTIVE 7W
SPENCER	SPECIAL
SPEZIO-JAROS	SPORT
SPINKS	AKROMASTER
STARDUSTER	TOO
STARDUSTER	SA-200
STATE SECURITIES	ARROW F
STEARMAN	4-C

A1A1 (2.5)

PLANE MAKE	MODEL
STINSON	108
STINSON	108-1
STINSON	10A
STINSON	108-3
STINSON	SM-8A
STINSON	SR-5A
STINSON	L-5-E
STINSON	SM-6B
STINSON	10-A
STINSON	108-2
STINSON	SR-8C
STINSON	SR-7B
STINSON	HW75
STINSON	SR-9C
STINSON	V77
STITS	SA-3
STITS	SA-6-A
STITS	SA-7-D SKYCOUPE
STITS	SA-9A
STITS	SA-11-A
STITS	SA-3-B
STITS	SA-3-A
STITS	SA-7-D
STITS	SA-6
STITS-SKEETO	SA-8
STOLP-CORNING	STARDUSTER TO
STOLP-DANIELS	SA300
STOLP-DELEY	SA-100
STOLP-EHLERS	ESA300
STOLP-ERIKSEN	STARDUSTER TOO
STOLP-ERIKSEN	STARDUSTER TOO
STOLP-GROOM	STARDUSTER TOO
STOLP-HENDERSON	STARDUSTER
STOLP-KENNEDY	STARDUSTER
STOLP-LIEN	STARDUSTER TO
STOLP-PFUNDHELLER	SA-300
STOLP-SEABRIGHT	SA-100
STOLP-STARLET	866-01-AB
STORY	WD-6
SWALLOW	TP
SWALLOW-KARAMIT IS	B
SWANSON	HALBERSTADT D 4
SWIFT	GC-1B
SWIFT	GC-1
TAYLOR	MONOPLANE
TAYLOR	T-2
TAYLOR-BECKHAM	MONO HB
TAYLOR-STEEVES	COOT-A
TAYLORCRAFT	BC-12-65
TAYLORCRAFT	F-19
TAYLORCRAFT	L-2M
TAYLORCRAFT	BC-12-D
TAYLORCRAFT	BL
TAYLORCRAFT	BC-65
TAYLORCRAFT	BL-65
TAYLORCRAFT	BC-12-DL
TAYLORCRAFT	BF-50
TAYLORCRAFT	BL-12-65
TAYLORCRAFT	BF-12-65
TAYLORCRAFT	DC-65
TAYLORCRAFT	BC-12-85
TAYLORCRAFT	BC-12D-1
TAYLORCRAFT	L-2-M
TAYLORCRAFT	L-2
TAYLORCRAFT	A
TAYLORCRAFT	DCO-65
TAYLORCRAFT	BL-65
TAYLORCRAFT	DC-65
TAYLORCRAFT	F-19
TAYLORCRAFT	BC-12
TAYLORCRAFT AVIAT	B-2 CHUMMY
TEMAN-KENNY	MONO-FLY
TERATORN	TIERRA I
TERATORN	TIERRA II
TERATORN-MARSHALL	TIERRA II

A1A1 (2.5)

PLANE MAKE	MODEL
TERRATORN-MCDANIEL	TIERRA
TESCHENDORF	FOUR-RUNNER
THOMAS-DICKAU	ESPERANZA-4
THORP	T-18
THORP-EWING	T-18
TIMM	N-2-T-1
TROJAN	A-2
TURNER	T-40-A
UEBEL-KNIGHT-TWIS	LIGHT WEIGHT
ULTRA LIGHT	HAWK 4
VANGRUNSVEN-PEDERSON	RV-3
VANTUIL	SPORTSMAN
VARGA	2150 A
VELLINE	BREEZY RLU-1
VELOON	COUGAR
VIKING-FLANAGAN	DRAGONFLY
VIKING-HAZELWOOD	DRAGONFLY
VIKING-HAZELWOOD	DRAGONFLY
VIKING-SWAN	DRAGONFLY
VOLKSPLANE	VP-2
VOLKSPLANE	VP-1
VOLKSPLANE	WE-1
VOLMER	VJ-22
VOLMER-FINN	SPORTSMAN VJ22
VULTEE	BT-13
VULTEE	BT-15
VULTEE	BT-13-A
WAG-AERO-POBEREZNY	CUBY
WACO	10
WACO	GXE
WACO	VKS-7-F
WACO	CUC
WACO	CTO
WACO	YOC
WACO	YKS-7
WACO	YKS-6
WACO	YKC
WACO	RNF
WACO	CJC
WACO	DJC-6
WACO	ARE
WACO	RPT
WACO	ASO
WACO	UPF-7
WACO-SOCATA	MS-894-A
WAG-AERO	ACRO TRAINER
WAG-AERO	CHUBBY-CUBY
WAG-AERO	WAG A BOND
WAG-AERO	CUBY
WAG-AERO-BARTLING	CUBY
WAG-AERO-EVENSON	SUPER CUBY
WAG-AERO-MCMANUS	SPORTSMAN 2+2
WAG-AERO-NYHOLM	CUBY
WAG-AERO-SCHNEIDER	SPORT TRAINER
WAG-AERO-SCHWEFEL	CUBY
WARWICK	W-4
WEBER-RAND	KR-2
WEFEL FLYING FLEA	HM-360
WHITAKER	CENTERWING
WITTMAN	WITTS V
WITTMAN	W-8
WITTMAN	TAILWIND
WITTMAN	W-10
WITTMAN	WO
WITTMAN	BONZO
WITTMAN	DFA
WITTMAN	W-37
WITTMAN	W-9-L
WITTMAN-COUGHLIN	W-10
WITTMAN-HUCH	TAILWIND
WITTMAN-MCQUISTON	TAILWIND W-8
WITTMAN-THIESSEN	TAILWIND
WOODY	PUSHER
WRIGHT-JVL VOTEC	FLYER REPLICA
[illegible]AIR-ASHWORTH	CH-200 ZENITH

A1A2 (3.0)

PLANE MAKE	MODEL
BEECHCRAFT	B-36-TC
CESSNA	T-210-N
DEHAVILLAND	DH-89A MKIV
DEHAVILLAND	TIGER MOTH82A
DEHAVILLAND-REPLICA	BE2C
PIPER	PA-32R 300
PIPER	PA-32R-301T
PIPER	PA-32-301T
PIPER	PA-32-160
PIPER	PA-32RT-301T
PIPER	PA-32RT-300
PIPER	PA-32R
PIPER	PA-32RT-300T
PIPER	PA-32R-300
PIPER	PA-32

A1A3 (3.5)

DE HAVILLAND	DHC-2
DEHAVILLAND	DHC-1
DEHAVILLAND	DHC-2

A1B1 (3.0)

ZENAIR-EBNETER	CRICKET MC-12

A1B2 (3.5)

AERO COMMANDER	560-F
AERO COMMANDER	560
BEECHCRAFT	76
BEECHCRAFT	T-34-A
BEECHCRAFT	EA-76
BEECHCRAFT	T-34-B
BEECHCRAFT	T-34-C
BEECHCRAFT	T-34
CESSNA	337-A
CESSNA	320-A
CESSNA	337-B
CESSNA	337-C
CESSNA	337-E
CESSNA	337
CESSNA	320-E
CESSNA	320-C
CESSNA	337-F
CESSNA	337-D
CESSNA	T-337-G-P
CESSNA	337-G
CESSNA	320-D
DORNIER	DO-28-A-1
DORNIER	DO-28-B-1
DORNIER	DO-28
GRUMMAN	G-44-A
GRUMMAN	G-44
GRUMMAN AMERICAN	GA-7 COUGAR
GULFSTREAM AMERICAN	GA-7
HALSMER	SAFETY TWIN #3
PARTENAVIA	68B VICTOR
PIPER	PA-601P
PIPER	PA-34-200
PIPER	PA-601B
PIPER	PA-34-T
PIPER	PA-34
PIPER	PA-34-200T
PIPER	PA-34-200-T
PIPER	PA-44-180
PIPER	PA-23-250-D
PIPER	PA-23-235
PIPER	PA-23-250-B
PIPER	PA-23-250
PIPER	PA-23-150
PIPER	PA-23-250-C
PIPER	PA-23-250-E
PIPER	PA-23-160
PIPER	PA-44

A1B3 (4.0)

PLANE MAKE	MODEL
AEROSTAR	601
BAUMAN	B-290
BONANZA	T-34
CESSNA	320
LEARFAN	2100
NOMAD	N-22-B
NOMAD	N-24
NOMAD	N-22
PIAGGIO	P-136-L
PIAGGIO	P-168 PORTOFIN
PIPER	PA-34-220-T
PIPER	PA-34-220T
PIPER	PA-34-
PIPER	PA-23-250-I
PIPER	PA-23-250-F
PIPER	PA-34
ROCKWELL	500-S
ROCKWELL	500-S
ROCKWELL	500

A1C4 (5.0)

DeH HERON	114

A2A2 (3.5)

PILATUS	PC-6

A2B2 (4.0)

AERO COMMANDER	500-B
AERO COMMANDER	500

A2B3 (4.5)

AERO COMMANDER	680
AERO COMMANDER	500-U
AERO COMMANDER	680T
AERO COMMANDER	720
AERO COMMANDER	681
AERO COMMANDER	500-S
AERO COMMANDER	680S
AERO COMMANDER	680-E
AERO-COMMANDER	680S
AERO-COMMANDER	680S
ANTONOV	AN-14
BEECHCRAFT	E-18-S
BEECHCRAFT	E-18
BNA-2A	TRISLANDER
DeH DOVE	104
PZL	M-15
PZL	AN-2
YU SHI	11

A2C4 (5.5)

ANTONOV	AN-28
BREGUET	941S
CASA	C212 AVIOCAR
DEHAVILLAND	DH6
GAC	100
IAI	ARAVA-201
NORTH AMERICAN	B-25-N
NORTH AMERICAN	B-25-J
PZL	AN-28
VOLPAR	CENTENNIAL

A3C4 (6.0)

PLANE MAKE	MODEL
AIDX	IC-2
DEHAVILLAND	DHC7
DEHAVILLAND	DHC-7-102
DEHAVILLAND	DHC-7-103
DEHAVILLAND	DHC-4
DOUGLAS	DC-3-GZOZA
DOUGLAS	DC-3-GZOZA
DOUGLAS	C-47-D
DOUGLAS	A-26-C
DOUGLAS	DC-3-A
DOUGLAS	DC-3-C
DOUGLAS	DC-3
HERALD	HP
ILYUSHIN	IL-12

A3D4 (6.5)

PLANE MAKE	MODEL
ANTONOV	AN-72
FAIRCHILD	C-123
MAI-QSTOL	QSTOL

A4D5 (7.5)

PLANE MAKE	MODEL
BOEING	YC-14
LOCKHEED	1649

B1B2 (4.0)

PLANE MAKE	MODEL
BEECHCRAFT	B-58
BEECHCRAFT	56-TC
BEECHCRAFT	B-55
BEECHCRAFT	C-55
BEECHCRAFT	A-55
BEECHCRAFT	C-50
CESSNA	310
CESSNA	310-B
CESSNA	310-A
CESSNA	310-D
CESSNA	310-C
PIPER	PA-30-B
PIPER	PA-30-C

B1B3 (4.5)

PLANE MAKE	MODEL
AERO COMMANDER	690-A
AERO COMMANDER	690
AEROSTAR	
AJI	HUSTLER
BEECHCRAFT	D-50-A
BEECHCRAFT	C-45-H
BEECHCRAFT	G-18-S
BEECHCRAFT	C-45
BEECHCRAFT	D-18-S
BEECHCRAFT	D-95-A
BEECHCRAFT	AT-11
BEECHCRAFT	58-P
BEECHCRAFT	B-60
BEECHCRAFT	D-55
BEECHCRAFT	BE-60
BEECHCRAFT	60
BEECHCRAFT	C-18-S
BEECHCRAFT	D-95
BEECHCRAFT	95
BEECHCRAFT	58
BEECHCRAFT	G-18
BEECHCRAFT	E-55
BEECHCRAFT	D-18
BEECHCRAFT	99
BEECHCRAFT	F-90
BEECHCRAFT	65
BEECHCRAFT	58P
BEECHCRAFT	B-100
BEECHCRAFT	B-95
BEECHCRAFT	56
BEECHCRAFT	58TC
BEECHCRAFT	[illegible]

B1B3 (4.5)

PLANE MAKE	MODEL
CESSNA	410
CESSNA	402-B
CESSNA	310-J
CESSNA	421-B
CESSNA	305
CESSNA	401-A
CESSNA	340
CESSNA	414
CESSNA	T-310-R
CESSNA	402
CESSNA	650
CESSNA	310-Q
CESSNA	401-B
CESSNA	425
CESSNA	310-R
CESSNA	310-K
CESSNA	421
CESSNA	310-L
CESSNA	401
CESSNA	310-N
CESSNA	404
CESSNA	310-P
CESSNA	305-A
CESSNA	500
CESSNA	310-F
CESSNA	421-A
CESSNA	310-H
CESSNA	411
CESSNA	310-I
CESSNA	421-C
CESSNA	340-A
CESSNA	414-A
CESSNA	501
CHEYENNE	
EMBRAER	326
FORD	4-AT-E
HAMILTON	WESTWIND
LOCKHEED	12-A
MITSUBISHI	MU-2B-36A
MITSUBISHI	MU-2B-30
MITSUBISHI	MU-2-B-25
MITSUBISHI	MU-2-F
MITSUBISHI	MU-2-B
MITSUBISHI	MU-2-B-20
MITSUBISHI	MU-2-J
MITSUBISHI	MU-2
PIPER	PA-31-325
PIPER	PA-31-350
PIPER	PA-31-T
PIPER	PA-31-P
PIPER	PA-31-310
PIPER	PA-31-352
PIPER	PA-31T
PIPER	PA-31
PIPER	PA-601
ROCKWELL	681-B
SIKORSKY	S-76

B1C4 (5.5)

PLANE MAKE	MODEL
BREGUET	FAL-10
BREGUET	FAL-20
EMBRAER	121
FAIRCHILD SWEARINGEN	METRO
LEAR JET	28-29
MITSUBISHI DIAMOND	MU-300
NORTH AMERICAN	NA-265-40-A
NORTH AMERICAN	NA-265-40
NORTH AMERICAN	NA-265
PIAGGIO	PD-808
ROCKWELL	SABRE 40
SWEARINGEN	SA-227-AC
SWEARINGEN	SA-226
SWEARINGEN	SA-226-TC
SWEARINGEN	SA-26-T
SWEARINGEN	SA-226-T(B)

B2B3 (5.5)

PLANE MAKE	MODEL
AERO COMMANDER	600
BEECHCRAFT	B-80
BEECHCRAFT	E-90
BEECHCRAFT	UC-45-J
BEECHCRAFT	H-18-S
BEECHCRAFT	BA-560
BEECHCRAFT	A-90
BEECHCRAFT	B-90
BEECHCRAFT	H-18
BEECHCRAFT	C-90
CESSNA	441
KING AIR	90
ROCKWELL	840
TURBO COMMANDER	200

B2C4 (6.0)

PLANE MAKE	MODEL
AERO COMMANDER	1121
BEECHCRAFT	300
BEECHCRAFT	B-200
BEECHCRAFT	200
CESSNA	550
DASSAULT-PAN AM	FANJET
DASSAULT/SUD	FAN JET FALCON
EMBRAER	EMB 110
FALCON	50
GRUMMAN	G-73
GRUMMAN	G-159
GRUMMAN-AMERICAN	G-159
HANDLEY PAGE	JETSTREAM
HAWKER SIDDELEY	DH125-400
HAWKER SIDDELEY	HS-125-700A
HAWKER SIDDELEY	DH-125-3-AR
HAWKER SIDDELEY	DH-125-400A
HAWKER SIDDELEY	HS-125-400
HAWKER SIDDELEY	DH-125-
KING AIR	200
NORD	1101
NORD	262
ROCKWELL	SABRE 60
ROCKWELL	SABRE 65
SHORT BROS.	330
SHORT BROS.	360
SHORTS	SD3-30

B3C5 (7.0)

PLANE MAKE	MODEL
ANTONOV	AN-30
ANTONOV	AN-24
CASA	C-207A AZOR
CONVAIR	580
CONVAIR	340
CONVAIR	240
CONVAIR	440
DEHAVILLAND	DHC-5
FAIRCHILD HILLER	FH227
FOKKER	F-27
FOKKER FAIRCHILD	F27
HINDUSTANI	748
HS-748	ANDOVER C
HS-748	ANDOVER
MARTIN	404
NIHON	YS-11

B3D5 (7.5)

PLANE MAKE	MODEL
BREGUET	200
DEHAVILLAND	COMET 4C

B4E5 (8.5)

PLANE MAKE	MODEL
ILYUSHIN	IL-76

C1C5 (6.5)

PLANE MAKE	MODEL
GATES LEARJET	55
HANSA	HAB-320
HS 125	1-406
HS-748	700
HS-748	600
LEAR JET	23
LEAR JET	55
LEAR JET	24-F
LEAR JET	25-B
LEAR JET	35-A
LEAR JET	24-B
LEAR JET	24
LEAR JET	25
ROCKWELL	JC 1121
ROCKWELL	SABRE 75A

C2B4 (6.0)

PLANE MAKE	MODEL
ROCKWELL	980

C2C5 (7.0)

PLANE MAKE	MODEL
CANADAIR	CHALLENGER
LOCKHEED	1329-25
REPUBLIC	F-84
ROCKWELL	NA-265-60
ROCKWELL	SABRE 80
ROCKWELL	NA-265
ROCKWELL	601
SABERLINER	JET

C3C5 (7.5)

PLANE MAKE	MODEL
YAKOVLEV	YAK-40

C3D5 (8.0)

PLANE MAKE	MODEL
AW-650	ARGOSY
BAC	111-300
BAC	111-400
BAC	111-200
BAC	111-475
BOEING	B-17-G
BOEING	727-200
BOEING	737
BOEING	727-100
DOUGLAS	DC9 10/20 SER.
DOUGLAS	DC9 30/40 SER.
DOUGLAS	DC9 SUPER 80
DOUGLAS	DC9-50
DOUGLAS	DC-9
DOUGLAS	DC-6A
DOUGLAS	DC-9-80
DeH TRIDENT	121-2
DeH TRIDENT	121-2E
FAIRCHILD	C-119
FOKKER	F-28
GULFSTREAM AMERICAN	G-1159A
GULFSTREAM AMERICAN	G-1159
HS-NIMROD	MK2
LOCKHEED	P-3
LOCKHEED	188
SUD	210
TUPOLEV	TU-124
VICKERS	VC-2
YAKOLEV	YAK-42

C4D5 (8.5)

PLANE MAKE	MODEL
AIRBUS	A-310
ANTONOV	AN-10
ANTONOV	AN-12
BOEING	720B
BOEING	C-97-G
BOEING	720
BOEING	757
BREGUET	1150
CANADAIR	CL-600
CANADAIR	CL-44
CANADAIR	CL 600
LOCKHEED	1011-600
LOCKHEED	100-20
LOCKHEED	400
LOCKHEED	100-30
TRANSALL	C-160

C4E5 (9.0)

PLANE MAKE	MODEL
AIRBUS	A-300
BOEING	707-100
BOEING	707-420
BOEING	767
BOEING	707-320B
BOEING	707-320
LOCKHEED	1011-200
LOCKHEED	1011-1
LOCKHEED	C-141A
LOCKHEED	C-141B
TUPOLEV	TU-114
VICKERS	VC-10-1150
VICKERS	VC-10-1100
VICKERS-VISCOUNT	745-D

C5E5 (9.5)

PLANE MAKE	MODEL
BOEING	747-SP

C6E5 (10)

PLANE MAKE	MODEL
ANTONOV	AN-22
LOCKHEED	C-5A

D1C5 (7.0)

PLANE MAKE	MODEL
LEAR JET	31CJ
LEAR JET	35
LEARJET	35-A

D3D5 (8.5)

PLANE MAKE	MODEL
BAC	111-500
BRITISH AEROSPACE	146
BRITISH AEROSPACE	B11
BRITISH AEROSPACE	146-200A
DeH TRIDENT	121-3
DeH TRIDENT	121-3B
TUPOLEV	TU-134

D4D5 (9.0)

PLANE MAKE	MODEL
BOEING	707-200
CONVAIR	990
CONVAIR	880
TUPOLEV	TU-154

D4E5 (9.5)

PLANE MAKE	MODEL
BOEING	777
DOUGLAS	DC-10 30/40
DOUGLAS	DC-8-61
DOUGLAS	DC-8-63
DOUGLAS	DC8 60/70 SE
ILYUSHIN	IL-86
ILYUSHIN	IL-62
LOCKHEED	1011-400
LOCKHEED	1011-500
LOCKHEED	1011-250
LOCKHEED	T-33-A
LOCKHEED	P-3BL
LOCKHEED	T-33
LOCKHEED	L1011-500 SE
LOCKHEED	10-E ELECTRA
ROCKWELL	B-1

D5E5 (10)

PLANE MAKE	MODEL
BOEING	B-52
BOEING	747
BOEING	E-4
BOEING	747-SR

E2D5 (8.5)

PLANE MAKE	MODEL
LOCKHEED	SR-71

E3E5 (9.5)

PLANE MAKE	MODEL
TUPOLEV	TU-144

H1H0 (2.0)

S1S0 (1.5)

U1U0 (1.0)

Y1Y0 (0.5)

Z1Z0 (0.0)

Z7Z0 (0.0)

FACILITY REQUIREMENTS

CHAPTER THREE

AIRPORT FACILITY REQUIREMENTS

Introduction

Chapter Three outlines those facilities required to meet and satisfy anticipated aviation activity through the year 2006. Facility requirements outlined herein are based upon FAA and IDOT guidelines. The Iowa Department of Transportation has taken exception to conformance with FAA guidelines in some cases. The most salient of these relate to the crosswind runway.

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

SOURCE: 1978 IDOT SASP, p. 54

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

Consideration should first be given to the ability of the existing airport site to accommodate future facility needs. This consideration would generally be given upon completion of Chapter Three. However, previous planning efforts have concluded that the existing site can accommodate future facility components typically associated with general aviation airports.

The emphasis within Chapter Three is placed upon the level of service provided by existing facilities. Second, consideration is given to facility improvements that are required to provide a level of service commensurate with present and future levels of aviation activity.

As noted in Chapter Two, all present operational activity is by single and twin engine aircraft. Where 500 or more annual itinerant aircraft operations by larger twin engine airplanes occur, the airport should be developed to General Utility - Stage I - Airplane Design Group II dimensional standards.

1. Airplane Design Group I:
   - A. Wingspan up to but not including 49 feet
   - B. Approach Category A and B aircraft
     - Category B: 91 knots or more but less than 121 knots

2. Airplane Design Group II
   - A. Wingspan up to but not including 79 feet
   - B. Approach Category A and B aircraft

RUNWAYS AND TAXIWAYS

Runway Alignment

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

The optimum runway orientation is one which will provide the airport a 95 percent level of wind coverage at a crosswind component value not exceeding 12 m.p.h. (10.5 knots) for utility airports and 15 m.p.h. for larger than utility airports. It would be desirable to 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.

Since there is not wind data available for Chariton, wind data tabulated at the Des Moines International was selected as most representative for Chariton Municipal. Reference may be made to Figure 3-1.

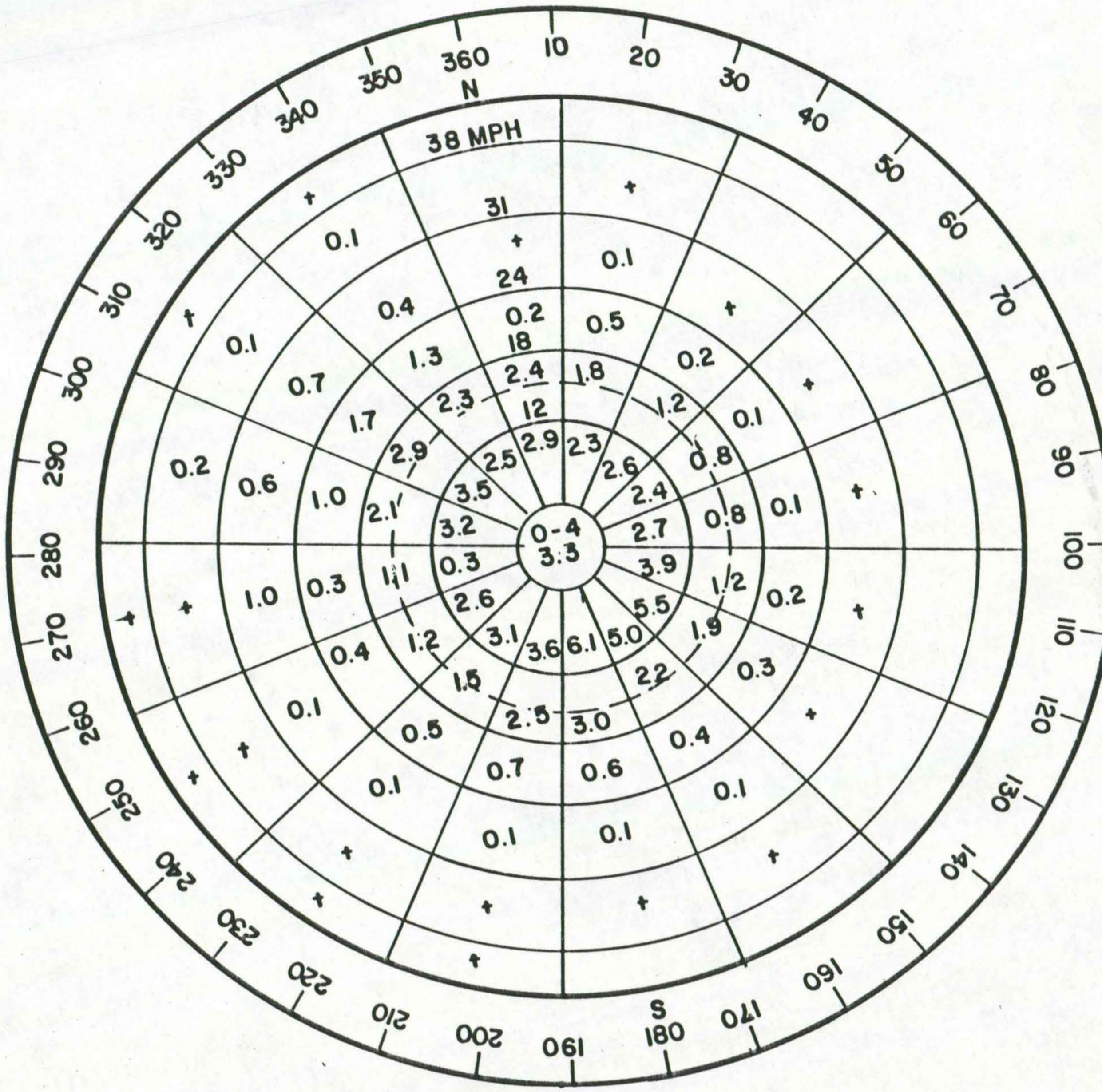
The IDOT, as a rule of thumb, recommends a minimum 60 degree separation between runway facilities. Although this is not a standard, it does minimize a duplication of wind coverage. Such consideration is relevant where funding is limited and a maximum return is expected from the investment in crosswind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

The existing primary runway, RW 17/35, provides an 82.7 percent and 91.7 percent level of wind coverage at the 12 and 15 m.p.h. crosswind component value, respectively. Consequently a second runway is required to provide supplemental coverage. Wind coverage provided by alternative runway alignments was tabulated for the following development scenarios.

Runway 17/35 (Existing)	82.7%	12 m.p.h.
Runway 12/30 (N 60° 15′ W)	80.2%	12 m.p.h.
Runway 9/27 (N 90° 00′ W)	75.6%	12 m.p.h.
Runway 6/24 (N 60° 00′ E)	75.2%	12 m.p.h.
Runway 10/28 (N 76° 00′ W)	78.6%	12 m.p.h.

A secondary runway having an orientation of North 60 degrees West, RW 12/30, would provide better coverage than that having an orientation of North 60 degrees East.

FIGURE 3-1: WIND ROSE



DES MOINES
1951 - 1960.
CALMS 3.3 %
GREATER THAN 1000 ft. &/OR 3 MILES = 94.9 %

Combined wind coverage at the 12 m.p.h. crosswind component value provided by the various alternative runway alignments are noted as follows:

RW 17/35 and RW 12/30	96.0 percent
RW 17/35 and RW 6/24	91.3 percent
RW 17/35 and RW 9/27	95.1 percent
RW 17/35 and RW 10/28	96.0 percent

The secondary runway alignment selected should have an orientation somewhere between North 60 degrees West and North 90 degrees West.

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

Runway Length and Width

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

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

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

Given the following:

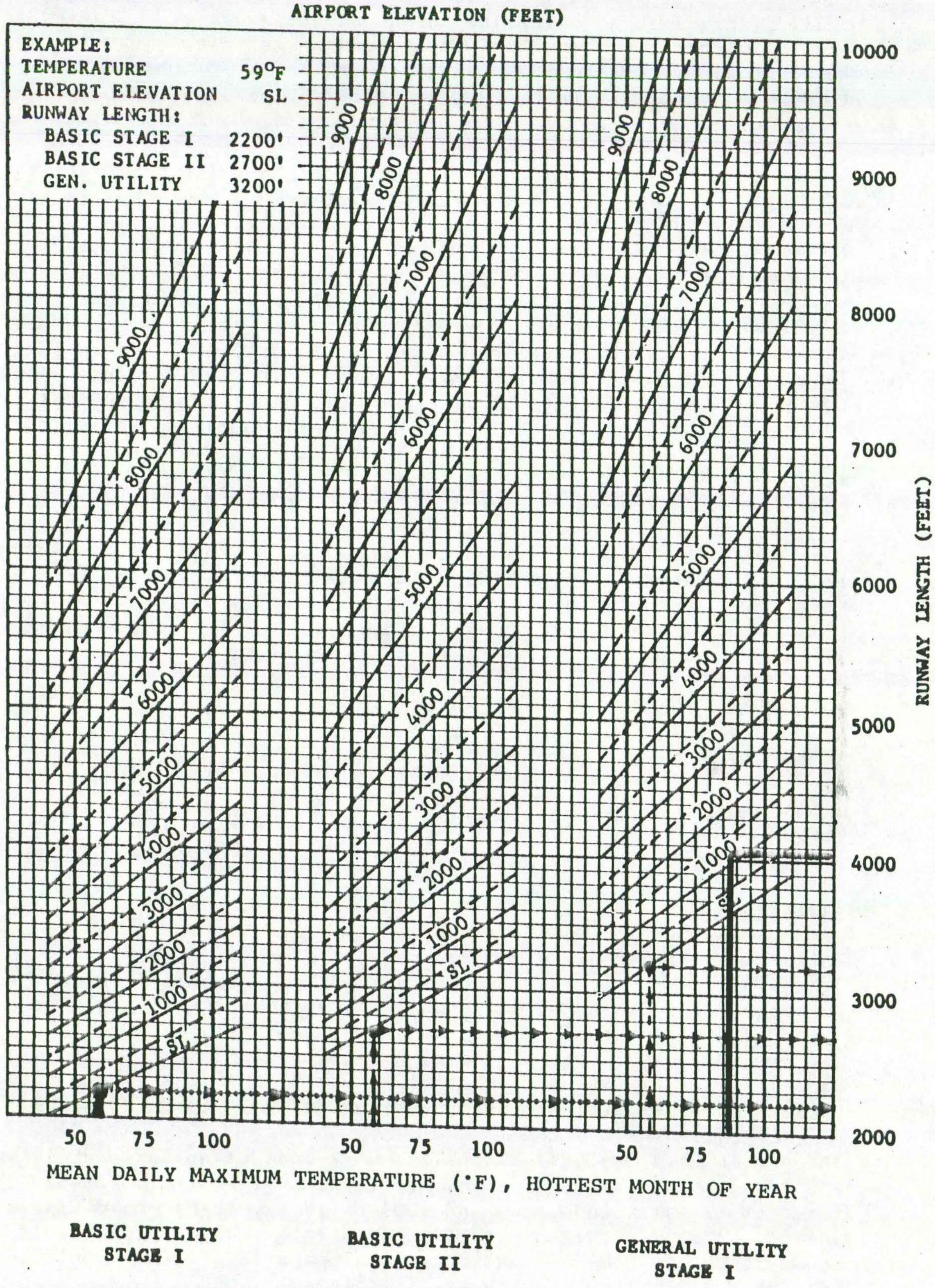
- Elevation: 1,049 feet (ASL)
- Temperature: 87 degrees

The runway length requirements for the Chariton Municipal Airport facility are as follows:

Basic Utility - Stage II: 3,400 feet
General Utility - Stage I: 4,000 feet

Where it is not feasible to construct a runway to the desired length, no less than 80 percent of the desired length should be constructed. While the crosswind runway should be the same length as the primary runway, it should in no case be less than 3,200 feet in length.

FIGURE 3-2: RUNWAY LENGTH CURVES



Runway 17/35 is presently 2,800 feet in length. An extension of 1,200 feet would be required to bring the runway up to an ultimate length of 4,000 feet. The most logical placement of the extension would be on RW 17. Due to the location of U.S. Highway 34, an extension to RW 35 would not be possible. The 1,200 foot extension on RW 17 would require the acquisition of additional land to include a dwelling unit and out buildings.

At the present time, there is no second or crosswind runway at the Chariton Municipal Airport. The crosswind runway would serve the same aircraft as would the primary runway and should according to FAA criteria, be designed to the same standards as the primary runway. As previously noted, IDOT has taken the position that at low activity airports, the benefits extended would be minimal in relation to the cost. Therefore, IDOT recommends construction of a turf runway at General Utility Airports. The crosswind runway at Chariton should in no case be less than a turf facility 3,400 feet in length and 150 feet in width based upon IDOT development guidelines. Winds with a crosswind component value in excess of 12 m.p.h. would occur 17.3 percent of the time based upon the current level of development. Adding a crosswind (RW 12/30) would provide a 96 percent level of wind coverage leaving 4 percent of the time winds in excess of 12 m.p.h. would occur. Therefore, the crosswind runway would increase the level of service by 13.3 percent.

The runway should be no less than 75 feet in width. The present width of RW 17/35 is 60 feet. Consequently, the width should be increased by an additional 15 feet. Should the crosswind runway be hard surfaced, it should also be constructed to a 75 foot width. Runway length and width requirements at the Chariton Municipal Airport are summarized in Table 3-1.

TABLE 3-1: RUNWAY LENGTH AND WIDTH

RUNWAY	INITIAL	ULTIMATE
Primary	60′ x 2,800′	75′ x 4,000′
Crosswind	none	150′ x 3,400′ Turf - 75′ x 4000′

Taxiways

Taxiways are constructed for the purpose of moving aircraft to and from the runway system. As activity increases, taxiways become necessary for the purpose of increasing runway capacity and providing for increased safety.

The Iowa DOT, as a rule of thumb, generally finds justification for a full parallel taxiway system when total annnual operations exceed 50,000 and a partial parallel taxiway when annual operations approach 30,000.

The present taxiway system consists of a connecting taxiway linking RW 17/35 and the terminal area. The taxiway is 40 feet in width. Based upon the forecast of aviation demand and IDOT criteria, there would appear to be no justification for the construction of a full parallel taxiway to increase runway capacity. A full and/or partial parallel taxiway would be expected to receive a low priority in terms of implementation.

The taxiway to accommodate Approach Category A and B airplanes in Airplane Design Group I should be no less than 25 feet in width.

Should a partial or full parallel taxiway be constructed, the following minimum criteria should be maintained.

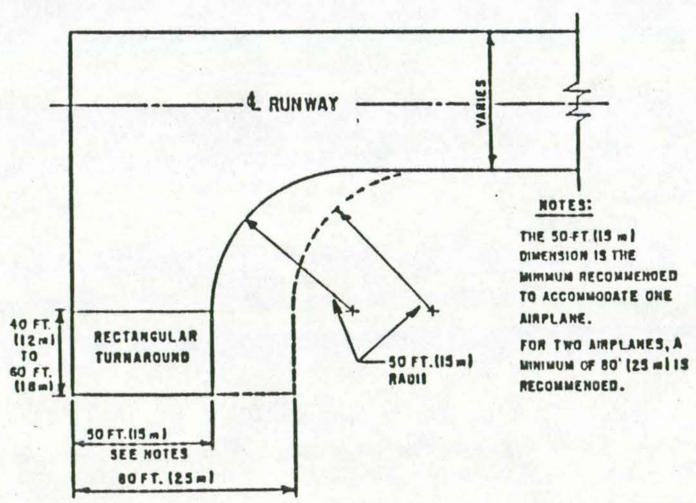
Runway Centerline to Taxiway Centerline.	25 feet
Taxiway Safety Area.	49 feet
Taxiway Centerline to Parked Aircraft and objects	0.75 times the wingspan of the most demanding airplane plus 7 feet
Taxiway Width.	25 feet

Taxiway exits should be located based upon activity. At low activity airports, a right angle taxiway exit located at the runway end and near the mid-point of the runway would provide an adequate level of service. For purposes of the Airport Layout Plan (ALP), it is recommended that a full parallel taxiway be shown for dimensional purposes even though construction is considered remote.

The taxilane is defined at that portion of the aircraft parking area used for access between taxiways, aircraft parking positions, hangars, and storage facilities. The width of the taxilane should be 0.63 times the wingspan of the most demanding aircraft plus seven feet. Using a winsgpan of 48.9 feet (Airplane Design Group I), the taxilane should be 75.6 feet. Consequently, no hangar, fence, etc. should be located within 37.8 feet of the taxilane centerline. The internal taxiway system providing access to tee-hangars should be no less than 20 feet in width.

It is recommended that a turnaround be provided on each runway end in lieu of the parallel taxiway. Reference may be made to Figure 3-3.

FIGURE 3-3: TURNAROUND



SOURCE: FAA AC 150/5300 - 4B, CHG. 6

A 50' x 80' turn-a-round is located on RW 17.

Drainage

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

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

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

Runway and Taxiway Paving

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

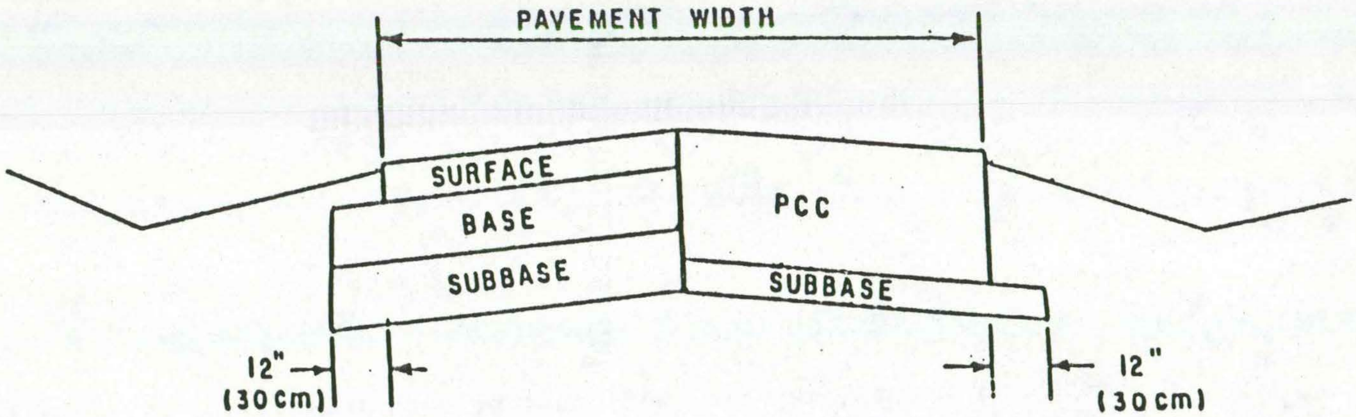
The various pavement courses are shown graphically in Figure 3-4 and described as follows:

SURFACE COUSE: Includes Portland cement concrete, bituminous concrete, aggregate bituminous mixtures, or bituminous surface treatments.

BASE COURSE: Consists of a variety of different materials which generally fall into two main classes, treated and untreated. The untreated bases consist of stone, gravel, limerock, sand-clay, or a variety of other materials. The treated bases normally consist of a crushed or uncrushed aggregate that has been mixed with cement or bitumen.

SUBBASE COURSE: Consists of a granular material or a stabilized soil.

FIGURE 3-4: TYPICAL PAVEMENT SECTION



SOURCE: FAA AC 150/5320-6C

Runway 17/35 presently is noted as having a 4,000 pound gross weight single wheel loading. An existing runway and taxiway typical pavement section was depicted in Figure 1-4 and 1-6. Consequently, improvements to the present runway and taxiway are needed to increase the service level of the airport. RW 17/35, the taxiway, and apron was overlayed with a 1 1/2 inch bituminous surface course in 1977.

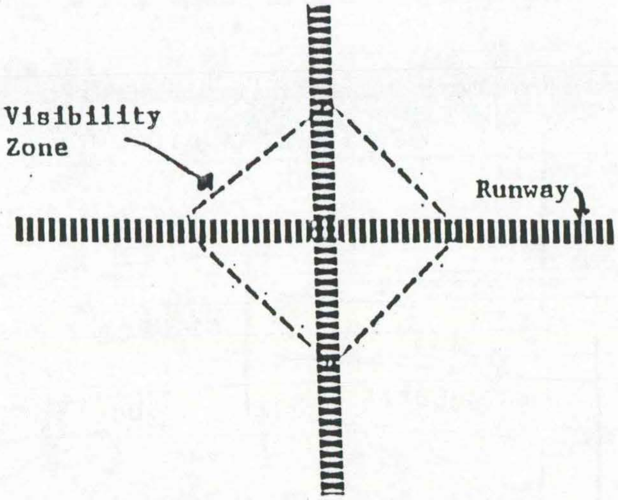
Runway Grade Change and Visibility

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

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

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

FIGURE 3-5: VISIBILITY ZONES



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

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

Transverse 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 minimum slope of three percent and not to exceed five percent. Reference may be made to Figure 3-6 concerning a typical runway cross section. Beyond ten feet turf areas should be sloped two percent.

A graded area beyond the runway surface is referred to as the runway safety area. The area, located symmetrically about the runway, extends outward from the runway centerline 60 feet and 240 feet beyond the runway ends. The primary function of the runway safety area is to provide a degree of safety should an aircraft veer off the runway. The transverse grade should not exceed two percent per 100 feet.

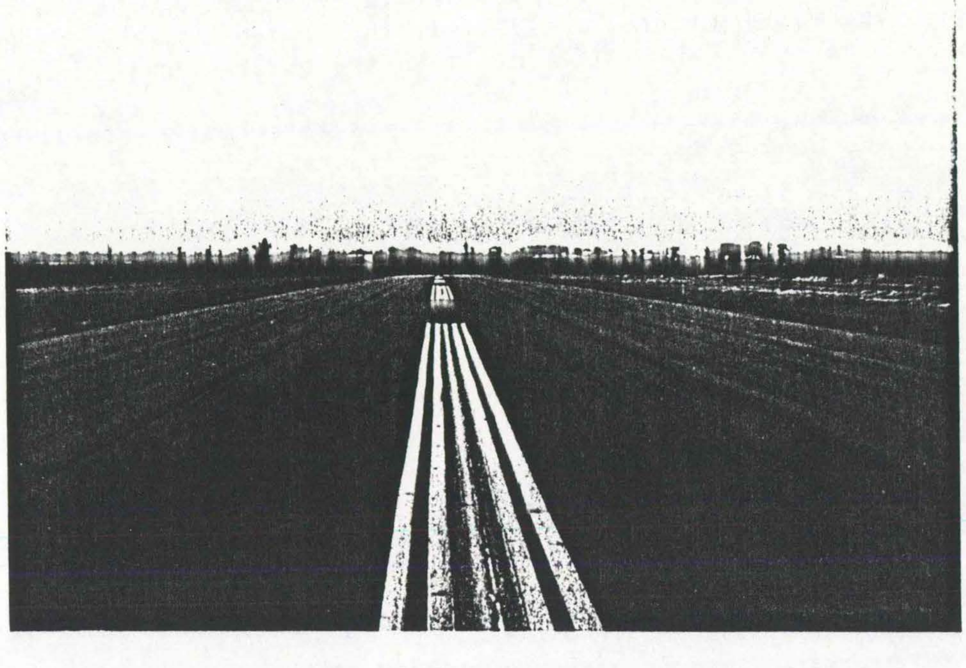
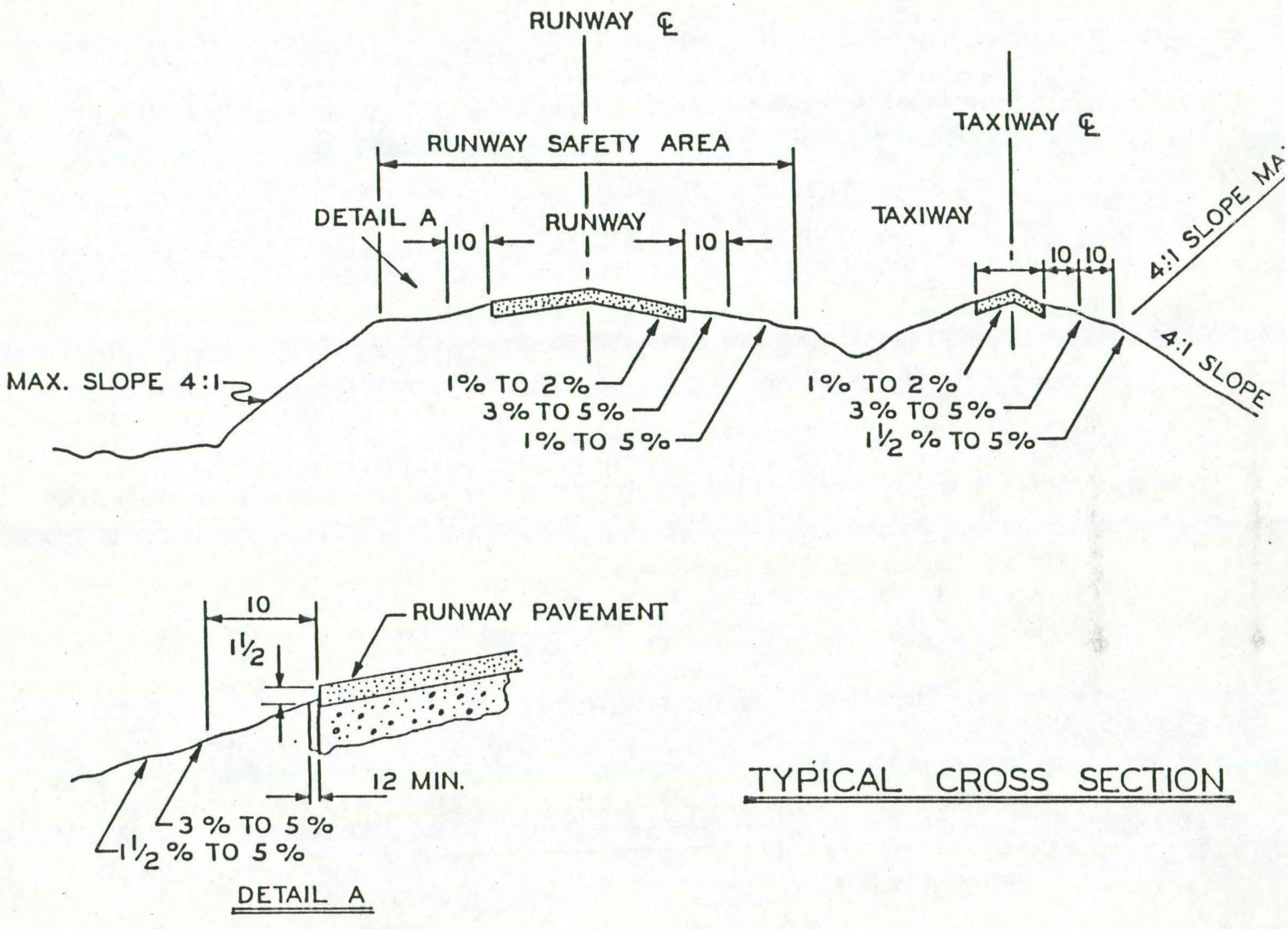


FIGURE 3-6: TYPICAL RUNWAY AND TAXIWAY SECTION



SOURCE: FAA AC 150/5300 - 4B, Chg. 5

Pavement Markings

A non-precision instrument runway is one to which a non-precision approach has been approved. NPI markings consist of basic marking in addition to threshold markings.

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

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

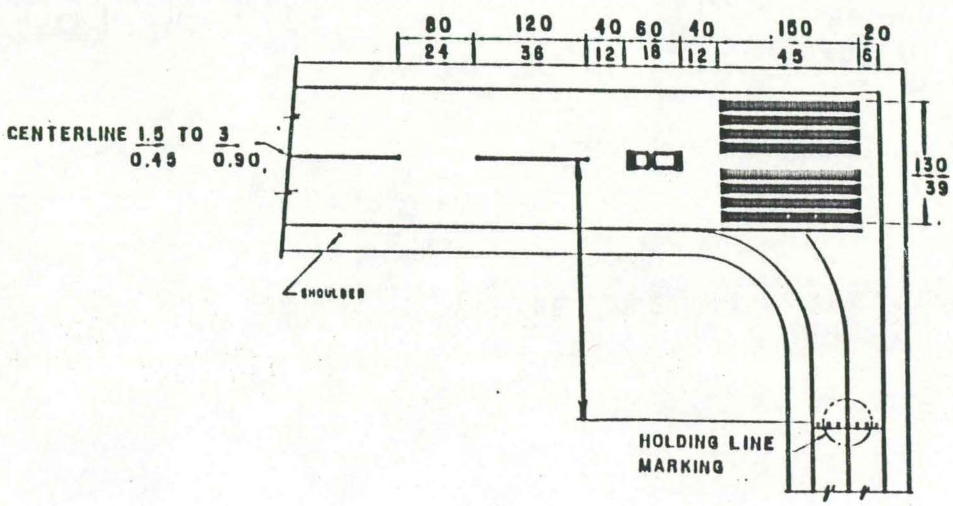
- Threshold markings: Threshold markings consist of eight 150′ x 12′ stripes. Each stripe is separated by three feet except the center where the separation is 16 feet. Where the runway is less than 150 feet, the width of the stripes and separation is reduced proportionally.

- Fixed distance marking: Two solid longitudinal bars located either side of the runway centerline 1,000 feet from the threshold.

Basic markings are in place on RW 17/35. Non-precision instrument markings should be placed on RW 17/35. Reference may be made to Figure 3-7. Unpaved runways are normally defined by placing markers at the corners of the runway and at 400 foot intervals along the length of the runway.

Taxiways are marked by a continuous stripe, six inches in width, along the taxiway centerline. Holding lines are located on the taxiway 150 feet from the runway edge. Additional information on pavement markings may be obtained from FAA AC 150/5340-1E.

FIGURE 3-7: NON-PRECISION INSTRUMENT MARKINGS



LANDING AND NAVIGATIONAL AIDS

Runway and Taxiway Lighting

A Medium Intensity Runway Light System (MIRL) was installed on RW 17/35 in 1978. Taxiway edge lights are also in place.

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 2,000 feet on one-half the runway length whichever is less. The yellow lights are located on the end opposite the landing threshold or instrument approach end. The edge light fixtures should be located no more than ten feet from the defined runway edge and spaced 200 feet on center. The runway light stake should be no less than 30 inches high due to snow removal and grass cutting. The lights, located on both sides of the runway should be directly across from each other and perpendicular to the runway centerline. Special requirements exist at runway intersections.

Two groups of threshold lights, the second part of a runway light system, are located symmetrically about the runway centerline. The threshold lights emit a 180 red light inward and 180 green light outward. The threshold lights should be located no closer than two feet and no more than ten feet from the runway threshold. The two groups of lights contain no less than three fixtures for a VFR runway and four fixtures for an IFR runway. The outer most light is located in line with the runway edge lights. The remaining lights are placed in ten foot centers towards the runway centerline extended. Air-to-ground radio control for the runway light ststem on RW 17/35 is in place.

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

Reference may be made to the following FAA Advisory Circulars:

AC 150/5300-24 Runway and Taxiway Edge Lighting Systems
AC 150/5340-27 Air-To-Ground Radio Control of Airport Lighting Systems

Precision Approach Path Indicator, (PAPI)

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

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

The PAPI system should be located on the left side of the runway (approach end) and so sited and aimed that it defines an approach path with adequate clearance over obstacles and a minimum threshold crossing height. Reference may be made to FAA AC 150/5345-28D. A PAPI system is recommended for on the primary runway. A SAVASI system was installed on RW 17/35 in 1978. Consideration may be given to replacement of the SAVASI with the PAPI system.

Runway End Identification Lights, (REIL)

Runway End Identification Lights (REIL'S) should be placed on RW 17/35. REIL'S should be located in line with the threshold lights, 75 feet from the runway edge. IDOT recommends installation of a REIL system when the annual operations exceed 3,000. Reference may be made to FAA AC 150/5300-14B, AC 150/5300-2C, and AC 150/5340-25 concerning REIL design and siting requirements.

Rotating Beacon

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

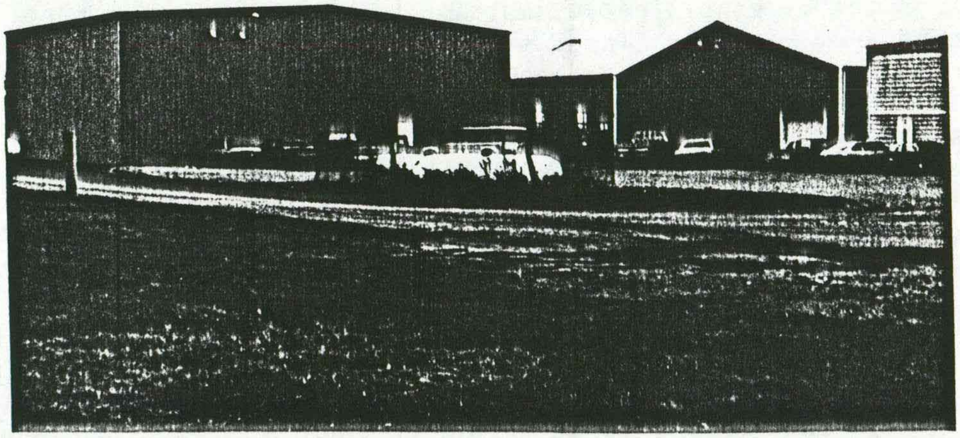
Segmented Circle and Lighted Wind Indicator

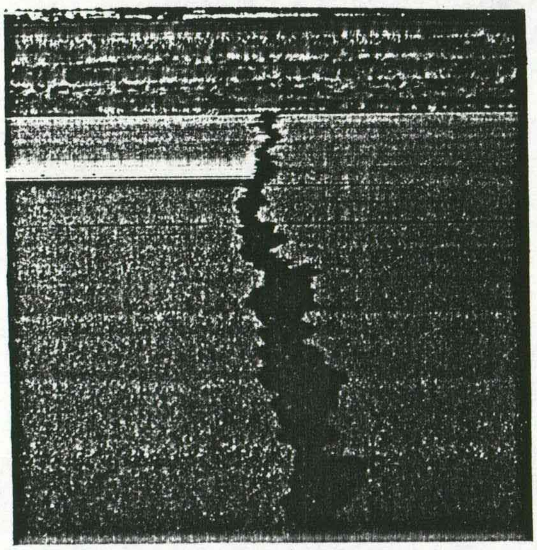
The segmented circle consists of a 100 foot diameter circle with a minimum of 18 segments constructed around the surface wind indicator. The marking system may be used to convey traffic patterns. A lighted wind indicator should be installed at the center. Reference may be made to FAA AC 150/5345-5. The segmented circle is located between the terminal area and RW 17/35.

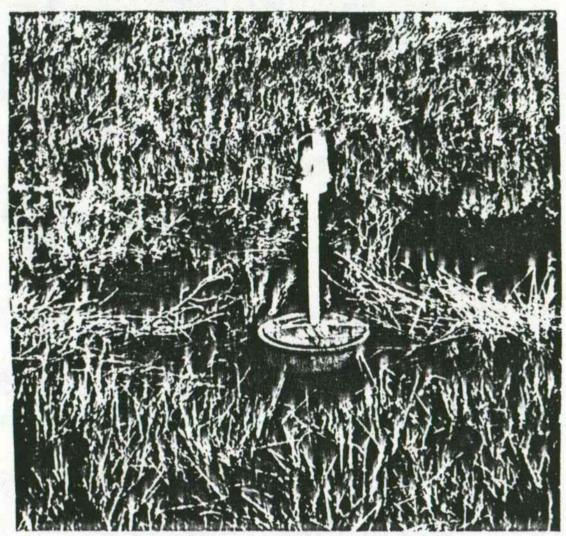
Nondirectional Beacon

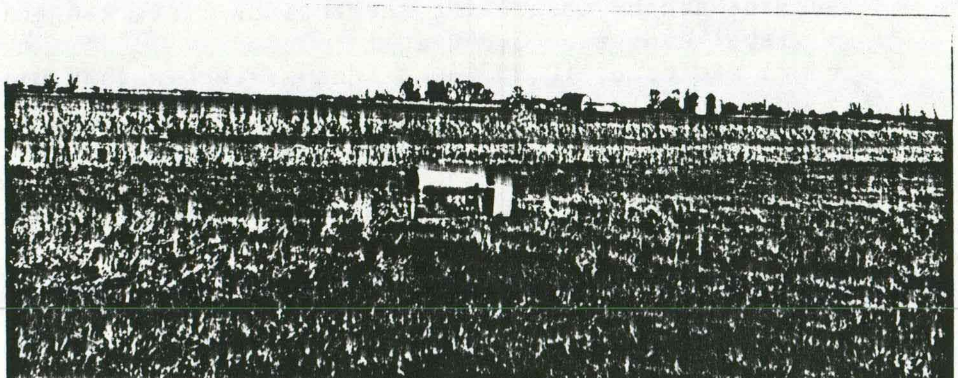
The nondirectional radio beacon (NDB) is located within the terminal area. Future metal buildings, power lines, metal fences, etc. should be located no closer than 100 feet to the NDB. The NDB radiates a signal which can be used by pilots to provide electronic directional guidance to the airport. This consists of two 65 foot poles spaced approximately 350 feet with two wires strung between them. The ground should be smooth, level, and well drained. The location should take into account the obstruction standards described in this report.

The NDB provides a non-precision instrument approach to RW 17.









FAR PART 77

Obstruction Standards

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

Standards for Determining Obstructions

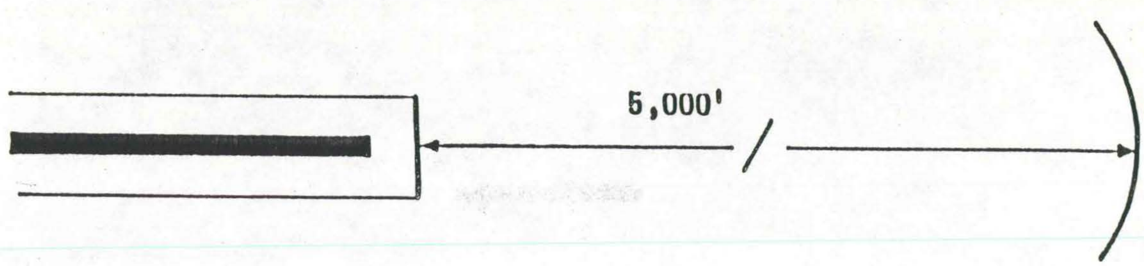
1. A stationary or mobile object is defined as an obstruction to air navigation if it is of a greater height than any one of the following:
   A. A height of 500 feet above the ground at the site.
   B. A height of 200 feet above the ground or airport elevation, whichever is higher, within three nautical miles of the airport reference point.
   C. The surface of a takeoff or landing area of an airport or any imaginary surface.
   D. Traverse ways on or near an airport to be used for the passage of mobile objects.

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

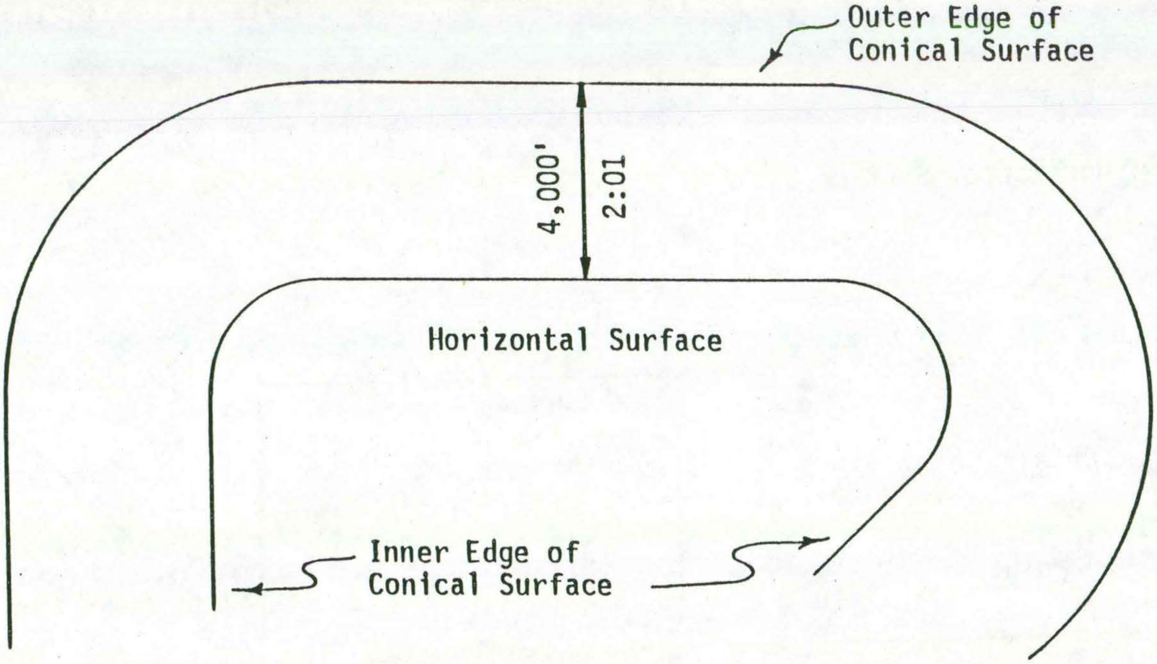
Imaginary Surfaces

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

A. Horizontal Surface: The horizontal surface is a plane 150 feet above the established airport elevation. It is constructed by swinging arcs of specific radii from the center of each end of the primary surface and by connecting the arcs by lines tangent to those arcs.
- Visual radius of 5,000 feet
- NPI radius of 10,000 feet (runway larger than utility)
- NPI radius of 5,000 feet (utility runway)

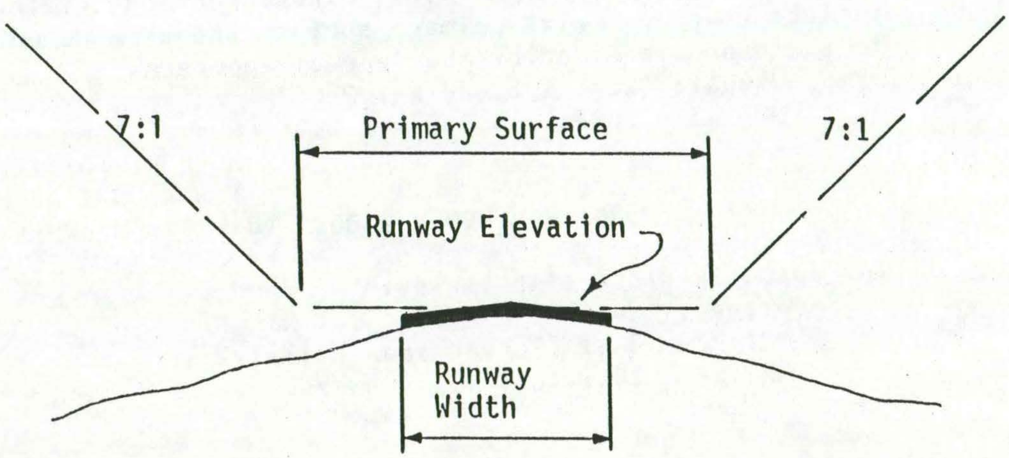


B. Conical Surface: The conical surface extends outward and upward from the periphery of the horizontal surface at a slope of 20:1 for a horizontal distance of 4,000 feet at the ends and 7:1 laterally.

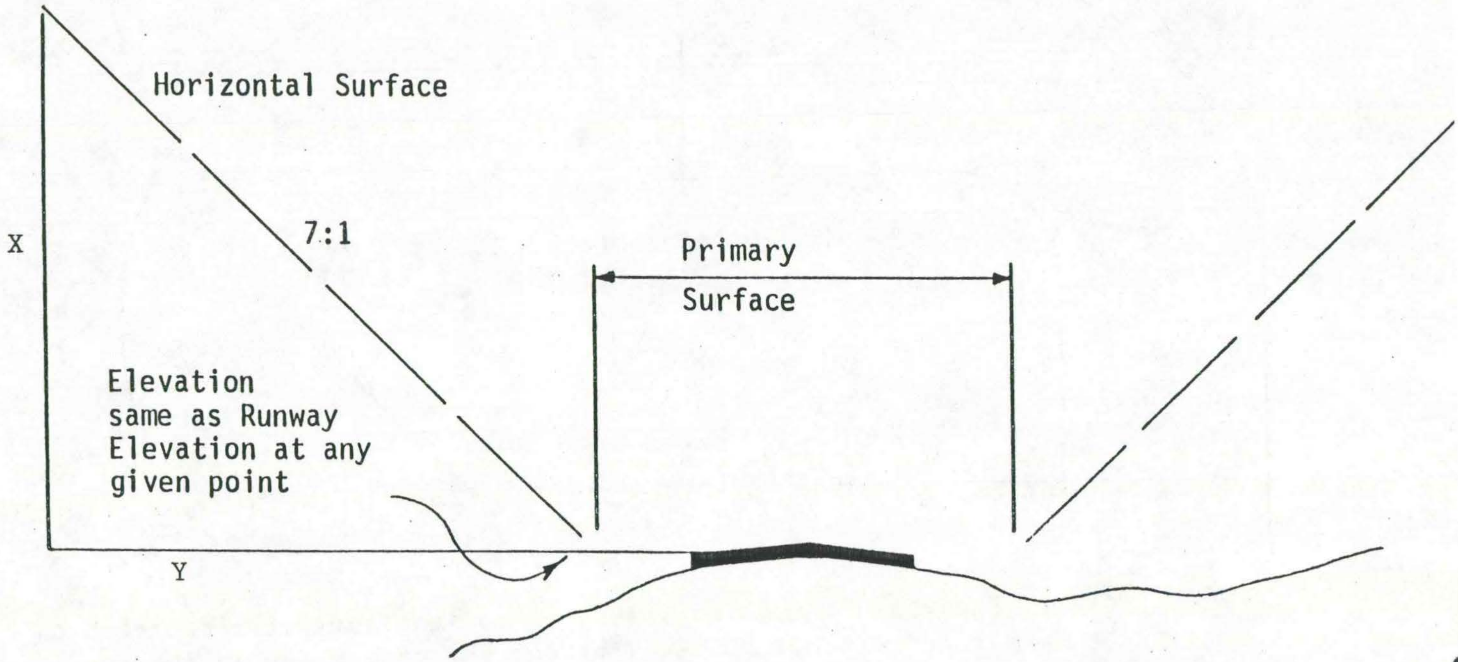


C. Primary Surface: The primary surface is longitudinally centered on the runway and extends 200 feet beyond the runway end in the case of a paved runway. The primary surface end coincides with the runway end in the case of a turf runway. The width of the primary surface varies with the approach.

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



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



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

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

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

The approach slope also varies:

Visual:	20:1
NPI:	34:1 (larger than utility)
NPI:	20:1 (utility runways)

Clear Zone

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

Utility Runways:
- Visual Approach: 250′ x 1,000′ x 450′ (8.035 acres)
- Non-precision Instrument Approach: 500′ x 1,000′ x 800′ (14.922 acres)
- Visual Approach opposite Non-precision Instrument Approach: 500′ x 1,000′ x 650′ (13.2 acres)

Obstacle Free Zone, (OFZ)

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

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

Clearway

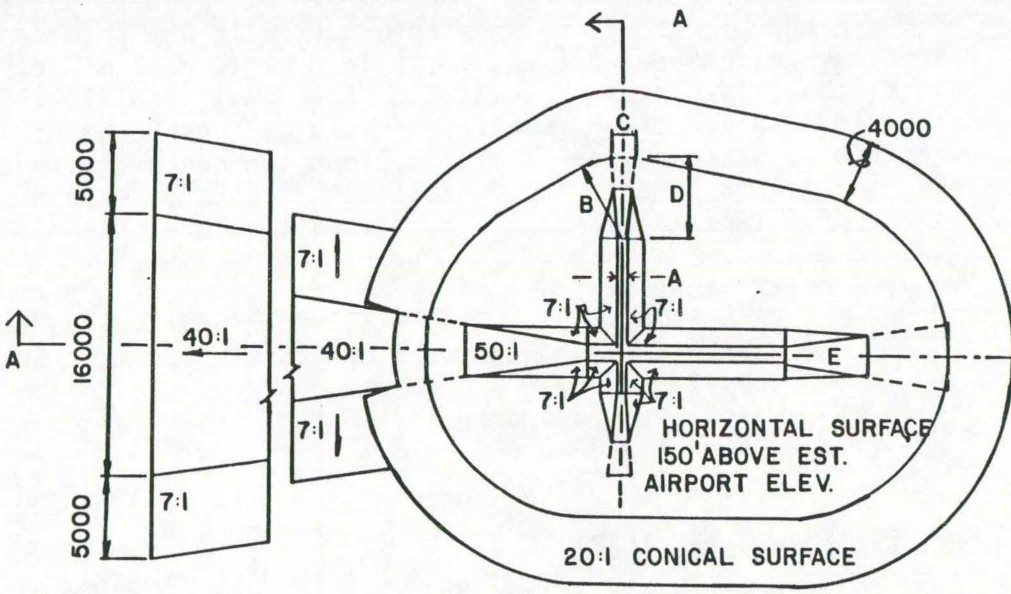
The clearway is an area 500 feet in width extending from the runway end outward and upward at a slope not exceeding 1.25% above which no objects or terrain may penetrate. The clearway should be under control of the airport owner and generally extends no more than 1,000 feet from the runway end.

Hazard Determination

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

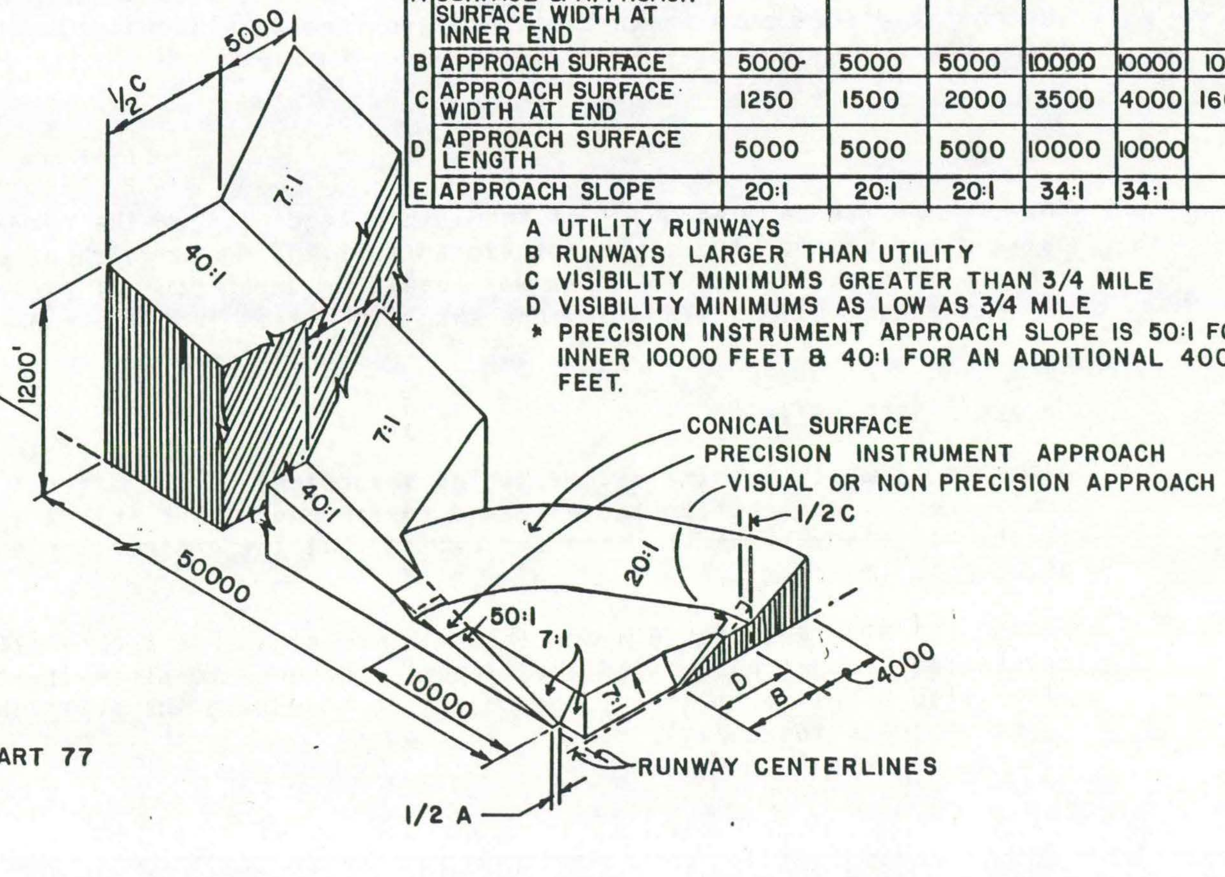
FAA AC 150/5300-4B, Chg. 8 summarizes minimum standards for identifying and preventing airport hazards on the airport. Hazards to air navigation are eliminated by either altering the object or adjusting the aviation operations to accommodate the object.

FIGURE 3-8: AIRPORT IMAGINARY SURFACE



	ITEM	DIMENSIONAL STANDARDS (in feet)					
		VISUAL RUNWAY		NON-PRECISION INSTRUMENT RUNWAY			PREC INSTR RUNW
		A	B	A	B		
					C	D	
A	WIDTH OF PRIMARY SURFACE & APPROACH SURFACE WIDTH AT INNER END	250	500	500	500	1000	100
B	APPROACH SURFACE	5000	5000	5000	10000	10000	100
C	APPROACH SURFACE WIDTH AT END	1250	1500	2000	3500	4000	1600
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 4000 FEET.



Source: FAR PART 77

AIRPORT IMAGINARY SURFACE

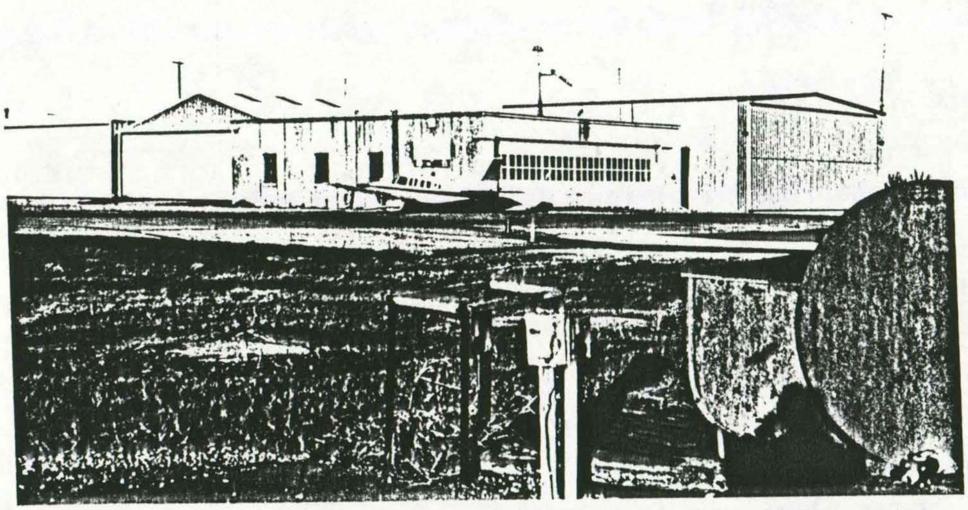
- All objects which prevent operational clearance for terminal navigational facilities.

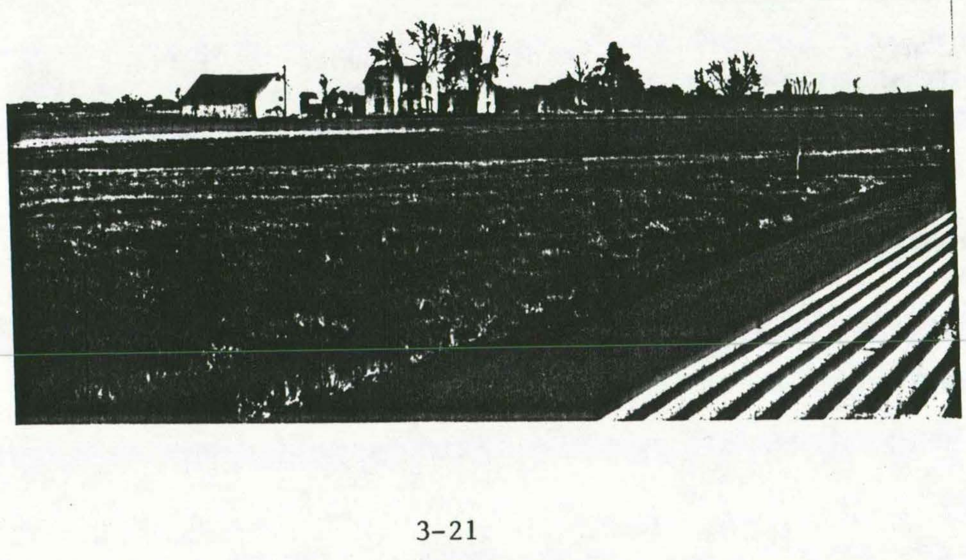
- All objects, including parked aircraft, within 7 feet plus 0.75 feet times the wingspan of the most demanding aircraft from the taxiway centerline, except for frangibly mounted NAVAIDS. For example:
  King Air C90-1 (50.3′ x 0.75 + 7′ = 44.725′)

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

Building restriction lines (BRL) extend outward beyond the runway 3,000 feet or four times the separation distance between the runway centerline and the BRL, whichever is less. The building restriction line should be determined for each runway based upon the following:

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





LAND USE

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

Open Space Areas

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

Industrial and Transportation Facilities

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

Airport and Aviation Oriented Facilities

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

Commercial Facilities

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

AIRPORT DEVELOPMENT ALTERNATIVE

CHAPTER FOUR

AIRPORT DEVELOPMENT ALTERNATIVES

Introduction

Chapter Four examines various development concepts which would provide for the implementation of those facility requirements discussed in Chapter Three. The primary objective is to ensure that the alternative selected for implementation provides the City of Chariton with the highest level of service justified based upon anticipated aviation activity. Future flexibility is an essential element that must be taken into consideration in selecting the best alternative. Development costs and associated environmental impacts must be addressed as well.

As noted within Chapter Two, Chariton is unique in that it has a large number of based aircraft compared to local aircraft ownership. Current aviation activity indicates use of facility by jet aircraft even though the runway is only 2,800 feet in length. The forecast indicated that an increasing number of twin engine and jet operations is expected. However, the number of jet operations is not expected to exceed 500 over the next 20 years. Therefore, justification for a runway constructed to a length of 5000 plus feet appeared questionable. The concern herein though is to recognize the potential that exists at Chariton and the fact that conditions may change, causing an increase in jet activity beyond that anticipated.

The various development alternatives examined within this chapter are concerned with the following:

1. Primary runway improvements - RW 17/35 and/or alternative
2. Crosswind runway improvements - RW 17/35 and/or alternative
3. Runway length, orientation, and future requirements
4. Obstructions
5. Capital costs
6. Site limitations and attributes
   A. Cultural: Farmsteads, roads, farming practices
   B. Physical: Topography, soils

Alternative A-1

Alternative A-1 would find the continued development of RW 17/35 to an ultimate length of 4,000 feet. In addition, the present width of RW 17/35 would be increased from 60 feet to 75 feet. An extension, 75′ x 1200′, would be placed on RW 17. Placement of additional length on RW 35 is not a viable alternative due to the present threshold location with respect to U.S. Highway 34. RW 35 is located approximately 500 feet north of the highway.

An extension to RW 17 would require the acquisition of approximately 17.3 acres of land in fee title. The parcel would extend north from present airport property to the east/west county road. The extension would require the removal of a dwelling unit, out buildings, and trees. The threshold of RW 17 would be located approximately 790 feet south of the east/west county road.

The clear zone would extend north of the east/west county road into Section 14. Approximately 6.4 acres of land in easement would be needed in order to accommodate clear zone requirements. The clear zone begins 200 feet beyond the threshold and extends outward 1000 feet. The clear zone width at the inner end coincides with the primary surface and is 500 feet in width. The outer width is 800 feet. The clear zone for a non-precision instrument approach contains 14.92 acres.

Assuming that the runway end elevation were the same or greater than that of the east/west county road, an additional 300 feet of runway could be obtained beyond the 4000 feet presently being contemplated. Additional length beyond 4,300 feet would not appear to be feasible without the relocation of the east/west county road. Pole lines and other obstructions within the clear zone area should be removed.

RW 17/35 provides an 82.7 percent level of wind coverage at the 12 m.p.h. crosswind component value. As previously noted, a second runway would be required to provide supplemental wind coverage.

Development of RW 17/35 to Airplane Design Group II standards would require the relocation of the present medium intensity runway edge light system as well as the threshold lights on RW 17. The SAVASI will also have to be relocated. Consideration may be given to replacement of the SAVASI by a Precision Approach Path Indicator (PAPI).

A partial parallel taxiway is recommended in order to enhance airport safety. The taxiway would not be required for purposes of increasing runway operational capacity. The taxiway would extend north from the terminal area to a point located 2000 feet north of RW 35. A turnaround would be constructed on RW 17.

Alternative A-2

Alternative A-2 is essentially the same as Alternative A-1 with the addition of a second runway. Alternative A-2 locates the second runway, RW 10/28, north of the terminal area. The proposed runway orientation is N 76° W. The RW 10/28 centerline extended would intersect RW 17/35 approximately 2000 feet north of RW 35. The facility would be constructed to an ultimate length and width of 4000 and 75 feet, respectively.

A minimum of 53 acres of land would be required in fee title to accommodate the construction of RW 10/28. In addition, approximately 16.5 acres in easement would be required to accommodate the clear zone off RW 28. Approximately 10 acres in easement would be required to accommodate clear zone requirements off RW 10.

Alternative A-2 represents the ultimate level of airport development in that RW 17/35 and 10/28 would be constructed to a length of 4000 feet.

RW 10/28 may initially be developed as a turf facility. Such action would be consistent with present IDOT airport development guides.

The airport would provide a 96.0 percent level of wind coverage at the 12 m.p.h. crosswind component value. RW 10/28 when considered alone would accommodate 78.6 percent of the wind.

RW 10/28 would extend along a ridge line with the terrain sloping away from the runway. The terrain is such that RW 28 could be extended beyond the 4000 foot scenario to 5000 feet.

The land area impacted by the construction of RW 10/28 is presently under cultivation. There are no farmsteads nor urban developments located within close proximity of RW 10/28. Ownership patterns are such that land remnants may be created. Consequently, it may be necessary to acquire such remnants in order to construct RW 10/28.

A partial parallel/connecting taxiway would be constructed from the terminal area to the midpoint of RW 10/28. A turnaround would be constructed on RW 28. The partial parallel taxiway constructed along RW 17/35 would serve RW 10.

FIGURE 4-1: ALTERNATIVE A-1 - RW 17/35
RW 17/35: 60' x 2800' (Existing); 75' x 4000' (Ultimate) (82.7%)
No Secondary/Crosswind Runway

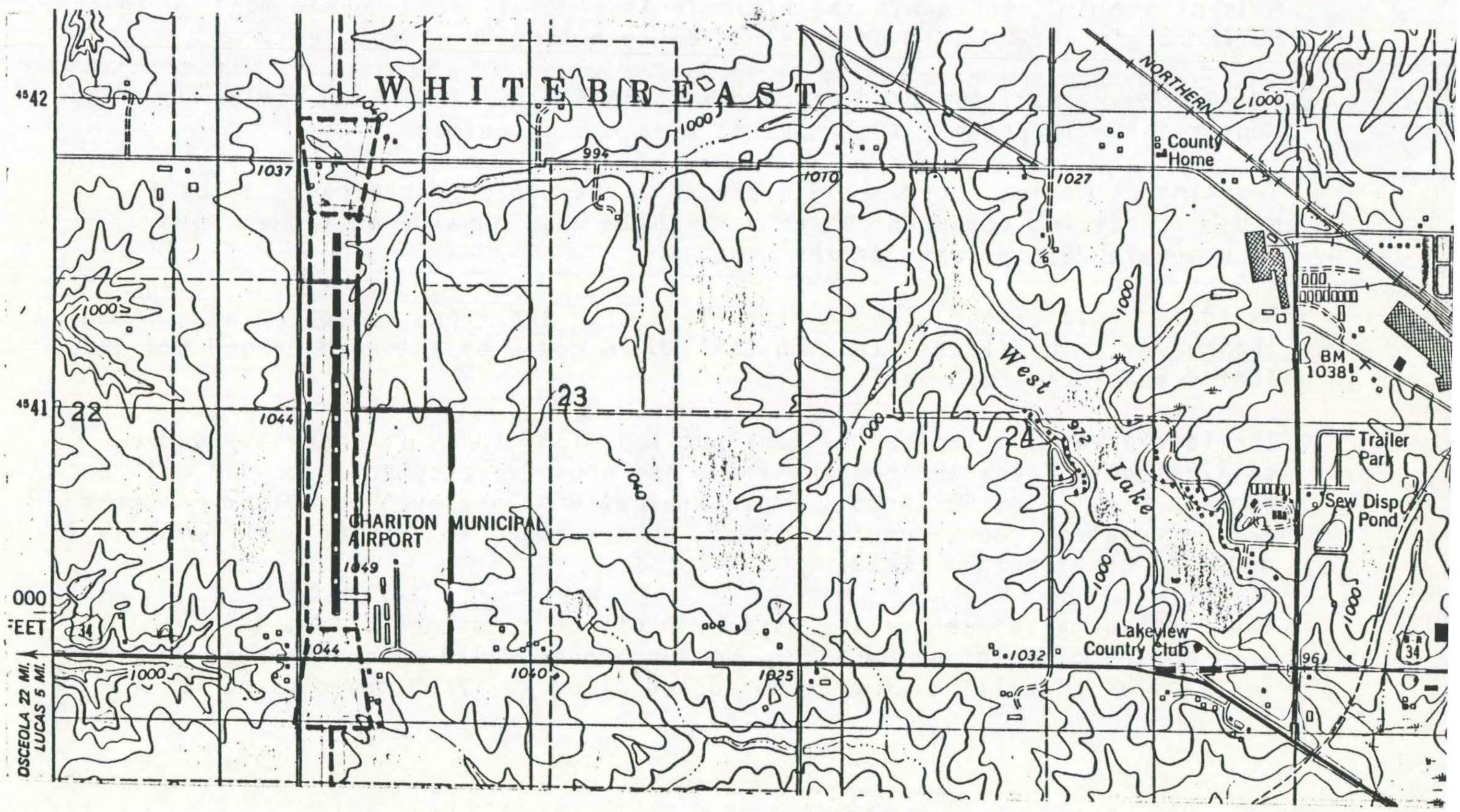
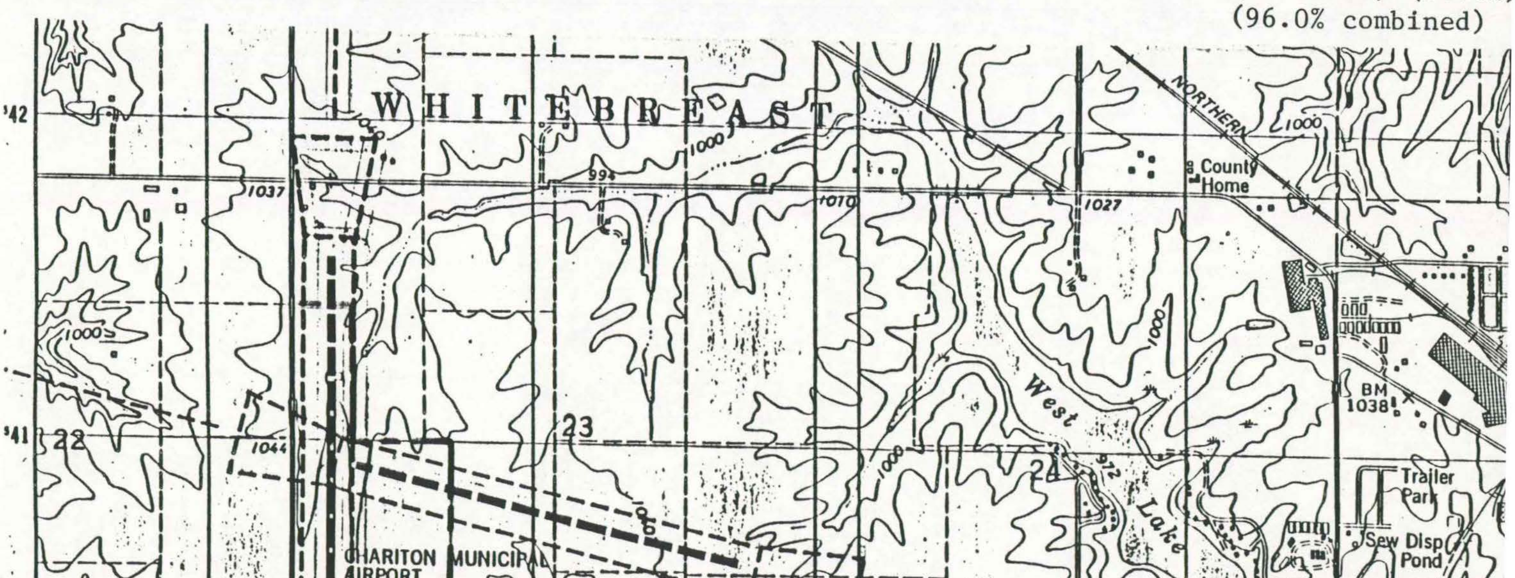


FIGURE 4-2: ALTERNATIVE A-2 - RW 17/35 and RW 10/28
RW 17/35: 60' x 2800' (Existing); 75' x 4000' (Ultimate) (82.7%)
RW 10/28: 150' x 3400' - Turf (Initial; 75' x 4000' (Ultimate) (78.6%)
(96.0% combined)



Alternative A-3

Alternative A-3 represents a more probable development scenario. RW 10/28 would be constructed as the primary runway while RW 17/35 would be maintained as the crosswind runway. No improvements would be contemplated on RW 17/35 in the near term.

RW 17/35 is stressed to a single wheel loading of 4000 pounds. To bring the pavement strength up to 12,500 pounds single wheel, it would appear that the existing runway would have to be reconstructed. The runway edge light system would also need to be relocated in order to accommodate the increase in pavement width. In essence, the existing runway would be reconstructed. Given the soil and terrain beyond RW 17, the reconstruction and development of RW 17/35 may be as costly as would the cost of constructing RW 10/28. Acquisition and removal of an existing dwelling unit, outbuilding, and trees would increase the cost of extending RW 17/35. While fewer acres of land would be required in fee title in order to accommodate RW 17/35, the unit cost per acre may be greater than that encountered in the development of RW 10/28.

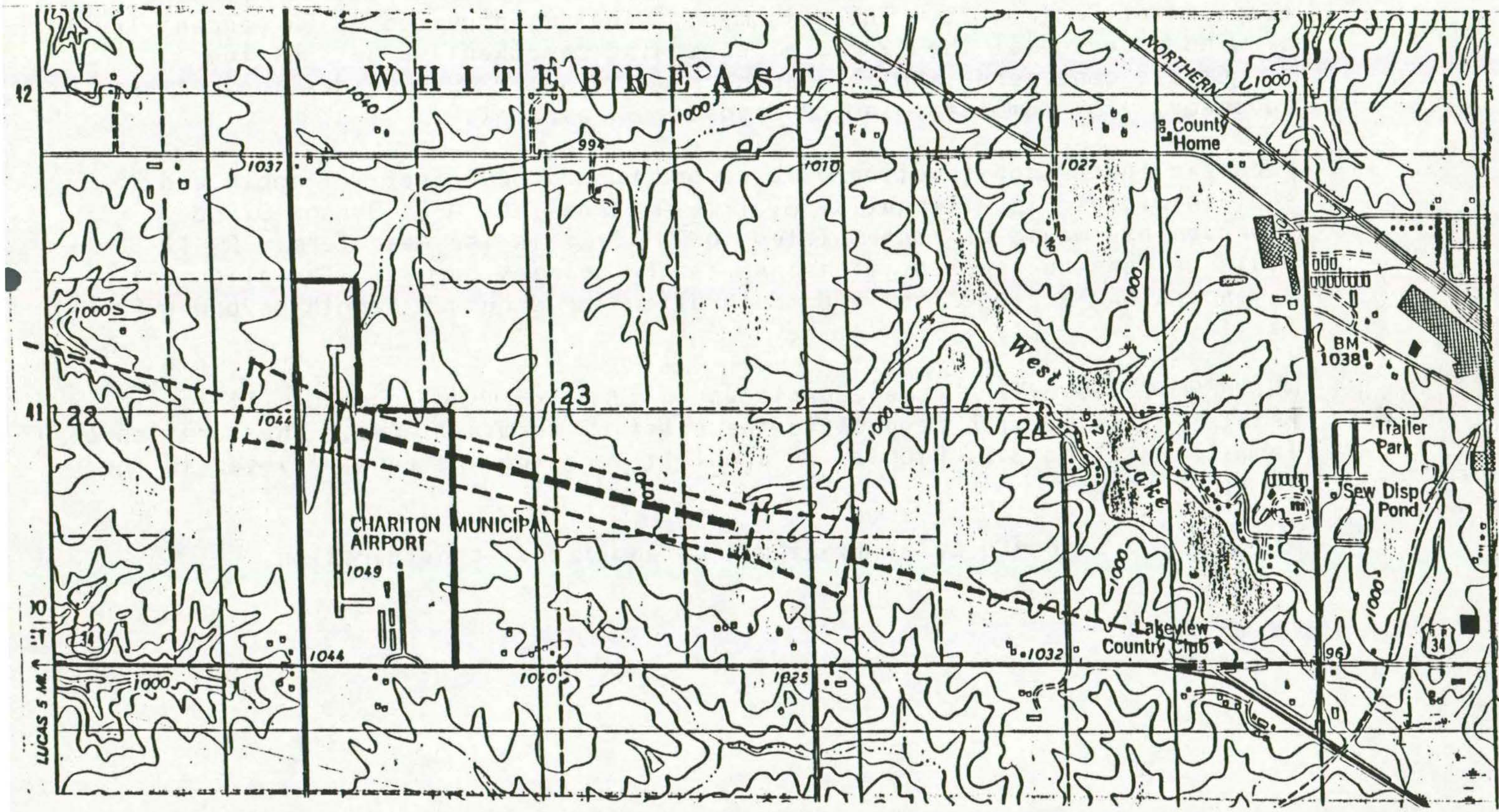


FIGURE 4-3: ALTERNATIVE A-3 - RW 17/35 and RW 10/28
RW 17/35: 60' x 2800' (Existing)
RW 10/28: 75' x 4000' (Initial) (N 76° W)

Alternative B

Alternative B located a second runway along an alignment of N 60° E. The combined wind coverage provided by RW 6/24 and RW 17/35 is 91.3 percent. RW 6/24 would be constructed to an ultimate length and width of 75 and 4000 feet, respectively. Alternative B is similar to the crosswind development concept noted on the present ALP.

Alternative B does not, however, provide an adequate level of wind coverage. The combined coverage is 91.3 percent while the design standard is 95 percent. Given the other alternatives that are available, the development concept presented in Alternative B represents a poor choice. Alternative B should be eliminated from further consideration.

Alternative C

Alternative C places the second runway in a northerly direction near the midpoint of Section 23. The alignment, N 60° W, provides an 80 percent level of wind coverage at the 12 m.p.h. crosswind component value. Of the alignments considered for the second runway, RW 12/30 provides the better coverage. The combined wind coverage is 96 percent.

Proposed is the construction of a second runway 4000 feet in length and 75 feet in width. In Alternative C, like Alternatives A-3, B, and D, no improvements would be contemplated to RW 17/35 in the near term. RW 12/30 would be constructed and maintained as the primary runway. The alignment extends along a ridge line and would allow for a runway length beyond 4000 feet.

While RW 12/30 offers some advantages in terms of wind coverage, it is remotely located with respect to the existing terminal area. The location of farmsteads along U.S. Highway 34 prohibit locating the runway closer to the terminal area.

Alternative C should be eliminated from additional consideration.

FIGURE 4-4: ALTERNATIVE B - RW 6/24 and RW 17/35
RW 17/35: 60' x 2800' (Existing) (82.7%)
RW 6/24: 75' x 4000' (N 60° E) (75.2%) (91.3% Combined)

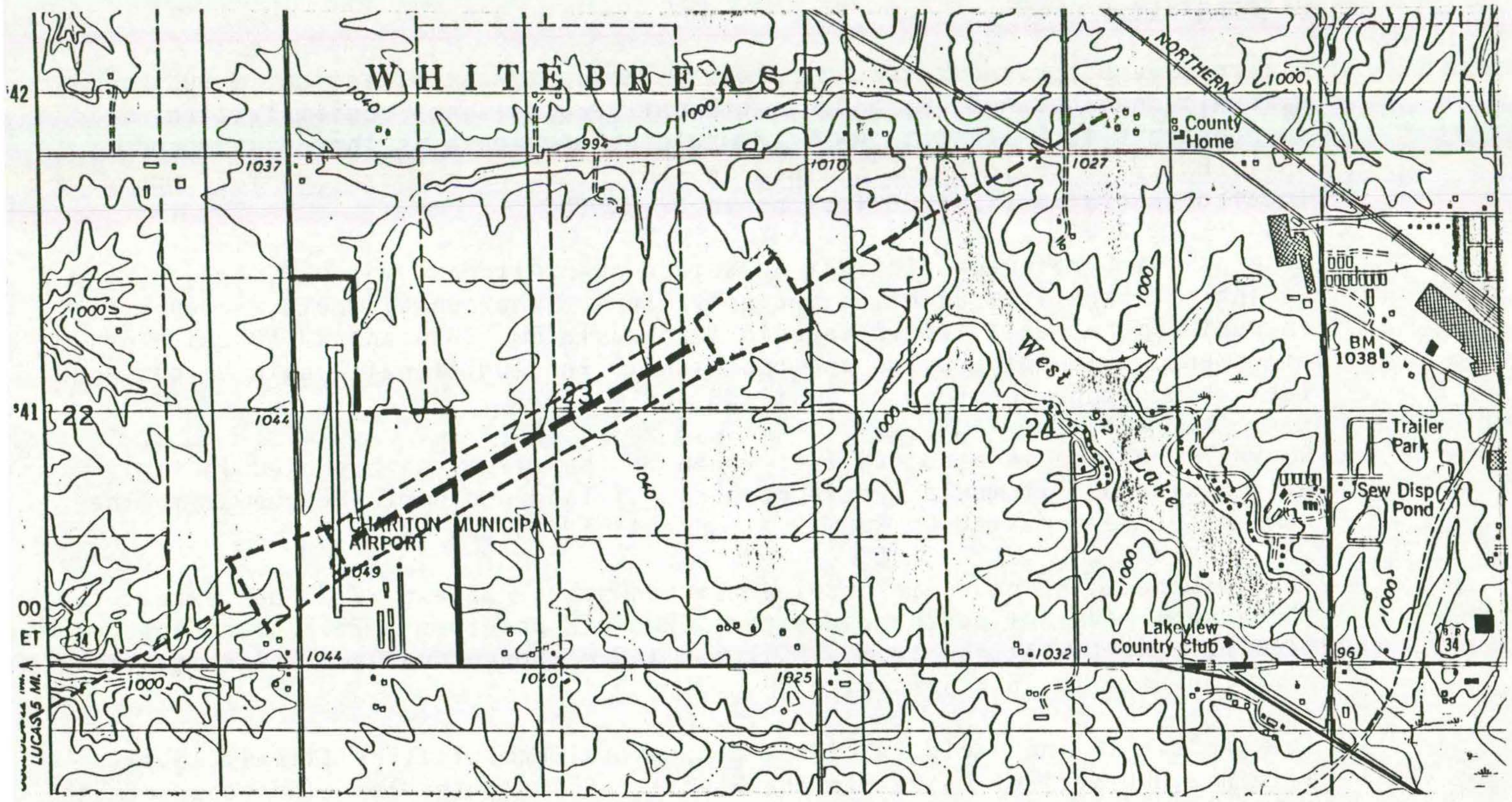
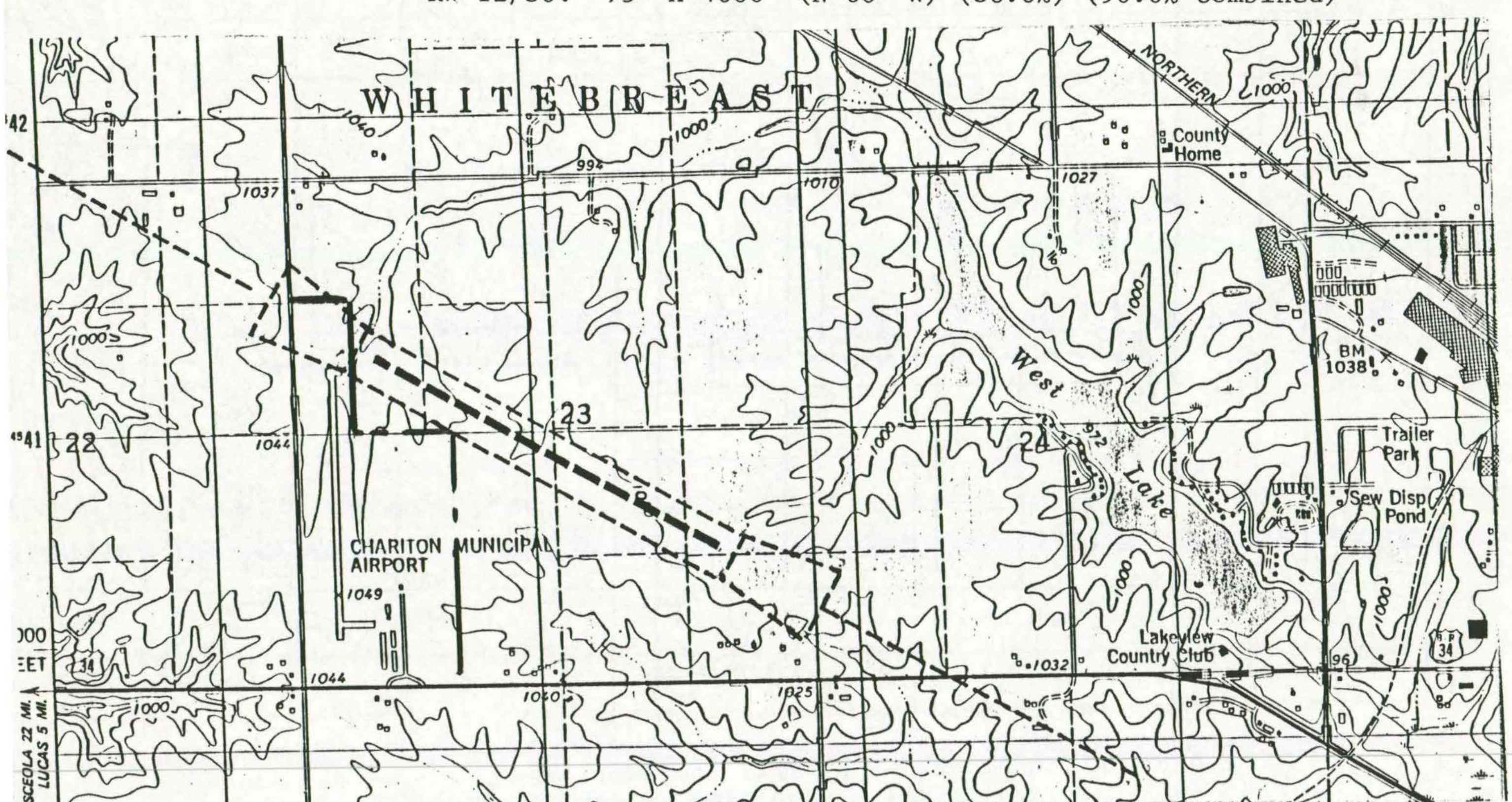


FIGURE 4-5: ALTERNATIVE C - RW 12/30 and RW 17/35
RW 17/35: 60' x 2800' (Existing) (82.7%)
RW 12/30: 75' x 4000' (N 60° W) (80.0%) (96.0% Combined)



Alternative D

Alternative D locates a second runway in an east/west direction, N 90° W. Like Alternatives A-3, B, and C, Alternative D does not contemplate any improvements to RW 17/35. RW 9/27 would be developed as the primary runway while RW 17/35 would be maintained as the crosswind runway. RW 9/27 would be located approximately 1900 feet north of RW 35.

Alternative D offers a distinct advantage over Alternatives A-2, A-3, B, and C in that it parallels existing property lines. The runway would, however, encounter more variation in terrain than would RW 12/30 and RW 10/28. The alignment would not provide the opportunity for additional length beyond 4000 feet as would be provided by RW 10/28 and RW 12/30.

RW 9/27 could be located 600 feet south of the alignment depicted in Alternative D. It would create remnants of land north of the runway in the same manner as created by Runway alignments 12/30 and 10/28.

The combined wind coverage provided by Runways 17/35 and 9/27 does exceed the 95 percent level of coverage desired. RW 9/27 provides a 75.6 percent level of wind coverage at the 12 m.p.h. crosswind component value. The combined wind coverage is 95.1 percent.

The terrain in the vicinity of the proposed alignment is relatively level within 2,400 feet of RW 9. In the last 1,600 feet, the terrain drops from the 1,040 foot contour to the 1,020 foot contour or by 1.25 percent.

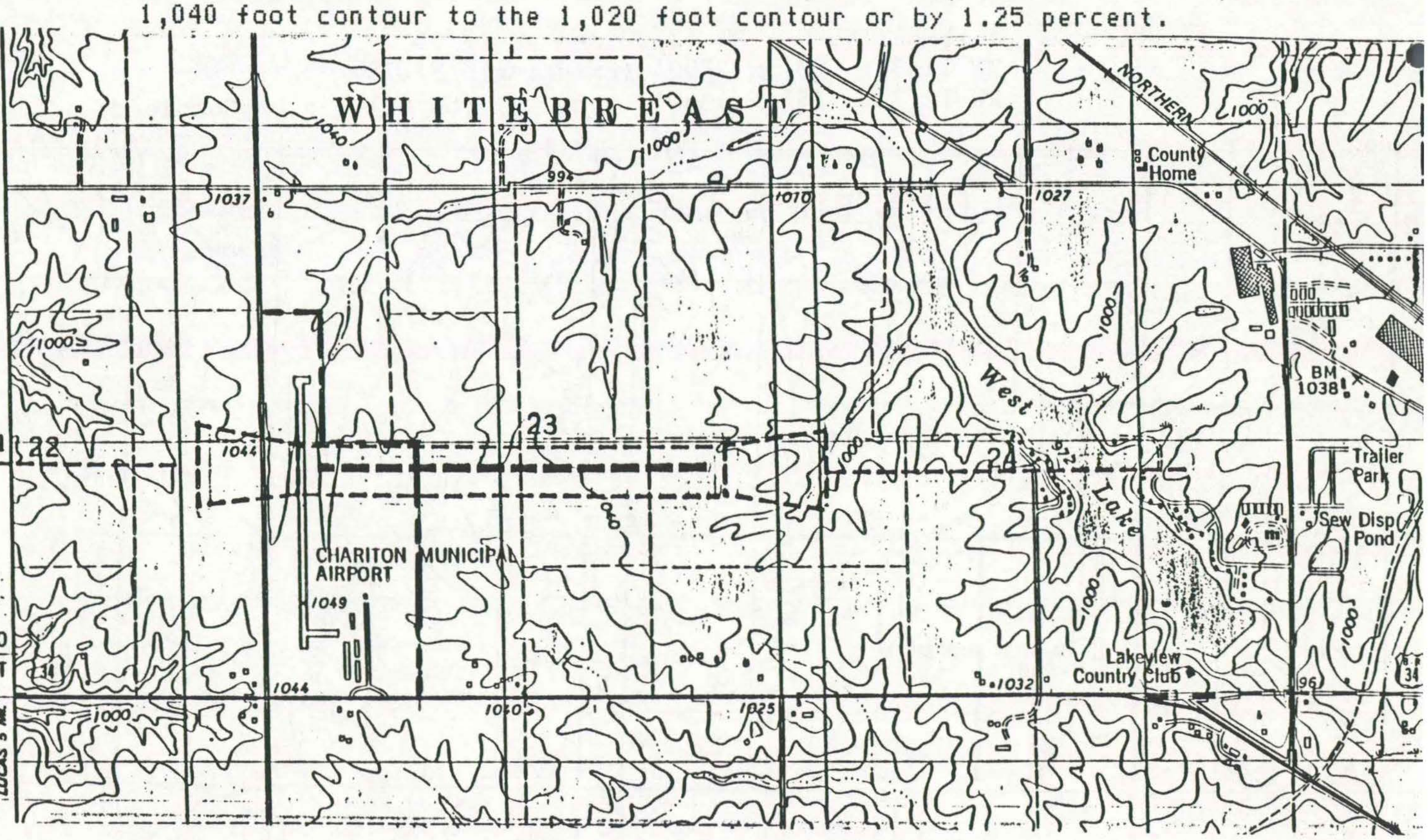


FIGURE 4-6: ALTERNATIVE D - RW 9/27 and RW 17/35
RW 17/35: 60' x 2800' (Existing) (82.7%)
RW 9/27: 75' x 4000' (75.6%) (95.1% Combined)

Alternatives E-1 and E-2

Alternative E-1 proposes the construction of a new primary runway east of the terminal area. Within this scenario, existing RW 17/35 would be closed and a new primary runway, 4000 feet in length and 75 feet in width, constructed. The concept was developed to take advantage of terrain and existing land uses. The runway orientation is N 0° 00′.

Alternative E-2 depicts the same primary runway alignment as E-1. A crosswind runway, RW 9/27, was incorporated into the concept. Alternatives E-1 and E-2 are essentially the same as Alternatives A-2 and C.

From the point of airport geometrics, Alternatives E-1 and E-2 provide a better layout than does Alternatives A-1 and C. The development concept does not appear to be a viable alternative in view of the present investment in existing facilities. Alternatives E-1 and E-2 would have merit if a new airport were being established.

Figure 4-7 depicts an extension of 1200 feet to RW 17 as well as the associated clear zone. Also noted are the centerline elevations of the north/south county road, pole locations, selected spot elevations, ground contour, and buildings.

An extension placed on RW 17 would require the maintenance of a five foot line of sight along the entire length of the runway. In addition, a 15 foot vertical clearance would be required between the north/south county road and the 7:1 transitional surface. The runway grade required to satisfy the two requirements noted above would require as much as ten foot of fill in places. Consequently, the runway end elevation should be no less than 1034 feet plus/minus. Some concern exists as to the availability of fill material for an extension to RW 17.

As previously noted, the extension would require the removal of an existing dwelling unit and out buildings. The pole line located within the clear zone would require relocation or placement underground. The east/west county road would also limit any future extension beyond 4000 feet to 300 feet. The entire runway would require reconstruction as well as the relocation of existing edge lights.

Figure 4-8 depicts the clear zone proposed for RW 35 assuming that a non-precision instrument approach was approved for RW 35 at some point in the future. As noted, none of the existing farmstead buildings would fall within the clear zone area. However, any future development within the farmstead site to the west would encroach on the clear zone. In addition, caution must be used in allowing development that would penetrate the approach surface and transitional surface.

Alternatives A-3 and D represent the more prudent choice for development in the long term. The concepts assume that RW 17/35 would be maintained as a crosswind runway. A new primary runway RW 10/28 or 9/27, would be constructed. At some point in the future RW 17/35 may be constructed to the same length and width as the primary runway.

The concepts offered here would initially eliminate the need to acquire the dwelling unit and out buildings off RW 17. Advantages offered by RW 9/27 and/or 10/28 when compared with the other alternatives are noted as follows:

* Topographic conditions
* Uniform soils
* Minimal conflict with existing buildings
* Opportunity for additional length beyond 4000 feet

Disadvantages inherent in Alternatives A-3 and D are:

* Impact upon farming operations
* Remnants of land that may be created

Alternative A-1, extending RW 17, has an advantage in that the alignment is established and a minimal amount of land would be required in fee title. The disadvantages when compared with the other alternatives include the following:

* Varied soil conditions
* Varied topographic conditions with natural drainage
* Existing dwelling unit and out buildings
* Limitation of future development beyond 4000 feet
* Reconstruction of RW 17/35
* Fill material required to maintain a centerline profile that would accommodate line of sight criteria and the 7:1 transitional surface.

RW 17/35 would require continued maintenance over the twenty-year planning period. Without adequate maintenance, the pavement would deteriorate to a point where an adequate level of service could not be provided.

<u>Decision Point</u>

The Chariton Airport Commission reviewed each of the alternatives and recommended that the Airport Layout Plan proceed with the development of RW 10/28 as the primary runway. The consenus was that the RW 10/28 alignment would provide the best level of service over the long term. It was recognized that the only other viable choice was to extend RW 17. Consequently, RW 10/28 developed as the primary was the preferred choice with an extension and reconstruction of RW 17/35 preferred should it not be feasible to develop RW 10/28.

The decision was based upon the following considerations:

* Ability of alignment to accommodate a runway facility beyond 4000 feet
* Terrain and associated grading (topography and fill)
* Potential obstructions (county roads)
* Farmsteads (relocation)

FIGURE 4-7: RW 17

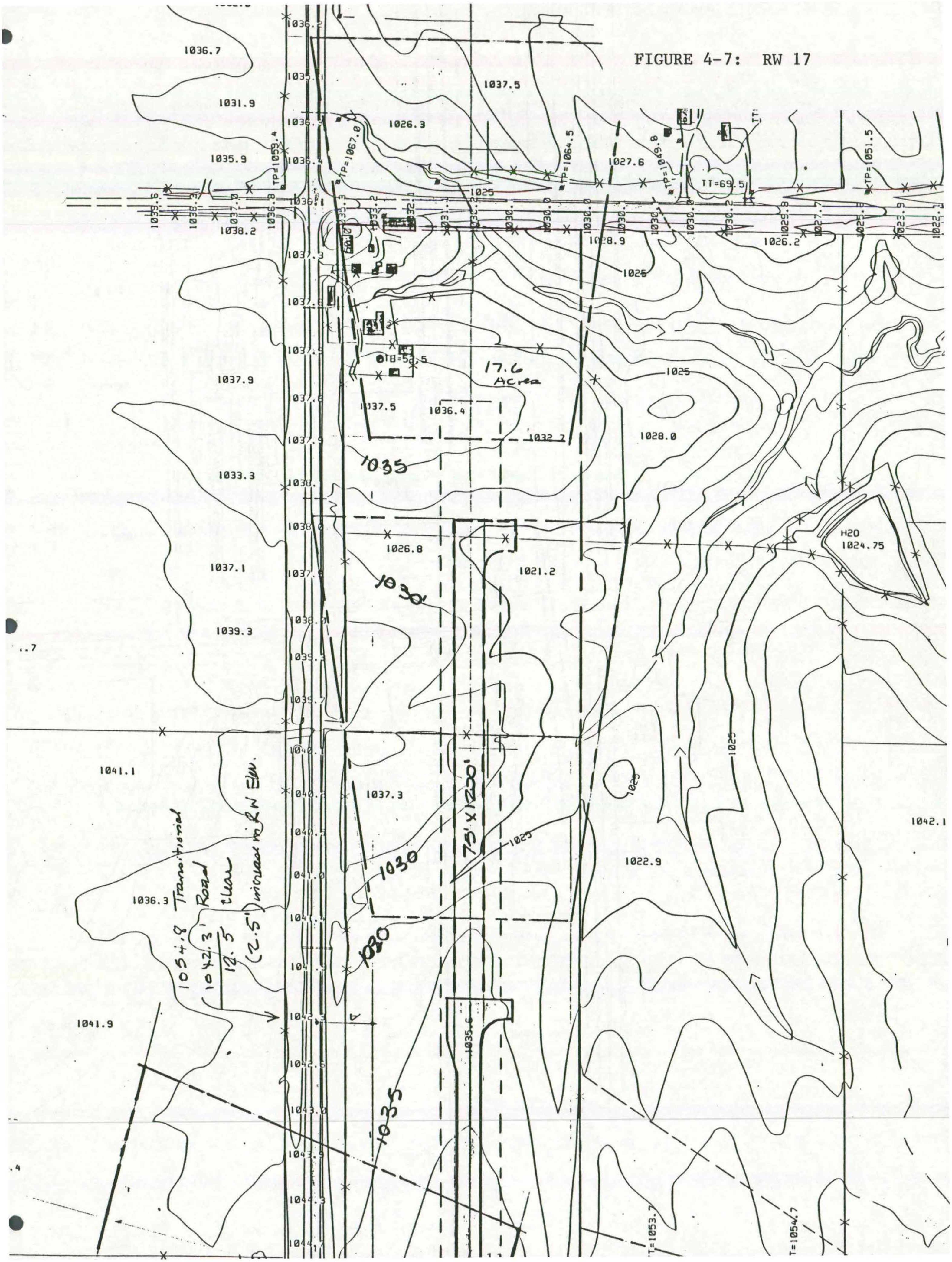


FIGURE 4-8: RW 35

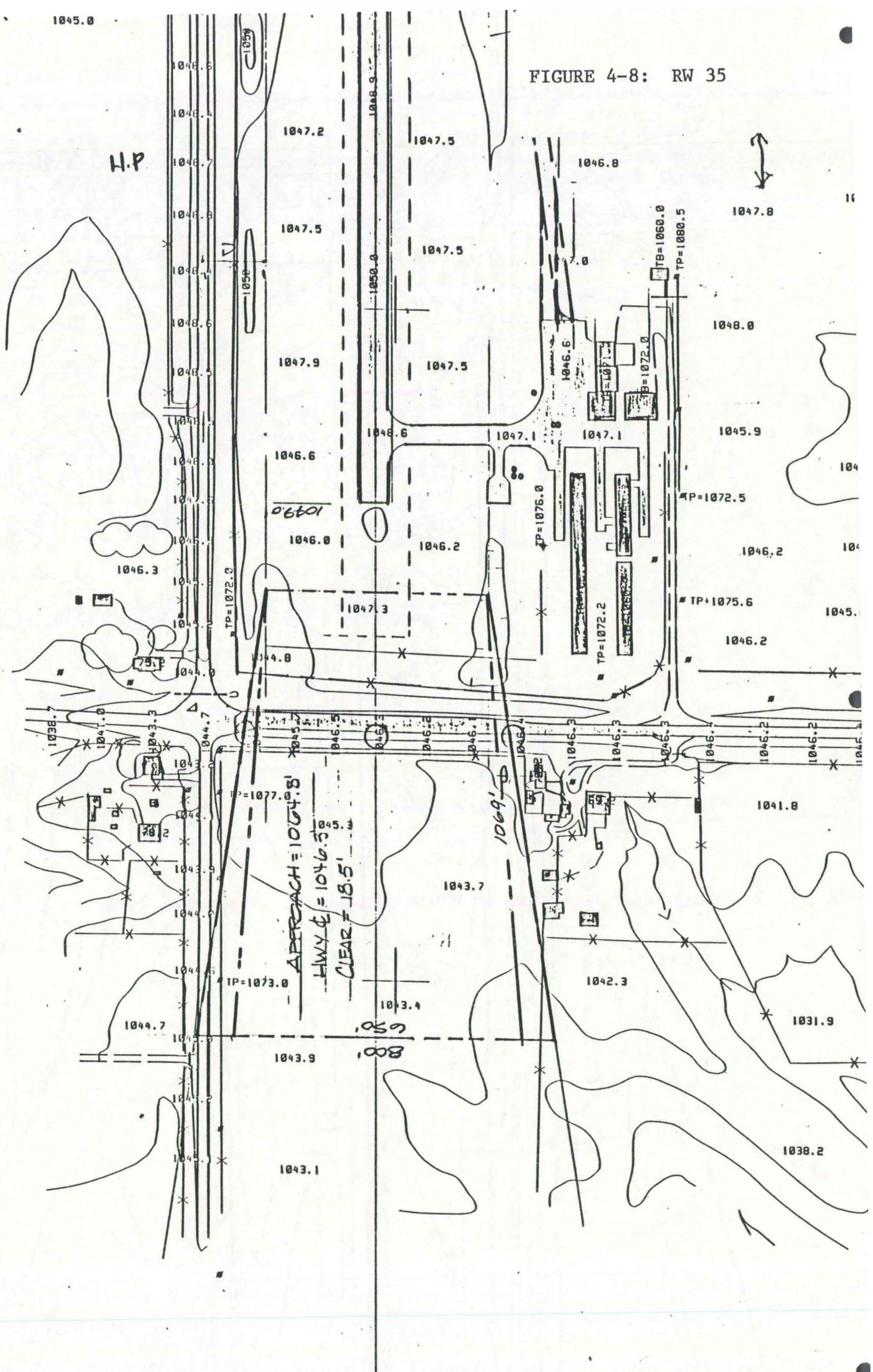


FIGURE 4-9: ALTERNATIVE E-1 - RELOCATED RW 17/35
Abandon existing RW 17/35; Construct new RW 17/35: 75' x 4000'
No Crosswind Runway

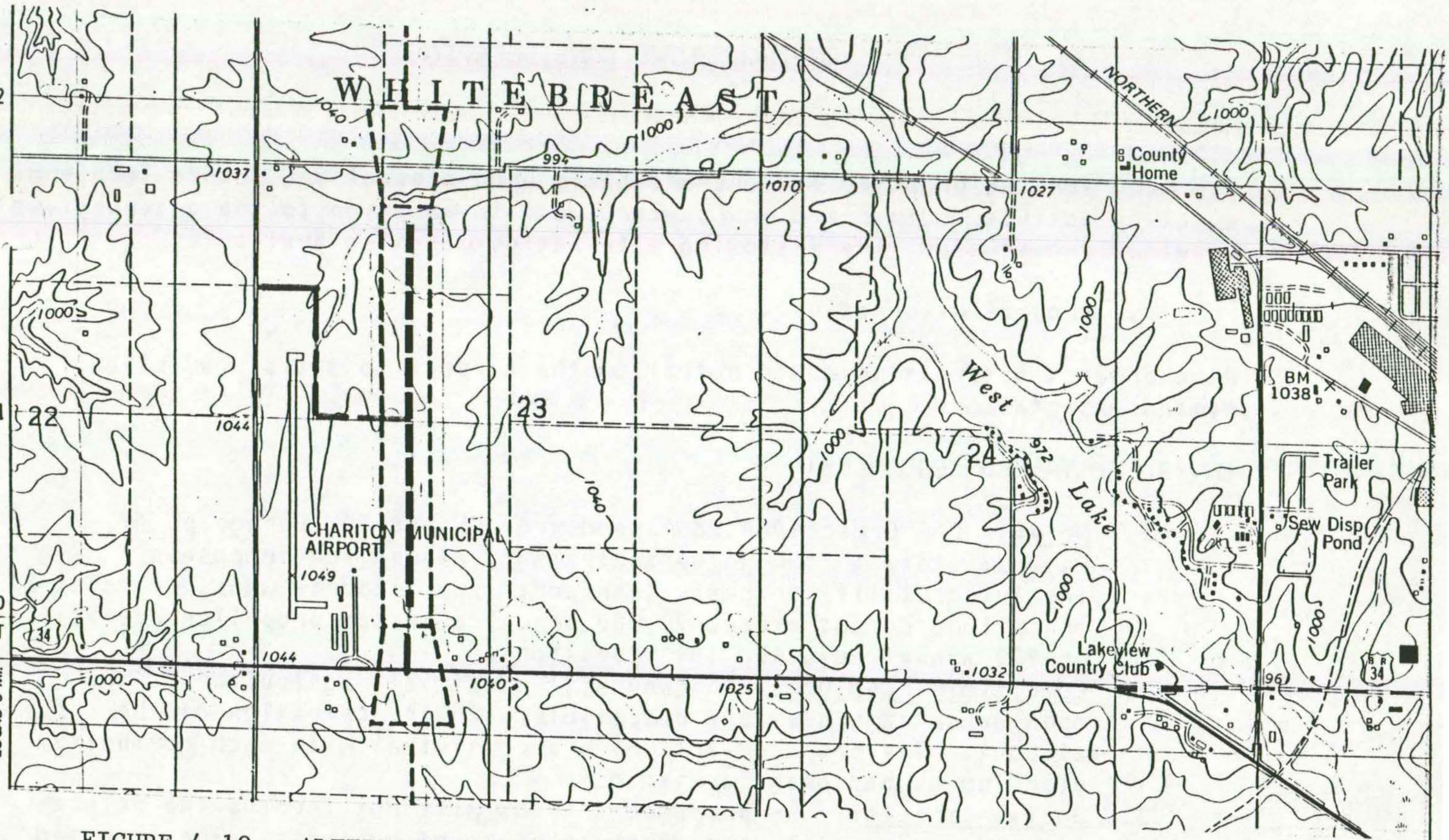
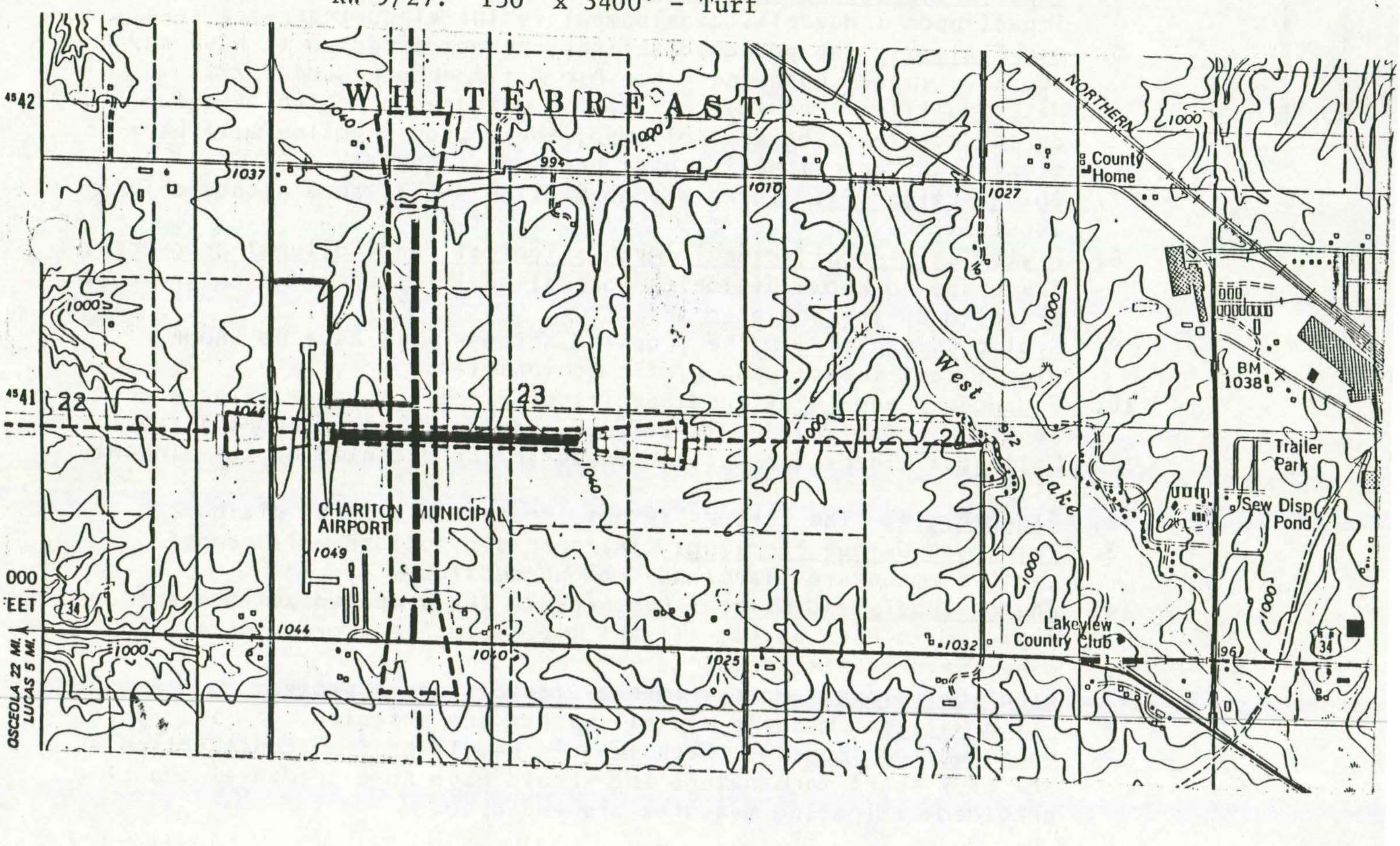


FIGURE 4-10: ALTERNATIVE E-2 - RELOCATED RW 17/35 AND TURF RW 9/27
Abandon existing RW 17/35; Construct new RW 17/35: 75' x 4000'
RW 9/27: 150' x 3400' - Turf



ENVIRONMENTAL CONSIDERATIONS

NEED:

The need for the proposed actions are based upon present and future levels of aviation activity summarized in Chapter Two. In addition to the alternatives previously discussed, the following alternative was also available:

1. Project Alternative

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

ENVIRONMENTAL CONSEQUENCES:

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

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

An environmental assessment will be required should FAA funding be utilized for land acquisition and/or runway construction. The cost of preparing the environmental assessment is an eligible item for FAA participation.

AIRPORT LAYOUT PLANS

CHAPTER FIVE

AIRPORT LAYOUT PLAN

Introduction

The Airport Layout Plan (ALP) consists of four drawings depicting existing conditions and future facility requirements. Because the plan represents a twenty-year time frame, it must be reviewed periodically and updated from time to time to keep the plan consistent with the changing times.

Airport Layout Plan Drawing

The airport layout drawing depicts existing airport facilities and airport property. An area on and adjacent to the airport site was mapped. The mapping was accomplished by aerial photography. Spot elevations and a countour interval of five foot are shown on the base map.

Ultimate airport development depicts the construction of a new runway, RW 10/28 as well as the reconstruction of extension of the existing runway, RW 18/36. The development of RW 10/28 as the primary runway was selected as the preferred alternative for reasons noted in Chapter Four.

Furthermore, it was decided to show the reconstruction and extension of RW 18/36 as a long term objective and/or as an alternative for ultimate development in the short term should obstacles to development of RW 10/28 be encountered that cannot be resolved in a prudent manner.

Consequently, the airport layout drawing assumes that RW 10/28 will be developed as the primary runway and that RW 18/36 will be maintained as the crosswind runway. Given the annual cost of maintaining a runway facility, consideration may be given to the concept of removing the asphalt surface course and subbase at some point in the future and maintaining RW 18/36 as a turf facility. The material removed would be used for construction and expansion of the apron areas.

RW 10/28 would be developed to an ultimate width and length of 75 and 4,000 feet, respectively. Additional length could be obtained on RW 28 providing a degree of flexibility not available on RW 17/35 without a road relocation. A turnaround would be constructed on RW 28.

Runway edge lights, threshold lights, REIL's and a PAPI system is proposed for installation on RW 10/28. A rotating beacon light is also recommended.

The planned approach to RW 10/28 is a non-precision approach and clear zones are depicted accordingly for each runway end. A non-precision instrument approach exists to RW 36 (RW 35). Clear zone requirements are shown for existing conditions as well as ultimate development.

Runway and airport data tables list pertinent information about the runways as well as the airport in general. The drawing also contains a wind rose and vicinity map. The drawing also depicts the building restriction line.

Airport Airspace Drawing

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

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

Clear Zone Drawing

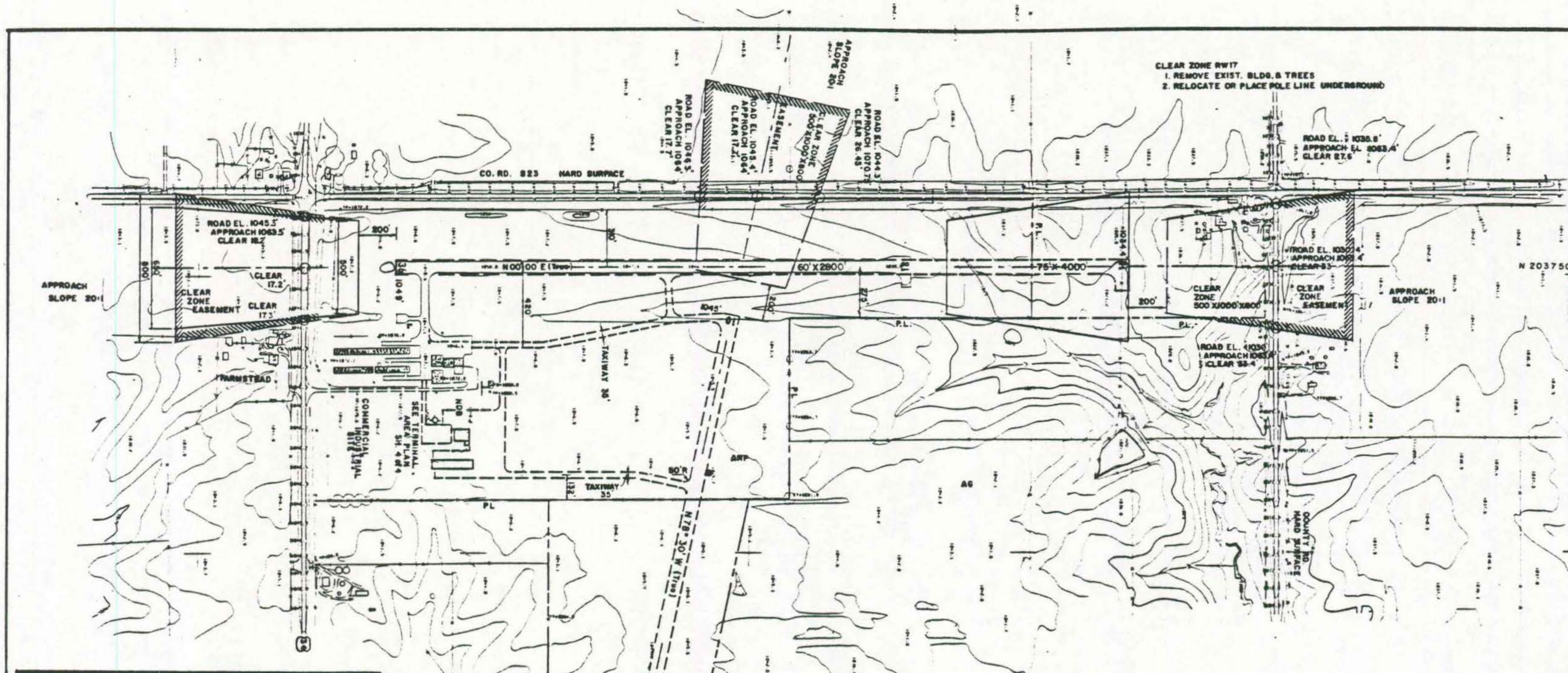
The clear zone drawing consists of large scale plan and profile views of the inner approach surface or clear zone for each end of each runway. The plan views, drawn to a scale of 1" = 200', for each runway and the respective clear zone at each runway end, along with pertinent ground features.

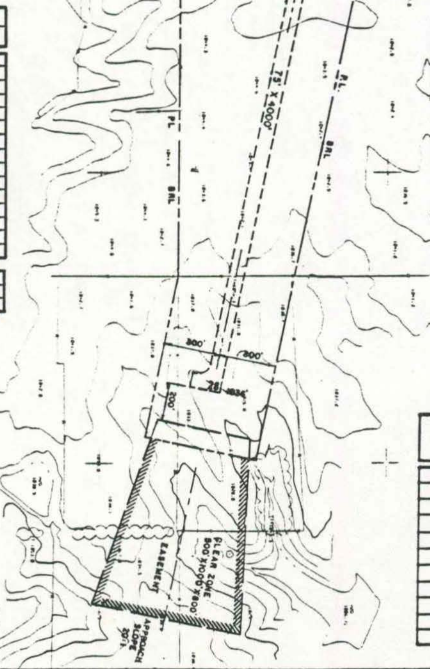
Directly below the plan views are drawn the respective profile views showing the planned approach slopes. The profiles extend a minimum of 1,000 feet beyond the runway ends at slopes of 20:1. Above-ground physical features, such as trees, power poles, roadways, buildings, etc. are identified in plan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

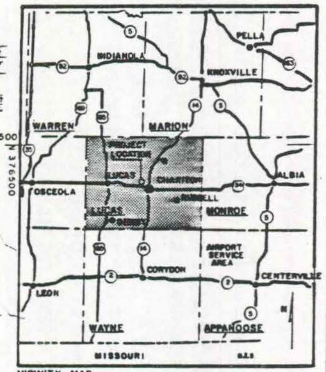
Terminal Area Drawing

The terminal area drawing shows the location of existing structures, taxiways, tiedown and apron areas as well as vehicle access and parking areas. The terminal area plan also shows proposed improvements.

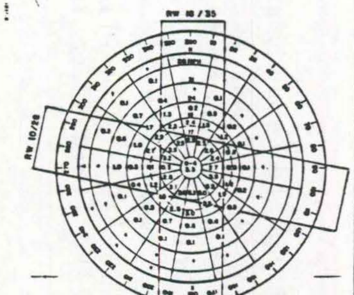
The terminal area plan should be updated to as built status each time an improvement is made. Utilities may be shown on the terminal area plan or on a separate drawing so that an accurate record is maintained. Subsurface drainage improvements are noted on the drawing. Since the information was obtained from secondary sources, field verification must be made at the time construction is contemplated. In fact, all underground utility location should be verified in the field prior to the commencement of any construction activities.







VICINITY MAP



LEGEND		
DESCRIPTION	EXISTING	ULTIMATE
AIRPORT PROPERTY LINE	PL	PL
ROTATING BEACON	◆	◇
CLEAR ZONE		
CLEAR ZONE EASEMENT	XXXXXXX/	/////////
BUILDING RESTRICTION LINE	BRL	BRL
FACILITY		
OVERHEAD LINES		
PRECISION APPROACH PATH INDICATOR (PAPI)		
RUNWAY IDENTIFIER LIGHTS (REIL)		
BUILDING - STRUCTURES		
RUNWAY VISIBILITY ZONE / LINE OF SIGHT	LOS	
ARP		⊙

AIRPORT CATEGORY	GU	GU
DESIGN GROUP (Wing Span Up to but not including)		II 79 Feet
APPROACH SPEED (Up to but not including)		121 Knots

AIRPORT DATA		
	EXISTING	FUTURE
AIRPORT ELEVATION	1050.0	1050.0
AIRPORT REFERENCE POINT ARP	LONG. 93°23'02"W LAT. 41°01'28"N	
MEAN MAX. TEMP.	87° F	87° F
% WIND COVERAGE	82.7 %	96.0 %
AIRPORT NAVIGATIONAL AIDS	NDB	NDB
AIRPORT ACREAGE	120	57 +/- RW10/28 177
FBO FACILITIES	YES	YES
FUEL	JET 80 100LL	SAME
BEACON - ROTATING	NO	YES
SEGMENTED CIRCLE	YES	YES
LIGHTED WIND INDICATOR	YES	YES
EASEMENTS		
TRAFFIC	LEFT	SAME

TRUE N

MAGNETIC DECLINATION
4° 30' 1962

TOPOGRAPHIC SURVEY

scale 300 600

CONTOUR INTERVAL= 5 FOOT

ELEVATIONS BASED ON MEAN SEA LEVEL

COMPILED BY STEREOPHOTOGRAMMETRIC
METHOD FROM AERIAL PHOTOGRAPHY

Date of Photography 12-10-87

N 369000
E 2042000

RUNWAY COORDINATES

RUNWAY	LAT.	LONG.
18	41° 01' 55" N	93° 23' 16" W
36	41° 01' 08" N	93° 23' 16" W
10	41° 01' 20" N	93° 23' 19" W
28	41° 01' 30" N	93° 24' 22" W

TRUE RUNWAY AZIMUTH

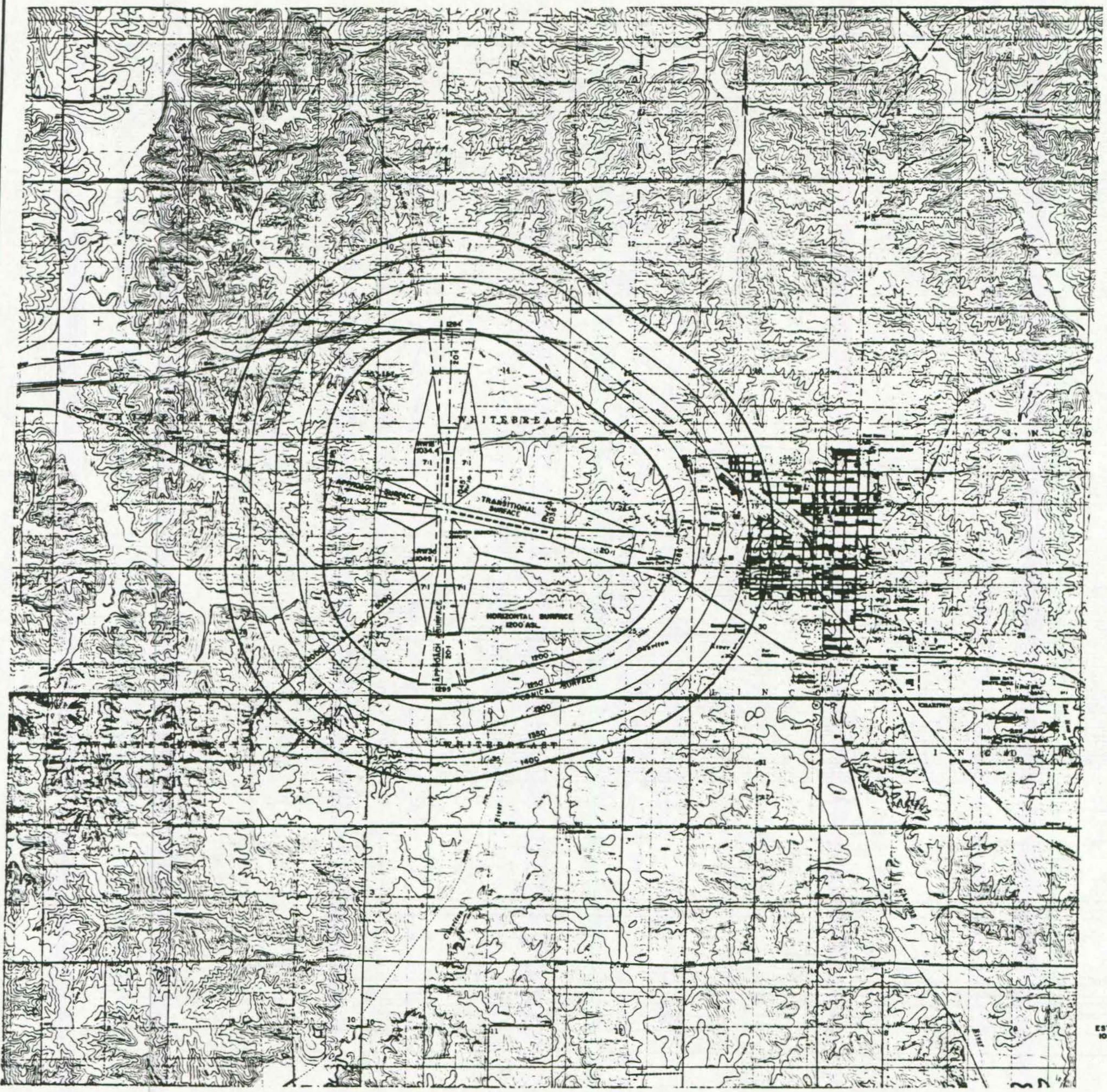
RW 18/36	180°
RW 10/28	101° 30'

RUNWAY DATA	RUNWAY 18/36		RUNWAY 10/28	
	EXISTING	FUTURE	EXISTING	FUTURE
EFFECTIVE RUNWAY GRADIENT	0.5 %	0.39 %		0.23 %
% WIND COVERAGE (12 MPH)	82.7 %			78.6 %
APPROACH (NON PRECISION INST. = NPI, VISUAL = V)	NPI / V	NPI		NPI
APPROACH SLOPE	20:1	20:1		20:1
RUNWAY LENGTH	2800'	4000'		4000'
RUNWAY WIDTH	60'	75'		75'
RW. PVMT. STRENGTH	4000 lb SW	12500 lb SW		12500 lb SW
RUNWAY SAFETY AREA (WIDTH, BEYOND THR.)	120', 240'	150', 300'		150', 300'
RUNWAY LIGHTING	MIRL	MIRL		MIRL
LANDING AIDS	SAVASI	PAPI		PAPI
RUNWAY MARKINGS	NPI	NPI		NPI

DATE		BY
REVISIONS		

CHARITON MUNICIPAL AIRPORT
CHARITON IOWA

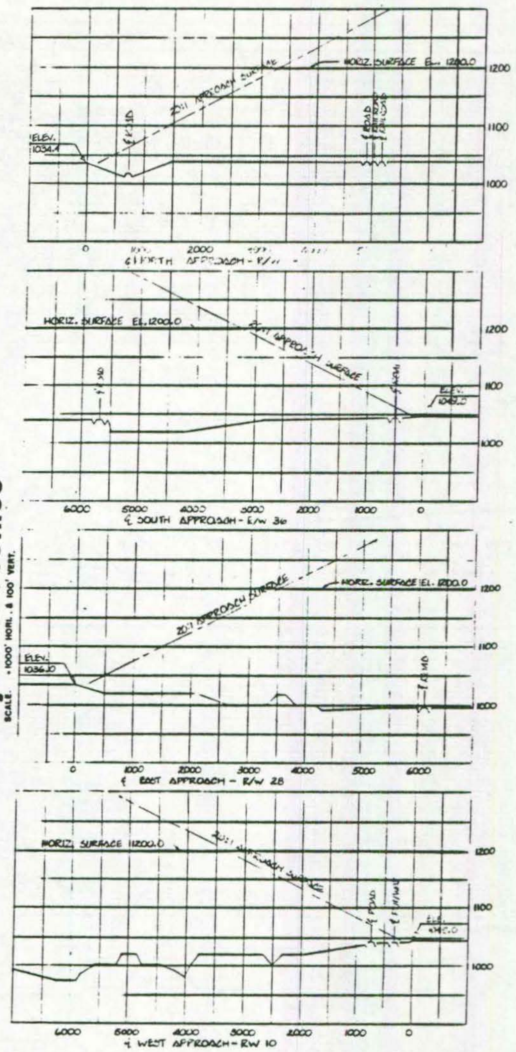
PROFESSIONAL DESIGN SERVICES P.O. BOX 191 ANKENY, IOWA 964-1229 SITE DESIGN PLANNING GRAPHICS	DESIGNED JLS	SCALE 1"=300'
	DRAWN JLS	DATE 3/31/88
	PROJECT NO. P-150	
AIRPORT LAYOUT PLAN	SHEET 1 OF 4	



ESTABLISHED AIRPORT ELEV. 1050 ASL

Runway End Profiles

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



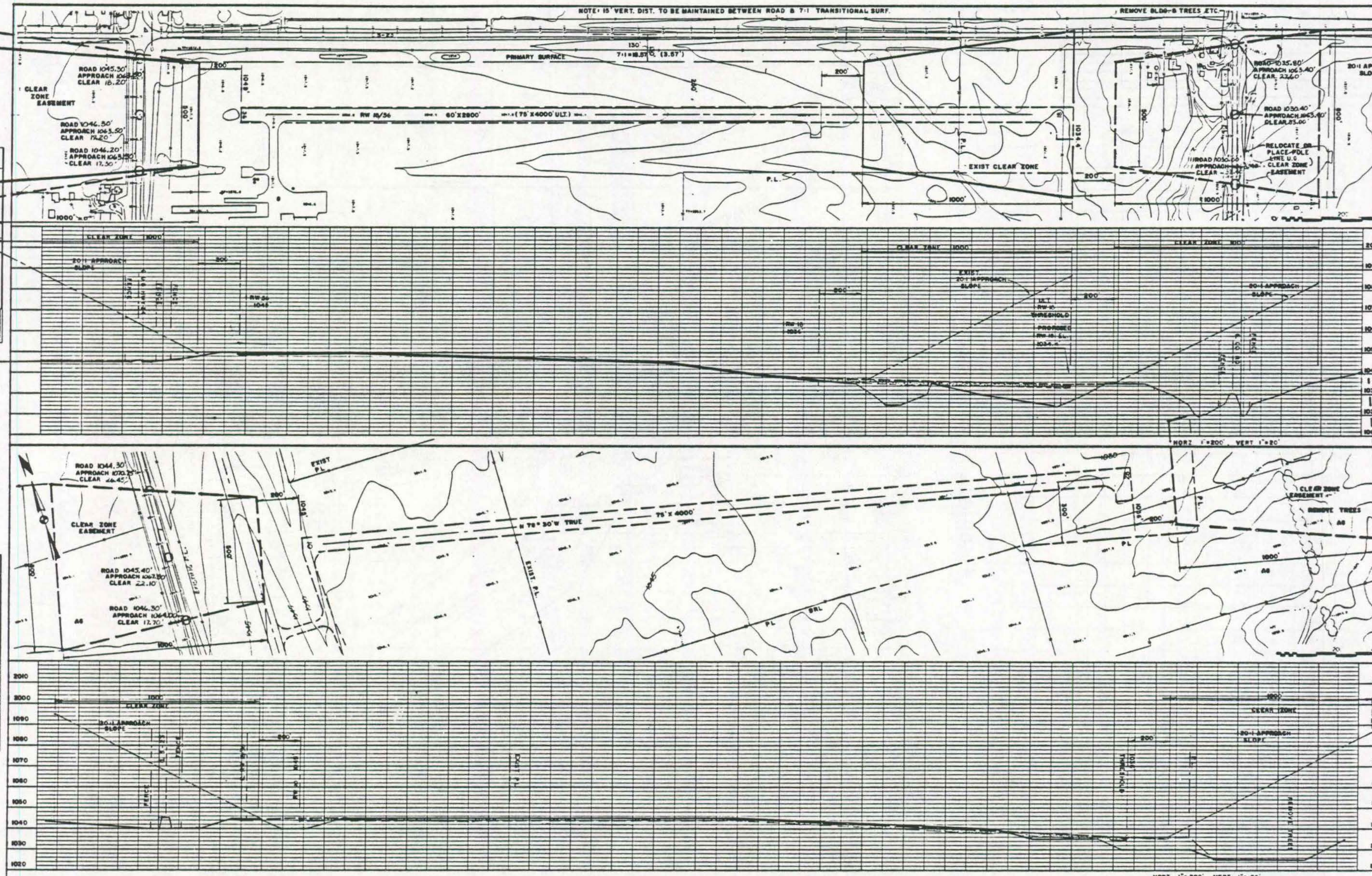
DATE	REVISIONS	BY

CHARITON MUNICIPAL AIRPORT
CHARITON IOWA

PROFESSIONAL DESIGN SERVICES
P.O. BOX 191 ANKENY, IOWA 964-1229
SITE DESIGN PLANNING GRAPHICS

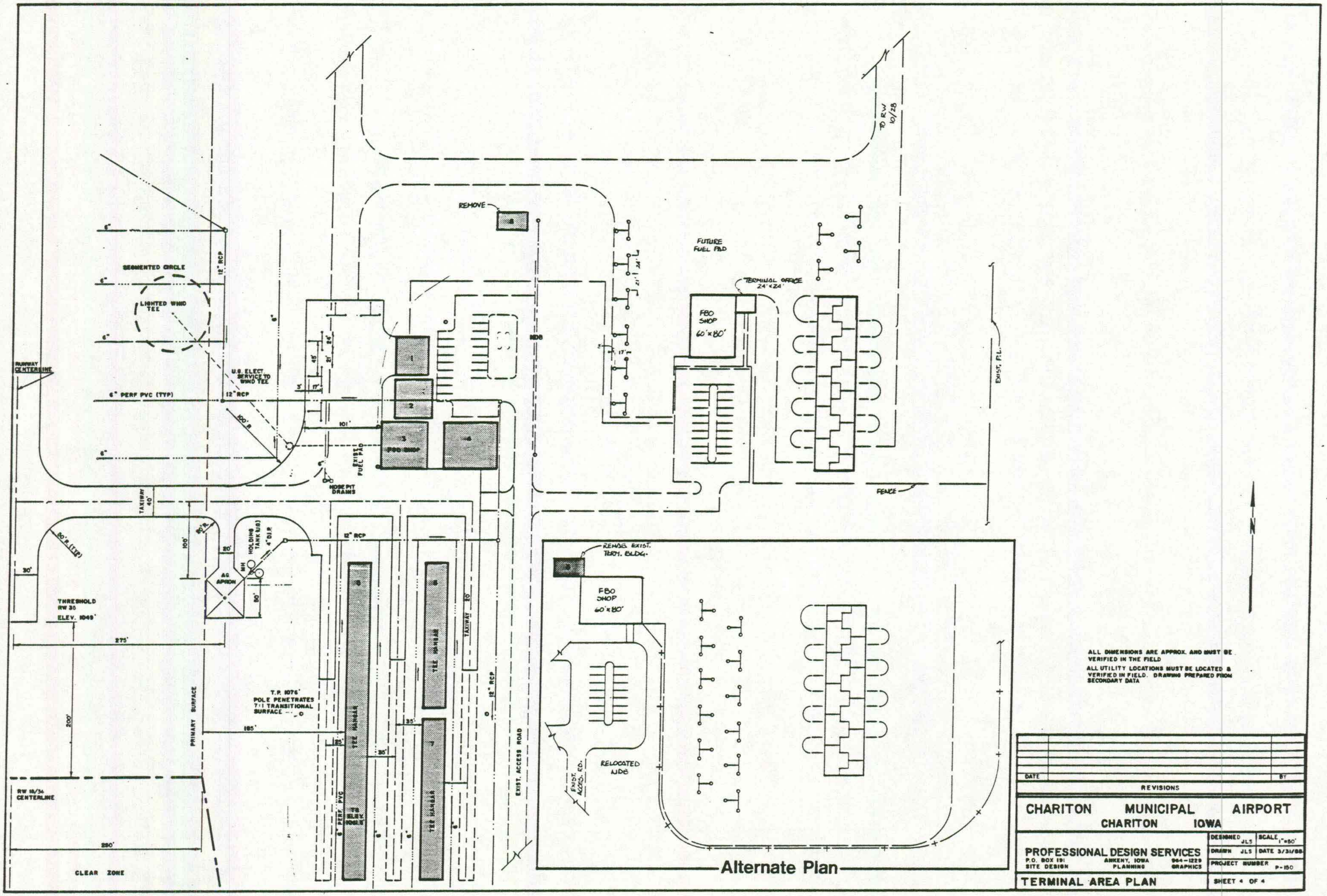
IMAGINARY SURFACES

DESIGNED JLS	SCALE 1"=2000'
DRAWN JLS	DATE 3/31/88
PROJECT NUMBER P-150	
SHEET 2 OF 4	



CLEAR ZONE PLAN & PROFILE CHARITON MUNICIPAL AIRPORT

SHEET 3 of 4


TO RW 10/28
REMOVE
FUTURE FUEL PAD
TERMINAL OFFICE 24'x24'
FBO SHOP 60'x80'
SEGMENTED CIRCLE
LIGHTED WIND TEE
12" RCP
6" PERF PVC (TYP)
U.G. ELECT SERVICE TO WIND TEE
RUNWAY CENTERLINE
EXIST. FUEL PAD
FBO SHOP
HOSE PIT DRAINS
NDB
EXIST. P.L.
FENCE
TAXIWAY 40'
80' R (TYP)
HOLDING TANK (U.G.)
4" D.I.P.
MH
AG APRON
THRESHOLD RW 35 ELEV. 1049'
275'
200'
PRIMARY SURFACE
T.P. 1076' POLE PENETRATES 7:1 TRANSITIONAL SURFACE
185'
TEE HANGAR
TAXIWAY 20'
EXIST. ACCESS ROAD
RW 18/36 CENTERLINE
250'
CLEAR ZONE
REHAB. EXIST. TERM. BLDG.
FBO SHOP 60'x80'
EXIST. ACCESS RD.
RELOCATED NDB
Alternate Plan
ALL DIMENSIONS ARE APPROX. AND MUST BE VERIFIED IN THE FIELD
ALL UTILITY LOCATIONS MUST BE LOCATED & VERIFIED IN FIELD. DRAWING PREPARED FROM SECONDARY DATA
N
DATE
BY
REVISIONS
CHARITON MUNICIPAL AIRPORT
CHARITON IOWA
PROFESSIONAL DESIGN SERVICES
P.O. BOX 191 ANKENY, IOWA 964-1229
SITE DESIGN PLANNING GRAPHICS
DESIGNED JLS
DRAWN JLS
SCALE 1"=80'
DATE 3/31/88
PROJECT NUMBER P-150
TERMINAL AREA PLAN
SHEET 4 OF 4

FEASIBILITY AND IMPLEMENTATIONS

CHAPTER SIX

DEVELOPMENT SCHEDULE

Introduction

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

1. Phase One: 1988 - 1992
2. Phase Two: 1993 - 1997
3. Phase Three: 1998 - 2007

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

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

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

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

PHASE ONE: 1988 - 1992

Within Phase One, the first development project proposed is land acquisition in fee for RW 10/28. Easements for that area of the clear zone extending beyond airport property would also be obtained within the initial development project. Approximately 57 acres of land would be acquired in fee with and an additional 24 acres in easement acquired for clear zone protection.

The second project in Phase One involves grading and drainage requirements necessary for the construction of the primary runway and connecting taxiway. The third project includes final subgrade preparation and paving of RW 10/28 and taxiway. The pavement areas would consist of a four (4) inch granular subbase and five (5) inch P.C.C. paving. The paved areas would also be marked within this project. Subsurface drainage would be provided along RW 10/28.

The fourth project provides for the installation of medium intensity runway edge and threshold lights on RW 10/28. A precision approach path indicator (PAPI) and runway end identifier lights (REIL) would be installed. Installation of a rotating beacon light would also be a part of the fourth project.

A non-precision instrument approach is planned for each runway. Implementation of Phase One projects will provide the Chariton Municipal Airport with a new primary runway 75 feet in width and 4,000 feet in length.

Development Summary - Phase One: 1988 - 1992

1. Land Acquisition and Fencing
    - A. Fee Title (RW 10/28) 57 acres +/-
    - B. Perimeter Fencing 7130 feet
    - C. Clear Zone Protection 24 acres +/-
2. RW 10/28 Improvements
    - A. 5 inch P.C.C. - 75' x 4,000'; Turnaround
    - B. Medium Intensity Runway Edge Lights
    - C. Precision Approach Path Indicator, Runway End Identifier Lights
    - D. Pavement Markings
3. Connecting Taxiway
    - A. 5 inch P.C.C. - 35' x 1,905'
    - B. Taxiway Edge Lights, Marking

PHASE TWO: 1993 - 1997

Phase Two would include the redevelopment of the present terminal area. Due in part to the present investment in and the location of existing hangar facilities, relocation of the FBO shop and other associated improvements would extend into Phase Three. In addition, demand for improved FBO facilities within the the 5 to 10 year time frame should be considered at that time.

Terminal area improvements would be divided into two stages of which the first would be implemented in Phase Two and the second in Phase Three. Phase Two activities would contemplate the construction of a new FBO shop, 60′ x 80′. The existing shop would be used for aircraft storage.

The present unused terminal building, referenced as #8 on the terminal area plan, should be demolished. A new terminal building containing 576 square feet is proposed for construction as a functional part of the FBO shop.

An apron area containing aarea for six aircraft tiedowns is also proposed. The apron area, containing 4,558 square yards, would provide airplane queuing space for refueling. Relocation of the underground fuel storage tanks and dispenser may also be required.

Phase Two activities are intended to provide the airport with additional tiedown space as well as aircraft storage space for Whitfield Flying Service. The latter would be accomplished by using the existing FBO shop for storage and relocating FBO activities.

Development Summary - Phase Two: 1993 - 1997

1. Apron Improvements
   - A. 5 inch P.C.C.; 4,588 square yards
   - B. Aircraft tiedowns - six stalls
2. FBO Shop/Conventional Hangar/Terminal Office
   - A. 60′ x 80′; 4,800 square feet
   - B. 24′ x 24′; 576 square feet

PHASE THREE: 1998 - 2007

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

Given the notion that most rural general aviation airports will realistically support only one hard surface runway, it is conceivable that no improvements will be made to RW 18/36 should RW 10/28 be constructed to the ultimate length of 4,000 feet.

The extent of RW 18/36 improvements beyond a turf runway may consist of a hard surface runway no less than 80 percent of the primary runway length. A partial parallel taxiway would also be constructed from the new taxiway construction to a point where it would intersect with RW 10.

Also within Phase Three, continued expansion of the terminal area may be contemplated to include an additional four tiedowns and the construction of a ten-unit tee hangar.

TABLE 6-1: DEVELOPMENT COSTS

PHASE ONE: 1988 - 1992

ITEM	DESCRIPTION	COST
I	Land Acquisition (RW 10/28)	
	1. Land in Fee	$ 57,400
	2. Land in Easement	11,900
	3. Fencing	12,478
	4. Appraisals	3,000
	5. Land Survey	7,500
	6. Land Negotiations	2,400
	7. Legal, Recording, and Administrative	2,000
	8. Contingencies	9,668
	SUBTOTAL	$ 106,346
II	Runway Grading (RW 10/28)	
	1. Excavation and Grading	$ 65,000
	2. Seeding and Fertilizing	19,500
	3. Drainage Structures	10,000
	4. Contingencies	9,450
	5. Engineering, Legal, and Administrative	16,065
	SUBTOTAL	$ 120,015
III	Runway Paving (RW 10/28)	
	1. Subgrade Preparation	$ 35,005
	2. 4" Granular Base	87,513
	3. 5" P.C.C.	511,560
	4. Shouldering	5,000
	5. RW Markings (NPI)	9,800
	6. Subdrains	48,000
	7. Contingencies	69,688
	8. Engineering, Legal, and Administrative	118,469
	SUBTOTAL	885,035
IV	Lighting and Navigational Aids (RW 10/28)	
	1. Edge and Threshold Light System (MIRL)	$ 40,000
	2. PAPI	14,000
	3. REIL's	7,000
	4. Contingencies	6,100
	5. Engineering, Legal, and Administrative	10,370
	SUBTOTAL	$ 77,470
V	Connecting Taxiway	
	1. Excavation and Grading	$ 11,278
	2. Subgrade Preparation	7,766
	3. 4" Granular Base	19,415
	4. 5" P.C.C.	116,490
	5. Markings	15,535
	6. Contingencies	17,048
	7. Engineering, Legal, and Administrative	28,982
	SUBTOTAL	$ 216,514

TABLE 6-1: DEVELOPMENT COSTS, cont.

VI	Taxiway Lighting	
	1. Medium Intensity	$ 19,050
	2. Contingencies	1,905
	3. Engineering, Legal, and Administrative	3,239
	SUBTOTAL	$ 24,194
	TOTAL PHASE ONE	$1,429,574
PHASE TWO:	1993 - 1997	
I	Apron Improvements	
	1. Miscellaneous Grading and Drainage	$ 9,000
	2. Subgrade Preparation	4,558
	3. 4" Granular Base	11,395
	4. 5" P.C.C.	68,370
	5. Tiedowns - 6 total	900
	6. Contingencies	9,422
	7. Engineering, Legal, and Administrative	16,018
	SUBTOTAL	$ 119,663
II	FBO Shop / Terminal	
	1. Conventional Hangar (60′ x 80′)	$ 156,210
	2. Terminal Office / Lounge (24′ x 24′)	28,800
	SUBTOTAL	$ 185,010
III	Underground Fuel Storage	
	1. Consideration may be given to relocation of existing storage capacity in Phase Two or Phase Three should existing facilities need to be replaced. ($10,000/5,000 gallon tank)	N/C
IV	Vehicle Parking	
	1. Excavation, Grading, Drainage	$ 10,143
	2. Rock - 4"	7,668
	3. Contingencies	1,781
	4. Engineering, Legal and Administrative	3,028
	SUBTOTAL	$ 22,620
V	Miscellaneous Construction	
	1. Apron Lighting	$ 3,000
	2. Sidewalk - 4"	6,800
	3. Fencing - Security	5,000
	4. Septic Tank	3,000
	5. Taxiway Improvement - Existing Hangars	10,000
	6. Contingencies	2,780
	7. Engineering, Legal, and Administrative	4,726
	SUBTOTAL	$ 35,306
	TOTAL PHASE TWO	$ 362,599

TABLE 6-1: DEVELOPMENT COSTS, cont.

PHASE THREE: 1998 - 2007

I	Land Acquisition (RW 18/36)			
	1.	Land in Fee (House/Outbuildings)	$	42,000
	2.	Land in Easement (RW 17 = 8.3)		
		(RW 35 = 12.6)		10,450
	3.	Fencing		5,495
	4.	Appraisals		2,500
	5.	Land Survey		5,000
	6.	Land Negotiations		1,200
	7.	Legal, Recording, Administrative		1,000
	8.	Contingencies		6,765
		SUBTOTAL	$	74,410
II	Runway Grading (RW 18/36)			
	1.	Place Pole Line U.G.	$	15,000
	2.	Remove Buildings/Trees Clear Zone		3,500
	3.	Excavating and Grading		120,000
	4.	Seeding and Fertilizing		19,500
	5.	Drainage Structure		20,000
	6.	Contingencies		17,800
	7.	Engineering, Legal, and Administrative		30,260
		SUBTOTAL	$	226,060
III	Runway Paving (18/36)			
	1.	Subgrade Preparation	$	35,005
	2.	4" Granular Base		87,513
	3.	5" P.C.C.		511,560
	4.	Shouldering		5,000
	5.	RW Marking (NPI)		9,800
	6.	Subdrains		48,000
	7.	Contingencies		69,688
	8.	Engineering, Legal, and Administrative		118,469
		SUBTOTAL	$	885,035
IV	Lighting and Navigational Aids (RW 18/36)			
	1.	Edge and Threshold Light System	$	40,000
	2.	PAPI		14,000
	3.	REIL's		7,000
	4.	Contingencies		6,100
	5.	Engineering, Legal, and Administrative		10,370
		SUBTOTAL	$	77,470
V	Apron			
	1.	Subgrade Preparation	$	2,893
	2.	4" Granular Base		7,233
	3.	5" P.C.C.		43,395
	4.	Grading/Drainage		5,786
	5.	Tiedowns		600
	6.	Contingencies		5,991
	7.	Engineering, Legal, and Administrative		10,184
		SUBTOTAL	$	76,082

TABLE 6-1: DEVELOPMENT COSTS, cont.

VI	Hangar		
	1. 10-unit Tee	$	195,700
VII	Taxiway - Connecting (Both)		
	1. Excavation and Grading	$	2,734
	2. Subgrade Preparation		1,857
	3. 4" Granular Base		4,643
	4. 5" P.C.C.		27,855
	5. Marking		400
	6. Contingencies		3,749
	7. Engineering, Legal, and Administrative		6,373
	SUBTOTAL	$	47,611
VIII	Taxiway - Connecting (RW 17/35)		
	1. Excavation and Grading	$	2,131
	2. Subgrade Preparation		1,580
	3. 4" Granular Base		3,950
	4. 5" P.C.C.		23,700
	5. Marking		300
	6. Contingencies		3,166
	7. Engineering, Legal, and Administrative		5,382
	SUBTOTAL		40,209

SOURCE: PDS, 1988

The total estimated capital cost to implement Phase One and Two is 1,792,173 dollars. In addition to the capital costs associated with the construction of airport facilities, the airport owner will also incur costs associated with the operation and maintenance of those facilities.

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

Private Sector Investment

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

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

The proposed development strategy assumes that the private sector will construct the tee-hangar facilities and taxiway pavement within twenty (20) feet of the hangar. The private sector would be encouraged to construct a conventional hangar in Phase Two and a ten-unit tee-hangar in Phase Three.
1. Tee-hangar construction, 10 units $198,100 (Phase Three)

Private sector investment within the first two phases is expected to be minimal assuming that the FBO shop is constructed by the airport owner. Private sector investment would total 198,100 dollars in Phase Three.

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

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

Airport Maintenance

The primary emphasis of the Airport Development Plan is placed upon identifying those facility needs required to bring the airport to design standards and statisfy aviation demand activity. However, once the facility component is constructed, maintenance becomes a major emphasis. Not only should the public investment in facilities be enhanced, those actions required to maintain a high degree of safety must be undertaken and hazardous conditions corrected immediately. A daily airport inspection program should be established and deficiencies noted. This action should be undertaken by the airport manager with deficiencies reported to the Airport Board or Committee for correction by the City.

Annual O & M Costs

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

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

An annual O & M budget of 70,000 dollars may be required to satisfy annual operating expenses. There are a number of variables of which the salary paid to the airport manager and/or FBO subsidy required are the more salient. Many of the smaller general airports have difficulty in attracting and maintaining an FBO without providing some subsidy. Most often, the FBO manages the daily operations of the airport in return for use of the terminal office and conventional hangar(s). In some situations, a dwelling unit is located on the airport and occupied by the FBO.

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

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

The FBO contract should identify specific services to be provided.

- Hours of operation
- Aircraft maintenance
- Pilot training

Funding

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

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

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

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

1. Private Contribution, Local Development Corporation
2. General Obligation Bonds
3. Revenue Bonds
4. Annual levy not to exceed 27 cents per 1,000 dollars of assessed valuation (Airport Authority)
5. Other public entities (28 E Agreement)

Airport generated revenue is used to satisfy annual O & M expenditures. Revenue is generated from the following sources:

1. Hangar rent
2. Gasoline sales
3. Farm
4. Misc. sources

Within the past five years, an average annual subsidy of 13,000 dollars was required in addition to airport generated revenues in order to meet annual O & M expenditures. Historic airport revenues and expenditures were summarized in Tables 1-17 and 1-18.

STATE AND FEDERAL ASSISTANCE

Federal Assistance

The Federal Airport Act of 1946 created the Federal-Aid Airport Program (FAAP) and a National Airport Plan (NAP). The Airport and Airway Development Act of 1970 repealed FAAP and NAF programs and established the Airport Development Aid program (ADAP) and National Airport System Plan (NASF). Public law 97-24B (Airport and Airway Improvement Act of 1982) required the publication of a National Plan of Integrated Airport Systems (NPIAS) by September 3, 1984 and created the Airport Improvement Program (AIP). Airports in Iowa have benefited from the various Federal airport assistance programs since FAAP was created in 1946.

The Airport and Airway Trust Fund created in 1970 as a repository for the tax monies paid by aviation users supports Federal programs. The primary source of revenue is generated by a eight (8) percent tax on passenger tickets. Other sources include a tax on freightway bills, international departures, and general aviation fuel. The Airport and Airway Safety and Capacity Expansion Act of 1987 set annual funding ceilings for each year through 1992.

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

State Assistance

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

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

1. Fuel
   A. Aviation gas tax - 8 cents per gallon
   B. Jet fuel tax - 3 cents per gallon
2. Aircraft registration fees
   A. Commercial: $35/aircraft
   B. General Aviation:
      Year 1 - 1.5% of list price
      Year 2 - 75% of first year
      Year 3 - 50% of first year
      Year 4 - 25% of first year
      minimum $15/aircraft

The amount of money that will be available from Federal sources is estimated at 2.1 million dollars and 1.7 million from State sources.

STRATEGY FOR DEVELOPMENT

Project Implementation

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

TABLE 6-2: PHASE ONE DEVELOPMENT STRATEGY

A. PUBLIC SECTOR	LOCAL	STATE	FEDERAL	TOTAL
1. Land Acquisition RW 10/28	$ 31,904	$ 74,442	$ 0	$ 106,346
2. Grading RW 10/28	36,005	84,011	0	120,015
3. Paving RW 10/28	88,503	0	796,532	885,035
4. Lighting RW 10/28	23,241	54,229	0	77,470
5. Connecting Taxiway	19,729	0	177,564	197,293
6. Lighting Taxiway	7,258	16,936	0	24,194
TOTAL	$206,640	$229,618	$974,096	$1,429,574

B. PRIVATE SECTOR

1. None

SOURCE: PDS, 1988

Public sector costs within Phase One is expected to total 1,429,574 dollars. The costs include a ten percent contingency and are based upon current dollars. The scenario assumes that a grant-in-aid totaling 974,096 dollars in Federal assistance would be obtained over the five year planning period. An additional 229,618 dollars would be applied for through IDOT. The City of Chariton would be obligated to provide the required match, 206,640 dollars.

The above scenario assumes the construction of a new primary runway, RW 10/28. Should RW 18/36 be developed as the primary runway rather than RW 10/28, the development scenario and associated costs would be similar. RW 18/36 would then be placed in Phase Three as a development item.

Phase Two projects concern terminal area expansion. The connecting taxiway proposed for construction in Phase One would provide access from the existing apron to the proposed apron area as well as RW 10/28 and RW 18/36.

TABLE 6-3: PHASE TWO DEVELOPMENT STRATEGY

A. PUBLIC SECTOR	LOCAL	STATE	FEDERAL	TOTAL
1. Apron	$ 35,899	$83,764	$ 0	$119,663
2. FBO Shop/Terminal	185,010	0	0	185,010
3. Vehicle Parking	22,620	0	0	22,620
4. Misc. Construction	35,306	0	0	35,306
TOTAL	$278,835	$83,764	$ 0	$362,599

B. PRIVATE SECTOR

1. None

SOURCE: PDS, 1988

Total public expenditures in Phase Two are expected to total $362,599 dollars of which 185,010 dollars is attributed to the construction of a new FBO shop and terminal building. The local share in this scenario would total 278,835 dollars. Assistance from an IDOT grant-in-aid would total 83,764 dollars.

MULTI-JURISDICTIONAL SUPPORT

Airport Ownership

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

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

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

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

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

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

Incorporated Communities

1. Chariton
2. Derby
3. Lucas
4. Russell
5. Williamson

County

6. Lucas

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

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

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

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

<u>Authority Creation</u>

Step 1 - Member Municipality Procedures

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

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

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

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

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

    D. Name of Authority.

    E. Place, date, and time of hearing.

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

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

Step 2 - Committee Procedures

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

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

   A. The Committee shall elect one of its members as a chairperson and another as secretary. Each officer shall serve a two (2) year term.

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

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

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

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

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

Step 3 - Board

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

1. The Board shall also elect from its membership a chairperson, secretary, and treasurer. Each officer shall be bonded and serve a two (2) year term.

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

The foregoing discussion summarizes the steps involved to create an airport authority. The authority, as previously indicated, is a means by which to obtain participation by those public entities that are located within a geographic area served by the airport.

For purposes of discussion, the taxable valuation for those entities that may wish to participate in the Airport Authority is summarized in the following table. The taxable valuation as of January 1, 1988 for Lucas County was reported at 177,368,078 dollars.

TABLE 6-4: TAXABLE VALUATIONS, JANUARY 1, 1988

	100% Value	Net Valuation - Total Taxable Value
1. Corporation		
Chariton	$ 81,974,125	$ 71,247,215
Derby	1,067,294	866,746
Lucas	2,495,869	2,162,172
Russell	6,194,036	5,083,726
Williamson	1,260,284	1,008,163
Subtotal - Corporation	$ 92,991,608	$ 80,368,163
2. Lucas County		
County Wide Total	$196,870,617	$177,368,078
Rural Only	$103,879,009	$ 96,999,915

SOURCE: LUCAS COUNTY ASSESSOR, January 11, 1988

Incorporated cities accounted for 45.3 percent of the total county taxable valuation. Of the incorporated total, the City of Chariton accounted for 88.7 percent of the total 80,368,163 dollars. The rural portion, or that taxable valuation outside the incorporated cities, was placed at 96,999,915 dollars as of January 1, 1988; representing 54.7 percent of the total.

The Airport Authority could levy a tax up to 27 cents per 1,000 dollars of taxable value within those entities that chose to participate in the Authority. Consequently, the airport would have an opportunity to derive its support from those public entities located within the primary airport service area. For purposes of discussion, the Airport Authority membership is limited to Lucas County, although as noted in Chapter One, the service area does extend into Wayne County. To illustrate the flexibility of the Airport Authority, three scenarios were developed. Scenario One assumes participation by all public entities within Lucas County.

SCENARIO ONE: ALL INCORPORATED CITIES AND LUCAS COUNTY

Lucas County	$ 96,999,915
Incorporated Cities	80,368,163
TOTAL TAXABLE VALUATION	$177,368,078

$177,368,078 - $1,000 = $177,368.078
(For Illustration Only)

27 Cents / $1,000 Taxable Valuation	= 47,889
25 " " " "	= 44,342
23 " " " "	= 40,795
21 " " " "	= 37,247
19 " " " "	= 33,640
17 " " " "	= 30,153
15 " " " "	= 26,605
13 " " " "	= 23,058
11 " " " "	= 19,510
9 " " " "	= 15,963
7 " " " "	= 12,416
5 " " " "	= 8,868
3 " " " "	= 5,321
1 " " " "	= 1,774

Assuming that all entities participated in the Airport Authority, the Authority would have the capability of generating in excess of 47,000 dollars annually. Tables 1-17 and 1-18 summarized historic sources of revenues and expenditures. Over a five-year period, the airport required an average annual subsidy of approximately 13,000 dollars. In other words, O & M expenditures exceed revenue by 13,000 dollars, annually. It should also be noted that at the present time, there is no outstanding debt for airport improvements (1). From casual observation, it is also evident that some of the maintenance has been deferred. Consequently, the Airport Authority would be structured so as to provide an increased level of annual maintenance. In addition, revenue would be used to provide for debt service of captial projects.

In addition to addressing the operating deficit of $13,000 annually, it is recommended that an additional 6,000 dollars be added to the O & M budget to allow for increased maintenance efforts. Consequently, a tax levy of eleven (11) cents would be required.

Debt service on capital projects will vary. Assuming a local obligation of 200,000 dollars in capital expenditures will be required to implement the construction of a new primary runway, an additional 16 cents would be required over a ten (10) year period for debt service. (The 16 cents is based on an amount of 200,000 dollars at an interest rate of 8 percent over a ten-year period.) Other methods of structuring the debt service may be used. For example, the period of debt service may extend over a longer period of time. However, for purposes of illustration, the above is offered for discussion.

The second scenario assumes that only Lucas County and the City of Chariton participates in the Airport Authority. The O & M budget for the airport as well as the local share of capital costs would remain essentially unchanged regardless of the ownership. The revenue generating capability of the Aiprort Authority would be reduced by five (5) percent.

SCENARIO TWO: CITY OF CHARITON AND LUCAS COUNTY

Lucas County	$ 96,999,915
City of Chariton	71,247,215
TOTAL TAXABLE VALUATION	$168,247,130

$168,247,130 - $1,000 = 168,247.13
(For Illustration Only)

27 Cents /	$1,000	Taxable	Valuation	=	45,427
25 "	"	"	"	=	42,062
23 "	"	"	"	=	38,697
21 "	"	"	"	=	35,332
19 "	"	"	"	=	31,967
17 "	"	"	"	=	28,602
15 "	"	"	"	=	25,237
13 "	"	"	"	=	21,872
11 "	"	"	"	=	18,507
9 "	"	"	"	=	15,142
7 "	"	"	"	=	11,777
5 "	"	"	"	=	8,412
3 "	"	"	"	=	5,047
1 "	"	"	"	=	1,682

(1) SOURCE: City Manager, September, 1987

As noted, the revenue generating ability of the Airport Authority is only slightly reduced assuming participation by the City of Chariton and Lucas County and not the remaining four (4) incorporated cities.

Scenario three assumes participation by all incorporated cities and Lucas County with different levy amounts applied to each entity. The third scenario was developed to illustrate the flexibility inherent in the Authority.

For example, the Winterset/Madison County Authority provides for the maximum levy by the City of Winterset. The revenue produced by the City of Winterset is matched by the County. In this scenario the City of Chariton could generate 19,237 dollars based upon the maximum levy of 27 cents per 1,000 dollars taxable valuation. To generate the same revenue amount, Lucas County would require a levy of 19.8 cents per 1,000 dollars.

The proposed Airport Authority involving Polk County and the Cities of Ankeny, Altoona, and Bondurant have devised a strategy to allocate its obligations based upon the percent of commercial/industrial tax base within each of the participating entities.

The scenarios that could be developed are unlimited. The levy could be extended for a specific number of years. In the Winterset/Madison County Authority, excess funds are placed in a captial improvement account so that the funds are available when needed for a capital project.

28 E Agreement

Chapter 28 E or the Iowa Code allows for the joint exercise of governmental powers.

> "Any public agency of this state may enter into an agreement with one or more public and private agencies for joint or co-operative action..........."

Consideration may then be given to the development of 28 E Agreements between the City of Chariton and public entiies within the airport service area as a means by which to attain multi-jurisdictional support for the development and operation of the Chariton Municipal Airport. Any 28 E Agreement must address the following:

- Duration
- New entity and powers delegated; administrative structure
- Purpose
- Financing Provisions
- Termination Provisions
- Acquisition, holding, and disposition of property