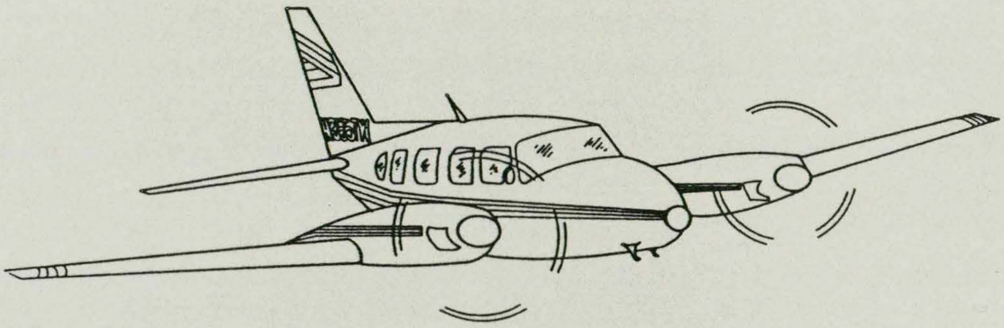
AIRPORT DEVELOPMENT PLAN

FOR

WEBSTER CITY, IOWA

1989



CGA
CONSULTING ENGINEERS
MARSHALLTOWN IOWA   AMES IOWA

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DATA COLLECTION

EXISTING AIRPORT

Location: The existing airport is located on a 180 acre parcel of land in Hamilton County approximately three miles southwest of Webster City. The area immediately surrounding the airport is in agricultural production.

Immediate access to the airport is via paved county roads. In addition U.S. Highway 20 is an east-west highway located approximately one half mile north of the airport and State Highway 17 is a north-south highway within approximately two miles of the airport and U.S. Highway 69 is a north-south route located approximately 13 miles east of the airport. In addition, Interstate 35 is located approximately 15 miles to the east.

Facilities: The airport is classified as a General Utility facility. The major feature of this classification is a 4,000'x75' runway. The runway has a 14/32 orientation. The pavement section consists of a 2 inch asphalt surface, 2 inch asphalt treated base and 8 inches of aggregate base or recycled asphalt pavement. The pavement was designed to accommodate aircraft with a maximum gross weight of 12,500 pounds.

Buildings on the airport include three carousel hangars which can accommodate four aircraft each. There are also two conventional hangars. One of the conventional hangars is used for chemical storage and spray plane operations and the other is anticipated to be used for aircraft maintenance facilities in the very near future. A 2,100 square foot terminal building provides a 900 square foot waiting room, office space, rest rooms and a class room/meeting room. Also a residence is provided for the airport manager.

The paved apron area provides approximately 7,700 square yards of ramp with 5 tie-down spaces. The apron also provides a refueling area and an area for the loading and unloading of aircraft passengers. The apron pavement section consists of 5 inches of portland cement concrete with an aggregate base.

Lighting and navigational aids include medium intensity runway lights with radio control, VASI, REIL's, lighted tetrahedron and wind sock, and rotating beacon. Nonprecision instrument approaches are established using the NDB located on the airport and the Fort Dodge VOR.

Water is supplied from a well located on the airport and the sewage disposal system consists of a septic tank and drain field.

100 octane low lead fuel is available at the airport from two small buried fuel tanks.

Based Aircraft: Aircraft currently based at the Webster City Airport include the following:

Owner	Aircraft Type
Midwest Storage	Mooney M20-J
Storm Flying Service	Tomahawk PA 38-112
Storm Flying Service	Warrior PA 28-151
Storm Flying Service	Warrior PA 28-151
Storm Flying Service	Archer PA 28-181
Storm Flying Service	Archer PA 28-181
Storm Flying Service	Arrow PA 28R-200
Storm Flying Service	Lance PA 32R-300
Storm Flying Service	Aztec PA 23-50
Storm Flying Service	Navajo PA 21
Storm Flying Service	Brave PA 36
Nelson	Piper PA 18
Hill	Piper PA 28-181
Webster City Flying	Cessna 182
Livingston	Piper PA 32R-300
Snyder	Cessna 172 B
J. B. Aviation	PA 32R-300

AIRPORT SERVICE AREA

Historically, a 20 mile radius or 30 minute travel time from an airport has been used as a guide for the area served by an airport. However, there are a number of factors involved in a decision to utilize or base a plane at a particular airport. Among these are surface travel time to or from the airport, services and facilities available at the airport, cost of services, quality of services and personal preference. All of these factors were brought out in the user survey conducted as part of this study. Some users closer to the Fort Dodge Airport preferred to charter out of Webster City due to the service they receive. A number of other users utilized the Fort Dodge Airport even though their destination was Webster City because of Fort Dodge's longer runway and instrument landing facilities.

Area airports and their location with respect to the Webster City Airport are depicted in Figure 1.1. Following is a list and description of facilities and services available at airports in the immediate vicinity (20 mile radius).

Fort Dodge:

Classification - Commercial Service/Basic Transport
Runways - 12/30 4,401 Feet
06/24 6,547 Feet
Navigation - VORTAC
NDB
REIL 12,30
VASI 6,12,30
3 Step MALSR 6
Fuel - 100 Octane Low Lead, Jet A

Clarion:

Classification - General Aviation/Basic Utility-II
Runways - 14/32 3,500 Feet
08/26 1,930 Feet (Turf)
Navigation - NDB
VOR (Fort Dodge)
REIL 14,32
Fuel - 100 Octane Low Lead

Boone:

Classification - General Aviation/General Utility
Runways - 14/32 3,000 Feet
02/20 3,245 Feet (Turf)
Navigation - NDB
VOR (Newton)
REIL 14
Fuel - 80 and 100 Octane Low Lead, Jet A

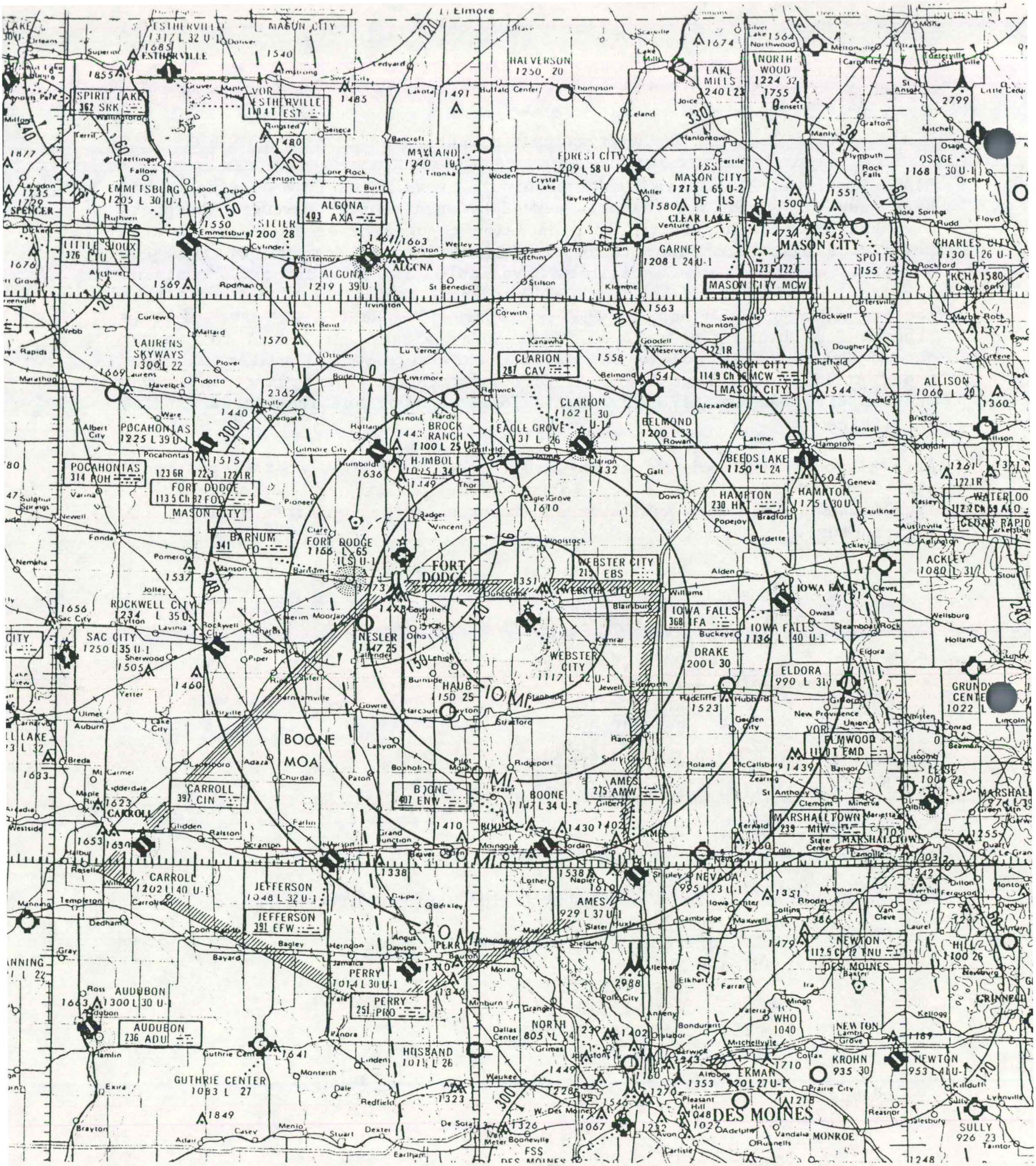

ESTHERVILLE
MASON CITY
SPIRIT LAKE
EMMETSBURG
ALGONA
HALVERSON
FOREST CITY
GARNER
CLEAR LAKE
NORTHWOOD
LAKE MILLS
OSAGE
CHARLES CITY
SPENCER
LITTLE SIOUX
LAURENS SKYWAYS
POCAHONTAS
FORT DODGE
CLARION
BELMOND
EAGLE GROVE
HUMBOLDT
BROCK RANCH
HAMPTON
BEEDS LAKE
ALLISON
WATERLOO
ACKLEY
BARNUM
WEBSTER CITY
IOWA FALLS
ELDORA
ROCKWELL CITY
SAC CITY
NESLER
HAUB
DRAKE
GRUNDY CENTER
BOONE MOA
CARROLL
BOONE
AMES
MARSHALLTOWN
NEVADA
JEFFERSON
PERRY
NEWTON
AUDUBON
GUTHRIE CENTER
HUSBAND
NORTH
WHO
EKMAN
KROHN
DES MOINES
SULLY
GRINNELL
10 MI.
20 MI.
40 MI.

FIGURE 1.1

For the purpose of this study, the Webster City Airport service area is estimated to cover the geographical area half the distance to neighboring airports. This is primarily Hamilton County. However, it should be recognized that the user survey indicates that some operations are being generated outside of the geographic service area and that with improved facilities, the service area would further expand.

POPULATION TRENDS

The community of Webster City has shown a substantial population growth trend through the year 1960 averaging nearly 11% growth in population every 10 years. The growth rate since then has been relatively flat.

TABLE 1.1 HISTORIC POPULATION GROWTH, WEBSTER CITY, 1900-1980

Year	Population	% Change	Year	Population	% Change
1900	4,613		1950	7,611	13.0
1910	5,208	12.9	1960	8,520	11.9
1920	5,657	8.6	1970	8,488	-0.4
1930	7,024	24.2	1980	8,572	1.0
1940	6,738	-4.1			

Because of the cyclic fashion of population trends and the growth pattern established in Webster City, it would be anticipated that a 5 percent growth in the community's population every ten years would be a fair projection. As can be seen in table 1.2, some 9,920 residents could reside in Webster City by the year 2010.

TABLE 1.2 POPULATION ESTIMATE, WEBSTER CITY, 1980-2010

Year	Estimated Population	% Change
1980	8,572	--
1990	9,000	5%
2000	9,450	5%
2010	9,920	5%

Hamilton County population has shown a moderate increase through the year 1930 and has been flat or moderately declined since then.

TABLE 1.3 HISTORIC POPULATION GROWTH, HAMILTON COUNTY, 1900-1980

Year	Population	% Change	Year	Population	% Change
1900	19,514		1950	19,660	-1.3
1910	19,242	-1.4	1960	20,032	1.9
1920	19,531	1.5	1970	18,383	-8.2
1930	20,978	7.4	1980	17,862	-2.8
1940	19,922	-5.0			

A number of projections are available for county population trends. The trends referenced herein were made by the Office of the State Demographer, the Iowa Department of Transportation, and Woods and Poole Economics, Inc. The projections made by the State Demographer and the I.D.O.T. were made in 1984 and 1987 respectively, and were based on certain assumptions about births, deaths, and migration. The Woods and Poole projections were prepared in 1987 based on economic models with employment statistics acting as a key determinant of the figures. For the purpose of this study, an average of the I.D.O.T. projection and the Woods & Poole projection are presented. Table 1.4 presents the projected population for Hamilton County and the surrounding six counties indicating a regional trend in anticipated population change.

TABLE 1.4 POPULATION TRENDS, SEVEN COUNTIES, 1980-2010

County	1980	Year 1990	2000	2010
Boone	26,184	25,437	25,232	24,977
Franklin	13,036	12,367	12,185	11,995
Hamilton	17,862	17,155	17,515	17,386
Hardin	21,776	21,351	20,984	20,443
Story	72,326	73,337	77,392	79,483
Webster	45,953	40,138	36,257	33,021
Wright	16,319	16,087	17,414	18,128
TOTAL	213,456	205,872	206,979	205,433
Hamilton as % of total	8.4	8.3	8.5	8.5

A very modest population decrease (2.6%) for Hamilton County is expected between the period from 1980 to 2010. This inlcudes a low of 17,155 residents in the year 1990. Typical of Iowa, the rural farm population has continues to decline while the larger communities have increased in population.

A 3.8 percent population decrease is expected in the seven county regional area between 1980 and 2010, and Hamilton Couny's share of the population is expected to remain relatively constant over the 30-year period.

The State of Iowa population projection has been estimated by averaging the State Demographer's projection, the I.D.O.T. projection and the Woods & Poole projection. This trend line is depicted in table 1.5 below.

TABLE 1.5 POPULATION PROJECTION, STATE OF IOWA, 1980-2010

1980	Year 1990	2000	2010
2,913,808	2,900,056	2,953,657	3,000,000

EMPLOYMENT TRENDS

The most significant factor affecting population trends relates to job opportunities within the community. Where new job opportunities can be reated, the community will be able to induce a population increase from in-migration as well as from an increase in the number of persons of child-bearing age who choose to remain in the community.

In addition, a community's employment characteristics offer a good indicator of its propensity for travel. In particular, certain types of employment tend to generate more air travel than others. Manufacturing and certain service types of industries tend to generate a high demand on air travel while other industries such as mining and certain agricultural related industries have a low demand for air travel. In general, travel tendancy by occupation can be summarized as follows:

High Travel: Manufacturing, Services, Federal Government, and State Government.

Medium Travel: Construction, Wholesale Trade, Retail Trade, Finance, Insurance and Real Estate.

Low Travel: Mining, Farming, Agricultural Services, Transportation, and Federal Military.

Projections of employment by type of occupation have been prepared by Woods & Poole Economics Inc. for all Iowa counties. Hamilton county projections have been organized by travel tendency in table 1.6 below.

TABLE 1.6 HISTORICAL AND PROJECTED EMPLOYMENT BY TRAVEL TENDENCY (IN THOUSANDS), HAMILTON COUNTY, 1970-2010

			Year			% Change
	1970	1984	1990	2000	2010	1990-2010
HIGH TRAVEL	3.56	4.52	4.96	5.52	5.63	13.5%
MEDIUM TRAVEL	2.30	3.11	3.52	4.06	4.22	19.9%
LOW TRAVEL	2.55	2.21	1.93	1.69	1.51	-21.8%
TOTAL	8.41	9.84	10.41	11.27	11.36	9.1%

As can be seen in table 1.6, total employment in Hamilton County is anticipated to increase by 9.1% over the next 20 years. A significant increase is projected in the high and medium travel tendency industries, while low travel tendency occupations are anticipated to decline.

Table 1.7 presents projected employment by travel tendency for the seven county region of Boone, Franklin, Hamilton, Hardin, Story, Webster and Wright counties. Total employment is expected to only show a moderate gain of 3.6% over the 20 year planning period, while the high travel tendency occupations are expected to increase by 10.9%

TABLE 1.7 HISTORICAL AND PROJECTED EMPLOYMENT BY TRAVEL TENDENCY (IN THOUSANDS), SEVEN COUNTY REGION, 1970-2010

			Year			% Change
	1970	1984	1990	2000	2010	1990-2010
HIGH TRAVEL	46.36	59.36	64.11	70.32	71.11	10.9%
MEDIUM TRAVEL	26.15	34.66	35.58	36.25	35.60	0.1%
LOW TRAVEL	20.85	17.85	16.16	14.58	13.35	-19.4%
TOTAL	93.62	111.87	115.85	121.15	120.06	3.6%

For comparison purposed, projected employment by travel tendency for the total state of Iowa is presented in table 1.8 below.

TABLE 1.8 HISTORICAL AND PROJECTED EMPLOYMENT BY TRAVEL TENDENCY (IN THOUSANDS), STATE OF IOWA, 1970-2010

			Year			% Change
	1970	1984	1990	2000	2010	1990-2010
HIGH TRAVEL	608.5	750.4	831.8	885.9	898.2	8.0%
MEDIUM TRAVEL	390.4	795.5	524.3	534.2	549.9	4.9%
LOW TRAVEL	279.5	248.6	229.5	211.0	194.3	-15.3%
TOTAL	1278.4	1494.5	1585.5	1646.8	1643.1	3.6%

As can be seen, the regional and state wide projections are expected to follow parallel trend lines. Hamilton County, on the other hand, is expected to exhibit slightly higher growth in medium and high travel tendency industries and in overall employment than in the regional and state wide trends.

USER SURVEY

As part of the data collection, an extensive survey of airport users was conducted. This survey was accomplished through both a mail-in survey form and follow up telephone contacts. The survey form was delivered to those individuals or corporations known to be using the airport or who might use the airport. The telephone contacts were used to follow up survey responses.

The purpose of the survey was to document who is currently using the airport, what type of aircraft they are using, how many operations they generate, what the future useage might be and what types of facility improvements they might require. A summary of responses follows.

NAME, ADDRESS & TELEPHONE: 75 responses.

DO YOU, YOUR BUSINESS, OR PARENT COMPANY CURRENTLY USE GENERAL AVIAITON: Yes - 57 responses.
No - 18 responses.

IF YES, PLEASE LEST AIRCRAFT TYPE, MODEL AND WHERE THE AIRCRAFT IS BASED: Single Engine - 16 responses.
Twin Engine - 8 responses.
Jet - 2 responses.

DO YOU USE PERSONAL, CORPORATE OR CHARTER AIRCRAFT:

ESTIMATED NUMBER OF TRIPS PER YEAR:
1-5: 18 responses.
6-10: 6 responses.
11-25: 4 responses.
26-51: 7 responses.
51 OR OVER: 8 responses.

DO YOU HAVE ANY FRIENDS, RELATIVES, CUSTOMERS, VENDORS OR OTHER BUSINESS REPRESENTATIVES THAT HAVE A NEED TO USE THE WEBSTER CITY AIRPORT:

HOW DO YOU EXPECT YOUR USE OF AVIATION TO CHANGE IN THE FUTURE:
Stay the same - 23 responses.
Increase - 39 responses.
Decrease - 1 responses.
Larger Aircraft - 9 responses.

IF THE WEBSTER CITY RUNWAY WERE LENGTHENED TO 5000 FEET TO ACCOMMODATE SMALL JET AIRCRAFT WOULD YOUR USEAGE OF THE AIRPORT CHANGE:
Yes - 16 responses.
No - 49 responses.

WOULD YOU BENEFIT FROM AN INSTRUMENT LANDING SYSTEM AT THE WEBSTER CITY AIRPORT:
Yes - 32 responses.
No - 26 responses.

WOULD YOU BENEFIT FROM AN AIRCRAFT MAINTENANCE SERVICE AT THE WEBSTER CITY AIRPORT:

Yes - 22 responses.
No - 36 responses.

ANY FACILITY NEEDS OR PROBLEMS WITH THE EXISTING FACILITIES OR OTHER COMMENTS: Jet Fuel, I.L.S., Crosswind Runway, Longer Runway.

HOW OFTEN DO YOU HAVE TO USE OTHER AIRPORTS BECAUSE WEBSTER CITY'S AIRPORT IS INADEQUATE:

Never/Seldom - 32 responses.
Occasionally - 10 responses.
Often - 8 responses.

ARE YOU OR YOUR COMPANY FORCED TO USE AIRPORTS OTHER THAN WEBSTER CITY DUE TO CURRENT LIMITATIONS:

Yes - 10 responses.
No - 25 responses.

Many of the responding businesses curently use airport facilities for transportation of both passengers and cargo. In an effort to provide an overview of how the airport is currently used, the following case histories are presented. These case histories are not all inclusive but are representative of some of the typical users.

Heavy Equipment Remanufacturers Corporation (HERC) remanufactures construction equipment such as scrapers and caterpillars. Airport useage is generated by vendors and clients visiting an average of one to two times per month. Typical aircraft range from single engine Bonanza's to Beach Craft King Air's.

King Management Company is a farm management business located in Des Moines. The company charters six to ten trips per year out of Webster City for transport of personnel. The company also owns a Cessna Citation III based in Des Moines used for out of state travel.

Contract management services for the Hamilton County Public Hospital is provided by Mercy Hospital of Des Moines. Through Van Dusen Airport Services, approximately weekly trips are made to transport specialists such as cardiologists and orthopedic surgeons to Webster City. These trips are currently being made with twin engine Navajo's and Senneca's.

Clear View Cattle Company is a cattle brokerage operation located in Blairsburg. The business operates a single engine Lance out of the Webster City Airport with an average of one to two trips per week for business purposes. The trips average 300 miles each to neighboring states with an occasional trip to Texas.

White Consolidated Industries Laundry Products Company manufactures clothes washers and dryers. WCI currently employs approximately 1,500 people. Considerable demand on aviation services are generated for transport of customers, vendors and freight. Major customers include Sears and Montgomery Wards. Jet operations for transport of Sears, Wards and WCI corporate personnel generate one to two trips per month. All jet operations currently take place at the Fort Dodge Airport due to the limited runway length at Webster City.

Decker Freight Line are involved with airport operations on the average of one trip every other week. Approximately 25% of Decker's airport operations are for the transport of personnel, bringing customers in, freight claims, and coordination while the other 75% of their operations are for transport of freight. Typical aircraft utilized are single and twin engine propeller aircraft. In addition, jet operations occur three to four times per year. The primary customer for air freight operations is WCI, although freight operations are also provided for Winnebago Industries among others.

Consolidated Freight and Storage interfaces with air freight shipments on an as needed basis. Although the frequency of air freight shipments is irregular, Consolidated reports two shipments in the last month. Aircraft have included a DC-3. The larger aircraft are diverted to Fort Dodge due to runway length. Air freight customers include WCI.

Johnson, Erb, Latham, Gibb & Carlson is a law firm located in Fort Dodge. The firm charters single and multi engine aircraft out of Webster City for business related trips on an average of two trips per month. The trips are usually to locations within Iowa or adjacent states.

Swine Health Center is a swine consulting business located in Morris Minnesota. They are currently undertaking a joint venture project with Swine Graphics in Webster City and the University of Minnesota. They anticipate monthly visits to Webster City in their single engine Brave for the duration of the project.

E.A. Pedersen Company is a construction company located in Omaha, Nebraska. They are currently working on a construction project for the Webster City Municipal Utility Company. They have made numerous trips to Webster City in their Baron B-55 during the bidding and project development phases and anticipate making at least two visits per month during the construction phase.

Van Diest Supply Company is a Webster City based business providing custom manufacturing of fertilizer, chemicals and pesticides. Company personnel occasionally fly charter out of Webster City but primarily fly commercial from Des Moines. Vendors and customers include American Cyanamid, Monsanto, ICI America, FMC, Eli Lilly, Mobay and Ciba Giegy all of which fly corporate jets to either Webster City or Fort Dodge to visit Van Diest totalling more than one visit per month.

Henning Construction Company located in Latimer charters out of Webster City any where from one trip per month to two trips per week.

Vantec Inc. is a plastic molding company currently using charter or commercial air service six to ten times per year for business trips to attend seminars, visit customers etc. They anticipate their business travel to increase to ten to twenty trips per year.

Iowa Central Community College offers a curriculum in Aviation/Airport Management. The two year curriculum includes providing students with private and commercial licenses, instrument rating and a certified flight instructor certificate. Currently classes range from thirty to forty students.

Heller's Carbonic West, Inc. produces dry ice and fiberglass containers. Heller's currently charters out of the Webster City Airport six to ten trips per year for business purposes.

Kurt T. Pittner is a Fort Dodge attorney. Pittner currently charters six to ten trips per year out of Webster City for business purposes.

United Parcel Service currently charters one to two trips per month out of Webster City. UPS's nearest operation center is in Fort Dodge and they provide truck service to Webster City for parcel pickup and delivery.

FORECASTS

INTRODUCTION

The purpose of aviation forecasts are to provide a basis for determining future airport useage and the types of facilities to accommodate that useage. Forecasts are normally provided for the short, intermediate and long range, or approximately 5, 10 and 20 years. It should be recognized that as the range increases, the accuracy of forecasts decreases. Therefore, a 20-year forecast is very approximate.

The aviation demand elements that need to be forecast for this study include:

- Airport Operations
  - Itinerant
  - Local
- Enplaned Passengers
- Air Freight
- Based Aircraft
- Design Aircraft

The method of forecasting involves examination of historical trends of air travel. Through extrapolation methods, these trends or tendencies can indicate future demand. Statewide trends are examined and used to devleop projections of a more local nature. Other elements that are related to aviation activity levels are also examined and are used to infleunce judgement in extrapolation methods. In addition, related elements are used to develop aviation forecasts through mathematical relationships. Related elements include demographic patterns, employment trends, and geographic factors. Lastly, the survey of airport users provides some insight into future useage of the airport.

REGISTERED AND BASED AIRCRAFT

The total number of based aircraft at an airport is an important factor i determining the size, type or number of facilities necessary to accommodat the airport's activity.

State Trend: Statewide forecasts anticipate future growth in the number o registered aircraft in the state of Iowa. According to the 1985 Iow Aviation System Plan "Aircraft registrations were found to be closely tie to the manufacturing, transportation and public utilities sectors and th Real Gross State Product." This in conjunction with national trend indicate the anticipated Iowa registered aircraft as follows:

TABLE 2.1 REGISTERED AIRCRAFT, STATE OF IOWA

1970	1980	1990	2000	2010
2,565	3,500	3,200	3,800	4,400

The statewide forecasts indicate an increase from 11 registered aircraf per 10,000 population in 1990 to nearly 15 registered aircraft per 10,00 population in 2010.

Regional Trend: Table 2.2 presents the number of registered aircraft i each of the seven counties surrounding Webster City and the ratio of th aircraft per 10,000 population. At the present time the region average 7.8 aircraft per 10,000 population.

TABLE 2.2 REGISTERED AIRCRAFT, SEVEN COUNTIES

COUNTY	POPULATION	CURRENT REGISTERED AIRCRAFT	AIRCRAFT PER 10,000 POPULATION
Boone	25,437	16	6.3
Franklin	12,367	11	8.9
Hamilton	17,155	18	10.5
Hardin	21,351	11	5.2
Story	73,337	53	7.2
Webster	40,138	36	9.0
Wright	16,087	15	9.3
TOTAL	205,872	160	7.8

Three trend lines have been determined to estimate future regiona registered aircraft. The low trend line anticipates that the current rati of 7.8 registered aircraft per 10,000 population will be maintained throug the year 2010. The high trend line anticipates that the regiona registered aircraft will increase over the next 20 years from the curren 7.8 registered aircraft per 10,000 population at the same percentage rat of increase as is projected in the State System Plan for the state. Th middle trend is simply the average of the high and low forecasts. These forecasts are presented in table 2.3.

TABLE 2.3 PROJECTED REGISTERED AIRCRAFT, SEVEN COUNTIES

	Regional Registered Aircraft		
	Low	Median	High
1990	160	160	160
1995	161	167	173
2000	161	175	189
2010	160	187	214

Webster City Based Aircraft: The number of aircraft based at the Webster City Airport can be expected to grow at a faster rate than is anticipated for the seven county region or for the state as a whole, based on the higher rate of employment growth projected in Hamilton county for medium and high travel tendency industries. Therefore, the based aircraft at the Webster City Airport are expected to follow a trend line from the current 10.5 based aircraft per 10,000 population to 14.7 based aircraft per 10,000 population which is the projected state wide average.

TABLE 2.4 PROJECTED BASED AIRCRAFT, WEBSTER CITY AIRPORT

1990	1995	2000	2010
17	20	22	26

AIRCRAFT OPERATIONS

An aircraft operation is a landing (arrival) or a takeoff (departure) from an airport. A "touch and go," for example, is considered two operations. The total number of operations is an important element in identifying the level of service needed at an airport and in setting priorities in funding airport improvements.

There are two types of operations - local and itinerant. A local operation is an arrival or departure of aircraft which operate in the local traffic pattern and are known to be arriving or departing from flights within a 20-mile radius of the airport. Also, simulated instrument approaches or low passes by any aircraft are considered a local operation. Itinerant operations are all those arrivals or departures other than local operations.

Since there is no daily log operational activity at the Webster City Airport, there is no historical data for extrapolating any kind of projections. However, in 1985 and 1986 the Iowa Department of Transportation did count operations at the airport using a sound actuated counter. The DOT methodology involves counting actual operations for several weeks during each season of the year. From this data, total annual operations are estimated. As a result of this count, the DOT estimated there to be 17,082 annual operations at the Webster City Airport.

The activity count calculates to be approximately 1,000 annual operations per based aircraft. This is a considerably greater ratio than at other measured airports. However, as brought out in the user survey, there are quite a large number of charter and itinerant operations at the airport. The Aviation curriculum at Iowa Central Community College was also thought to have been a major factor in the large number of operations. However, in analyzing the count, it was found that the majority of the operations associated with the College occured during three weeks of the nearly eighteen week count and the operations per hour during that three weeks was slightly less than during the other periods.

The forecasted total operations at the Webster City Airport have been estimated based on the forecast of based aircraft, found earlier in this report, and an anticipated average of 1,000 annual operations per based aircraft. According to the 1985 Iowa Aviaiton System Plan, "Itinerant operations account for about 58 percent of total aviation operations. This figure is based on data from FAA control towers." However, it is felt that itinerant operations at the Webster City Airport are higher than average and a figure of 65 percent is used herein. Local operations account for the differance between total operations and itinerant operations. Table 2.5 presents total, itinerant and local annual operation forecasts for the Webster City Municipal Airport.

TABLE 2.5 ANNUAL OPERATIONS, WEBSTER CITY AIRPORT

Year	Based Aircraft	Annual Operations	Itinerant Operations	Local Operations
1990	17	17,000	11,000	6,000
1995	20	20,000	13,000	7,000
2000	22	22,000	14,300	7,700
2010	26	26,000	16,900	9,100

AIR PASSENGERS AND AIR FREIGHT

The number of air passengers was estimated at 1.5 times the number of itinerant operations. Reference may be made to table 2.6.

TABLE 2.6 AIR PASSENGERS, WEBSTER CITY AIRPORT

Year	Itinerant Operations	Air Passengers
1990	11,000	16,500
1995	13,000	19,500
2000	14,300	21,450
2010	16,900	25,350

The tonnage of air freight was estimated at eight pounds per enplaned passenger as presented in table 2.7.

TABLE 2.7 AIR FREIGHT (IN TONS), WEBSTER CITY AIRPORT

Year	Air Passengers	Air Freight
1990	16,500	66.0
1995	19,500	78.0
2000	21,450	85.8
2010	25,350	101.4

AIRPLANE DESIGN GROUP

The future Webster City Airport facilities should be planned that will safely accommodate all aircraft operations desired by the community in order to accomplish transportation and economic development goals.

The Iowa Department of Transportation maintains a policy that 500 annual operations of a critical aircraft are necessary to justify planning facilites to accommodate that aircraft. In the survey of users phase of this study, approximately 100 annual jet operations were identified that would take place today if adequate facilites were available.

The large number of total operations, projected growth in high travel tendency occupations, and the current demand for jet operations at the Webster City Airport would all tend to indicate that it would be reasonable to plan for jet operations in the future.

The type of airport facilities to plan for are based on the design aircraft approach category and airplane design group. These can be summarized as follows:

1. Aircraft Approach Categories:

   A. Category A: Approach speed less than 91 knots.
   B. Category B: Approach speed 91 knots or more but less than 121 knots.
   C. Category C: Approach speed 121 knots or more but less than 141 knots.

2. Airplane Design Group:

   A. Airplane Design Group I: Wingspan up to but not including 49 feet.
   B. Airplane Design Group II: Wingspan 49 feet up to but not including 79 feet.
   C. Airplane Design Group III: Wingspan 79 feet upt to but not including 118 feet.

The aircraft referenced in the survey of users included a Cessna Citation III and a Learjet. The Cessna Citation III has an approach speed of 114 knots and a wing span of 50.6 feet. A Learjet 24 has an approach speed of 128 knots and a wing span of 35.6 feet. On this basis it is recommended that the airport be planned for Approach Category C, Airplane Design Group II.

FACILITY REQUIREMENTS

INTRODUCTION

This portion of the study describes those facility and equipment requirements needed to accommodate the aviation demand forecasted in the previous portion of the study.

The following specific items of development and requirements are addressed:

- Runway and Taxiway - Length, width, clearances, visibility, orientation and grades.
- Terminal Area - Apron, hangars, administration building, and auto parking.
- Obstructions - Navigable airspace.
- Drainage.
- Paving - Rigid pavement and flexible pavement.
- Marking, lighting and visual aids.
- Airport Industrial Park.

Information contained herein is drawn primarily from applicable FAA Advisory Circulars. As indicated in the Forecast of Aviation Demand section on this study, development should be planned to Transport standards for Approach Category C, Aircraft Design Group II.

RUNWAY AND TAXIWAY

LENGTH:

Runway length requirements are a function of the aircraft type using the facility and certain conditions at the airport, including 1) temperature, 2) surface wind, 3) runway gradient, 4) pavement condition, and 5) altitude of the airport. The following paragraphs describe these factors and their effect on the runway length at the Webster City Airport.

- Temperature. The higher the temperature, the longer the runway length requirements. This is due to the fact that higher temperatures reflect lower air densities. Therefore, increased airspeed is required to obtain or maintain proper lift. These faster speeds require longer runway lengths for acceleration and deceleration. This study assumes a mean daily maximum temperature during the hottest month of the year to be 83 degrees Fahrenheit.

- Surface Wind. The greater the headwind the shorter the runway length requirements and conversely, tailwinds require longer runway lengths. The following table approximates the effect of wind:

ACTUAL WIND (KNOTS)	% INCREASE OR DECREASE OF LENGTH WITH NO WIND
+ 5	- 3
+ 10	- 5
- 5	+ 7

SOURCE: Planning and Design of Airports, Robert Horonjeff.

For the purpose of this study, a no wind situation will be assumed. This is a worst case situation since if there is any wind, a landing direction can be selected where there is at least some headwind component.

- Runway Gradient. Runway gradient, or slope of the runway, requires additional runway length for takeoff on an uphill gradient as opposed to a level or downhill gradient. Therefore, the runway length determined in this section will need to be increased to account for the gradient. It is assumed the gradient of the runway will be 0.37% based on the existing runway at the Webster City Airport.

- Pavement Condition. When landing operations govern the length of the runway, additional runway length may be required for wet conditions. However, runway gradient and wet runway effects are not cumulative and, when both conditions apply, the larger of the increases is used to determine the recommended runway length.

- Altitude of the Airport. The higher the altitude of the airport, the longer the runway length requirements. Higher altitudes reflect lower air densities. Therefore, higher operating speeds are required to maintain sufficient lift. In general, an additional 7% of runway length is required for each additional 1000 feet of altitude. For the purpose of this study, an altitude of 1119 feet above mean sea level is assumed for the airport.

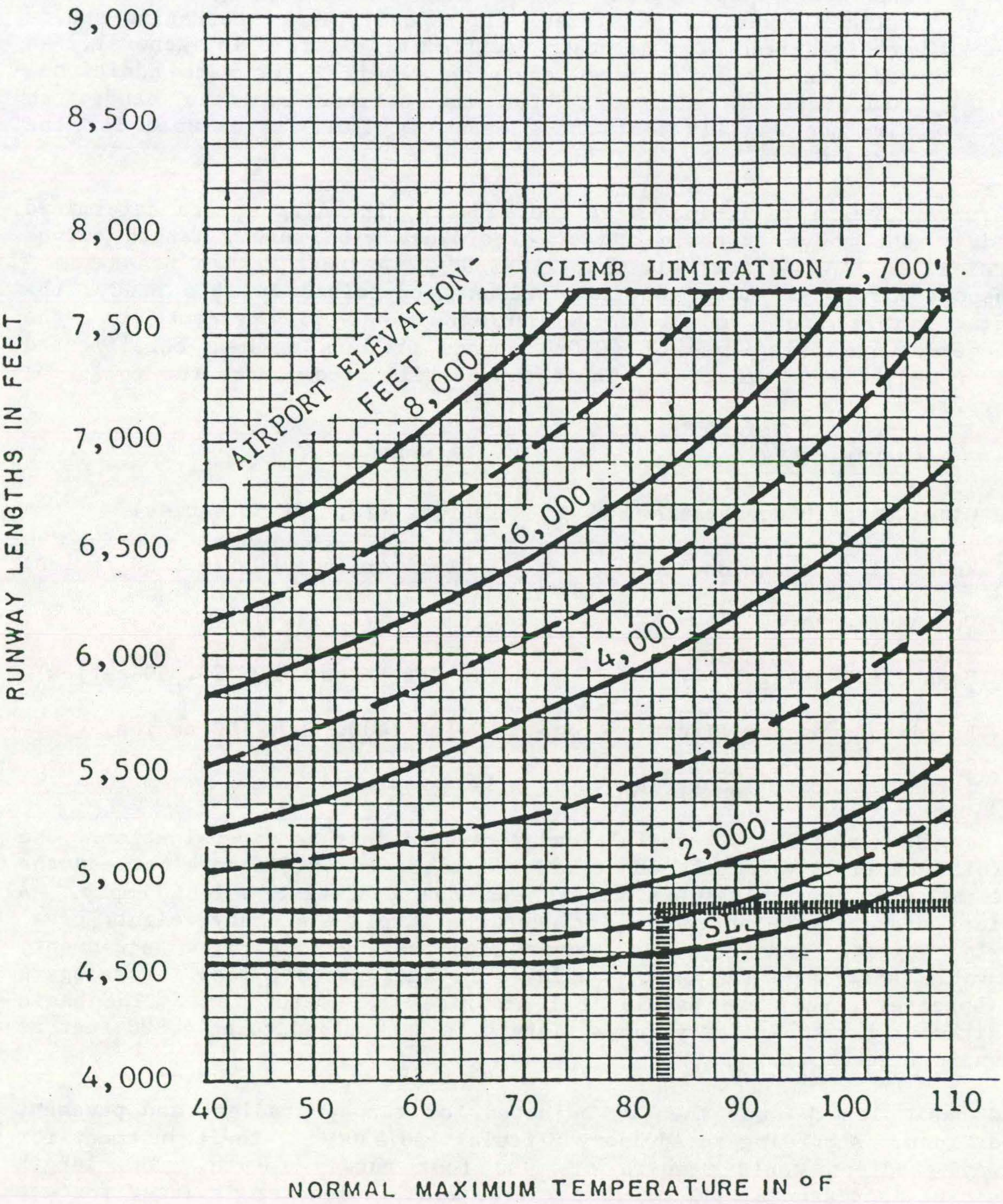
The runway length requirements at the Webster City Airport are determined based on the above criteria and in accordance with runway length curves contained in FAA Advisory Circular 150/5300-12 Airport Design Standards - Transport Airports. Based on the forecasts contained in this study, the length curves for airplanes which comprise 75 percent of the turbojet-powered airplanes of 60,000 pounds or less maximum certificated takeoff weight were selected. These curves will accommodate the following aircraft:

MANUFACTURER	MODEL
Gates Learjet Corporation	Learjet (20, 30, 50 series)
Rockwell International	Sabreliner (40, 60, 75 & 80 series)
Cessna Aircraft	Citation (I, II, III)
Dassault - Bregeut	Fan Jet Falcon (10, 20, 50 series)
British Aerospace Aircraft Group	HS-125 (400, 600, 700 series)
Israel Aircraft Industries	1124 Westwind

The length curves for 60% useful load were used in this determination. The useful load of an aircraft is considered to be the difference between the maximum certificated takeoff weight and the operating weight empty. A typical operating weight empty includes the airplane's empty weight, crew, crew's baggage and supplies, removable passenger service equipment, removable emergency equipment, engine oil, and unusable fuel. Passengers and baggage, cargo, and usable fuel comprise the useful load. The basic requirement for the primary runway length is determined to be 4,800 feet as shown in Figure 3.1.

This basic length must then be adjusted for runway gradient and pavement conditions. According to Advisory Circular 150/5300-12, the adjustment for runway gradient would require a 4,900 foot runway length. The length should be increased by 15% or up to 5,500 feet, whichever is less, for wet runway conditions. Therefore, the recommended runway length is 5,500 feet.

A cross wind runway is recommended to accommodate aircraft operations when the wind conditions are such that the aircraft cannot safely use the primary runway. It is assumed the demand for the cross wind runway will be from lighter propeller driven aircraft in the basic utility classification. The normal runway length for basic utility aircraft is 4,000 feet. The cross wind runway can be shortened to 80% of its required length. This is



75% FLEET @ 60% USEFUL LOAD

RUNWAY LENGTH CURVES

FIGURE 3.1

based on a wind situation where the primary runway cannot be used. There should be sufficient headwind on the cross wind runway justifying a shorter length. Therefore, it is recommended here that the cross wind runway length be in the range of 3,200 feet to 4,000 feet.

Width and Clearances:

The airport's dimensional requirements are based on the standards of the FAA as described in Advisory Circular 150/5300-12 for Airplane Design Group II. These dimensional standards are as follows:

Runway Width	100 feet
Runway Shoulder Width	10 feet
Runway Safety Area Width	500 feet
Taxiway Width	35 feet
Taxiway Safety Area Width	79 feet
Separation Distance	
Runway Centerline to Parallel Taxiway Centerline	400 feet
Runway Centerline to Aircraft Parking Area	400 feet
Runway Centerline to Property/ Building Restriction Line	500 feet
Taxiway Centerline to Fixed or Movable Object and to Property Line	64 feet

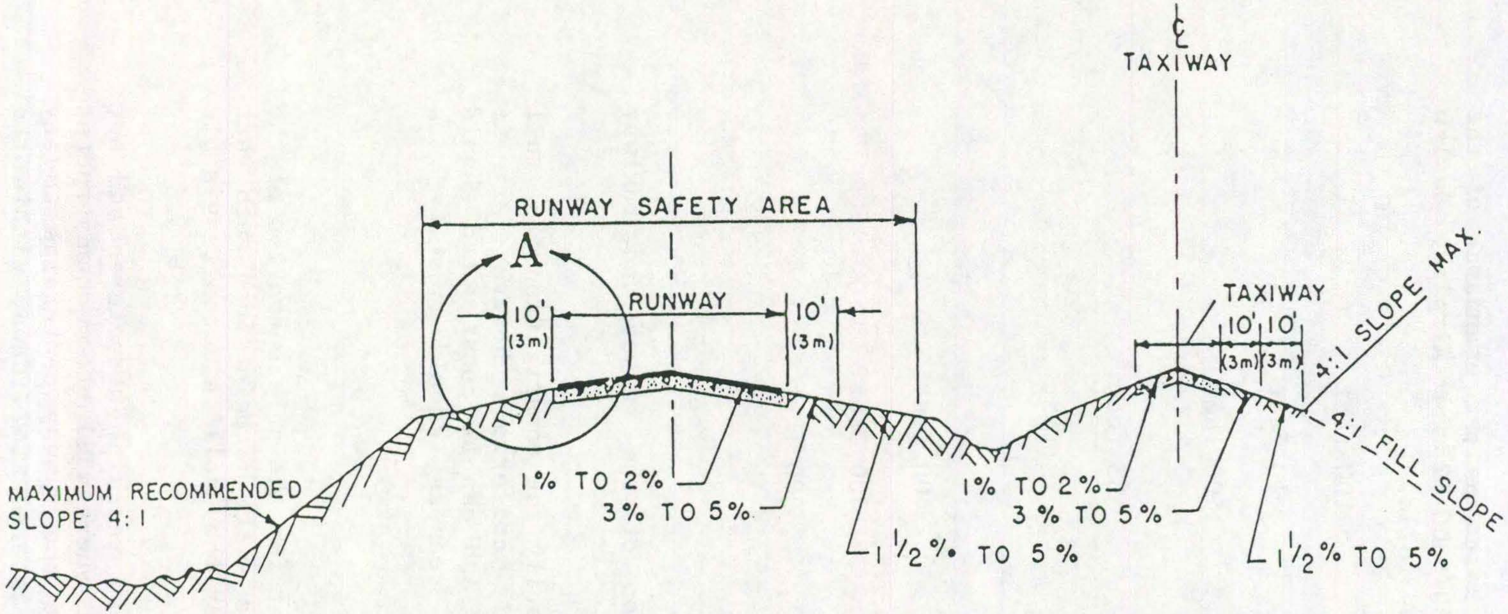
Figure 3.2 depicts a typical cross section of the runway and taxiway configuration.

The forecast of aviation demand does not justify the construction of a full parallel taxiway system based on capacity criteria. However, it is recommended that it be planned for anyway and can be constructed should activity exceed expectations or safety reasons should justify its development.

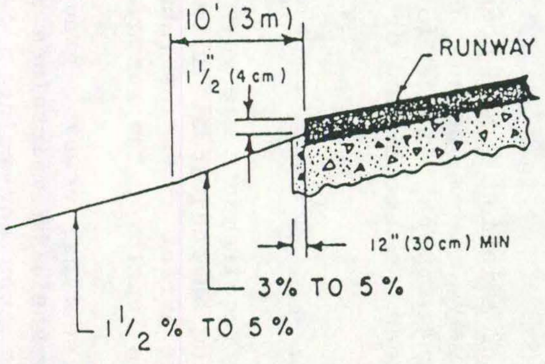
Line-Of-Sight:

Line-of-sight requirements are very important for the safe operation of the airport. Along an individual runway, grades shall be maintained such that any two points 5 feet above the runway centerline shall be mutually visible for the entire length of the runway.

Between intersecting runways, grade changes, terrain, structures and any other objects shall be maintained such that there will be an unobstructed line of sight from any point 5 feet above the runway centerline to any point 5 feet above the centerline of the intersecting runway within the



LOCATION OF DITCH, SWALE OR HEADWALL DEPENDS ON SITE CONDITION BUT IN NO CASE WITHIN LIMITS OF RUNWAY SAFETY AREA.



DETAIL A

TRANSVERSE SLOPES SHOULD BE ADEQUATE TO PREVENT THE ACCUMULATION OF WATER ON THE SURFACE.
SLOPES SHOULD FALL WITHIN THE RANGES SHOWN ABOVE.
THE RECOMMENDED $1\frac{1}{2}$" (4 cm) PAVEMENT EDGE DROP IS INTENDED TO BE USED BETWEEN PAVED AND UNPAVED SURFACES.
IT IS DESIRABLE TO MAINTAIN A 5% SLOPE FOR THE FIRST 10' (3m) OF UNPAVED SURFACE IMMEDIATELY ADJACENT TO THE PAVED SURFACE.

TYPICAL CROSS SECTION

FIGURE 3.2

runway visibility zone. The runway visibility zone is graphically depicted in Figure 3.3.

Runway Location and Orientation:

Runway location and orientation are important from a safety, environmental, efficiency and economic point of view. The following paragraphs discuss the considerations to be made in runway location and orientation while Phase IV (Airport Layout Plan) will address the specific location at the existing airport site to satisfy these considerations.

Wind coverage is of paramount importance in orienting a runway. Runway orientation should be such that the airport can be utilized 95% of the time without excessive cross wind components. For aircraft in Aircraft Approach Category C, the recommended limiting crosswind is 13 knots (15 miles per hour). For general utility operations, the recommended limiting crosswind is 10.5 knots (12 miles per hour).

Airspace beyond the physical extents of the runway should be considered. This includes clear zones, approaches, obstructions and traffic patterns. Clear zones and obstruction standards are discussed elsewhere in this section of the study.

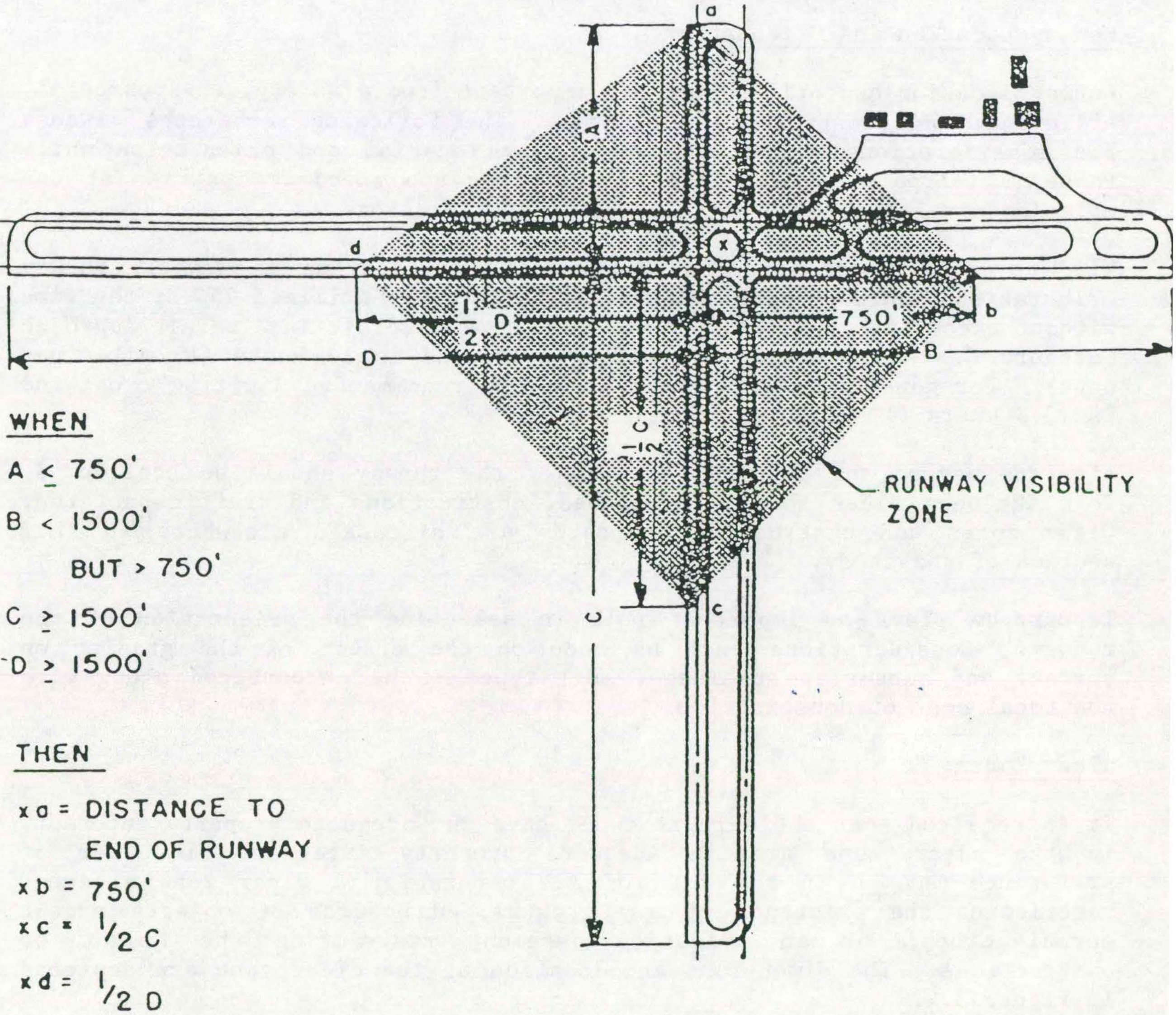
Topography plays an important role in selecting the orientation of the runway. Considerations must be made on the effect of the grading on surface and subsurface drainage, soil types to be encountered along with the total cost of construction.

Clear Zones:

It is required that the airport owner have an "adequate property interest" in the clear zone area. "Adequate property interest" in order of preference may be in the form of fee ownership; a clear zone easement restricting the existence of any growths, structures or objects except normal crops; or an avigation easement restricting the height of obstructions. The dimensions and location of the clear zone are depicted in Figure 3.4.

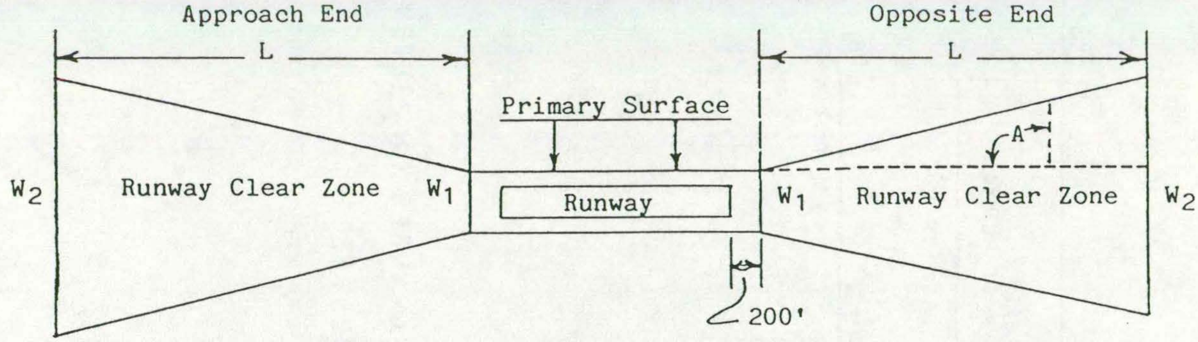
Surface Gradient:

In addition to the sight distance requirements listed above, the runway's longitudinal grade shall not exceed those limitations depicted in Figure 3.5.



RUNWAY VISIBILITY ZONE

FIGURE 3.3



Facilities Expected To Serve	Set No.	Runway End: Approach End	Runway End: Opposite End	Dimensions: Length L (feet)	Inner Width W_1 (feet)	Outer Width W_2 (feet)	Runway Clear Zones (acres)	Flare Ratio A (rise/run)
Only Small Airplanes	1	V		1,000	250	450	8.035	.1:1
			V	1,000	250	450	8.035	.1:1
	2	V		1,000	500	650	13.200	.075:1
			NP	1,000	500	800	14.922	.15:1
	3	NP		1,000	500	800	14.922	.15:1
			NP	1,000	500	800	14.922	.15:1
Large Airplanes	4	V		1,000	500	700	13.770	.1:1
			V	1,000	500	700	13.770	.1:1
	5	V		1,000	500	700	13.770	.1:1
			NP 3/4 +	1,700	500	1,010	29.465	.15:1
	6	V		1,000	1,000	1,100	24.105	.05:1
			NP 3/4	1,700	1,000	1,510	48.978	.15:1
	7	V		1,000	1,000	1,100	24.105	.05:1
			P	2,500	1,000	1,750	78.914	.15:1
	8	NP 3/4 +		1,700	500	1,010	29.465	.15:1
			NP 3/4 +	1,700	500	1,010	29.465	.15:1
	9	NP 3/4 +		1,700	1,000	1,425	47.320	.125:1
			NP 3/4	1,700	1,000	1,510	48.978	.15:1
	10	NP 3/4 +		1,700	1,000	1,425	47.320	.125:1
			P	2,500	1,000	1,750	78.914	.15:1
	11	NP 3/4		1,700	1,000	1,510	48.978	.15:1
			NP 3/4	1,700	1,000	1,510	48.978	.15:1
	12	NP 3/4		1,700	1,000	1,510	48.978	.15:1
			P	2,500	1,000	1,750	78.914	.15:1
	13	P		2,500	1,000	1,750	78.914	.15:1
			P	2,500	1,000	1,750	78.914	.15:1

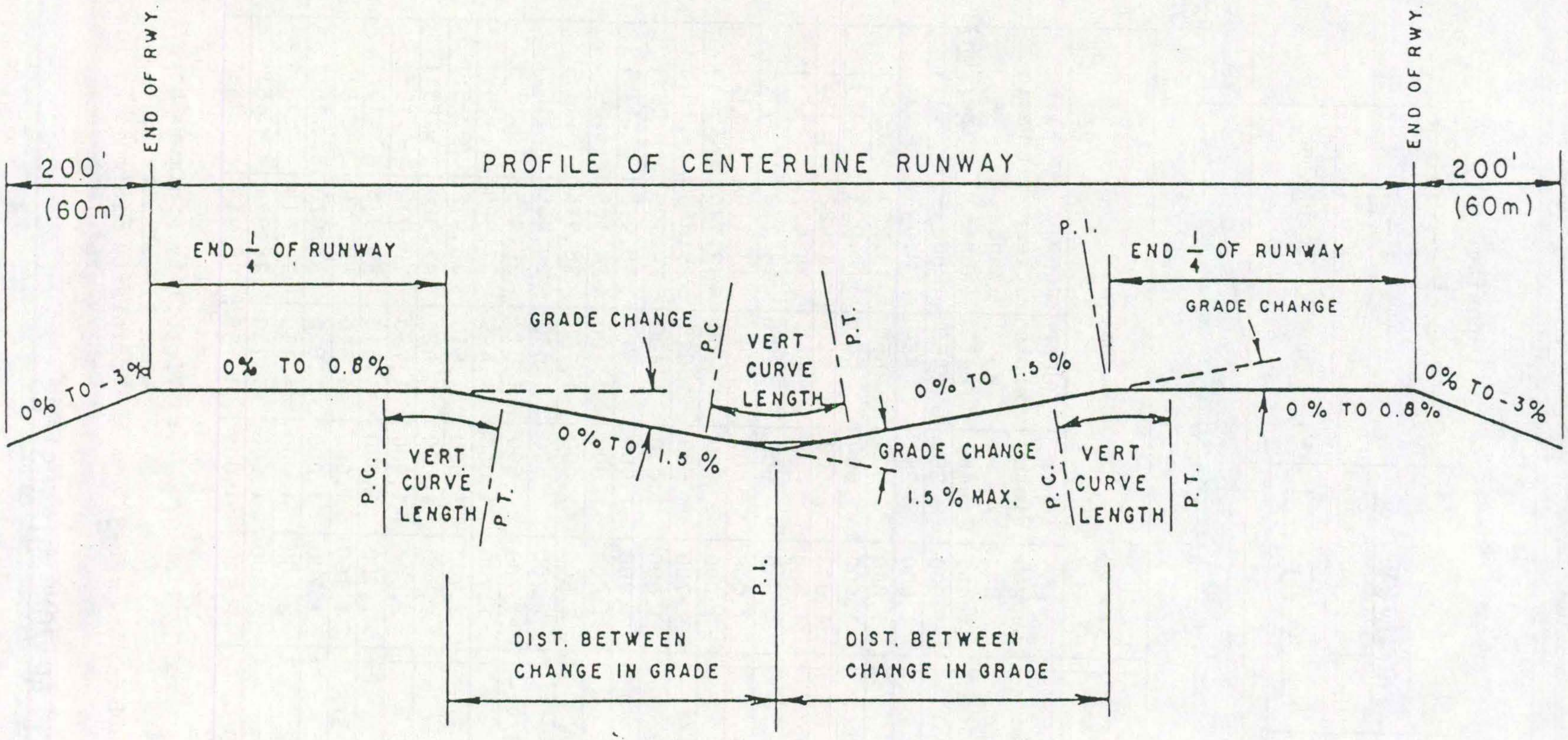
V = Visual approach
NP = Nonprecision approach
P = Precision instrument approach

NP 3/4 + = Visibility minimums more than 3/4-statute mile
NP 3/4 = Visibility minimums as low as 3/4-statute mile

*

RUNWAY CLEAR ZONE DIMENSIONS

FIGURE 3.4



MINIMUM DISTANCE BETWEEN CHANGE IN GRADE = 1000' (300m) x SUM OF GRADE CHANGES (IN PERCENT).

MINIMUM LENGTH OF VERTICAL CURVES = 1000' (300m) x GRADE CHANGE (IN PERCENT).

LONGITUDINAL GRADE LIMITATIONS

FIGURE 3.5

TERMINAL AREA

Itinerant Apron:

The area required for parking of itinerant aircraft can be projected based on the forecasted itinerant operations. The methodology used in this projection is described as follows:

a. Calculate the total annual itinerant operations. This was done in the forecast of aviation demand portion of this report.

b. Calculate the average daily itinerant operations for the most active month. Assume the most active month is 10% busier than the average month.

c. Assume the busy itinerant day is 10% more active than the average day. This is based on data from FAA surveys.

d. Assume one itinerant aircraft represents two operations (one loading and one takeoff).

e. Assume that a certain portion of the itinerant airplanes will be on the apron during the busy day. Fifty percent is used here.

Based on the above analysis, the itinerant apron requirements have been calculated and are presented in the following table.

YEAR	ANNUAL ITINERANT OPERATIONS	ITINERANT TIE-DOWNS REQUIRED
1990	11,000	9
1995	13,000	11
2000	14,300	12
2010	16,900	14

Based Aircraft Apron:

In addition to itinerant apron requirements, a certain area will be required for the tie-down of based aircraft. This depends on a number of variables and is difficult to project. Some of the factors affecting an aircraft owner's decision to tie-down an airplane are: quality of the available hangars; cost of hangar space; value of the aircraft; and personal preference. For Webster City it is estimated that a maximum of 10% of the based aircraft owners will choose to tie-down their aircraft. The calculated based aircraft tie-down spaces are determined as follows.

YEAR	BASED AIRCRAFT	BASED AIRCRAFT TIE-DOWNS REQUIRED
1990	17	2
1995	20	2
2000	22	2
2010	26	3

Apron Requirements:

Total apron area requirements should provide adequate space for:

a. Tie-Down of Based Aircraft
b. Tie-Down of Itinerant Aircraft
c. Temporary Parking of Transient Aircraft
d. Short Term Loading and Unloading
e. Fixed Base Operator Functions
f. Fueling
g. Aerial Applicator's Operation Area

With proper planning, the apron area will accommodate the maximum number of aircraft while maintaining ease of ingress and egress. The apron area should also be planned with a certain amount of flexibility and expandability. Figure 3.6 depicts a typical layout of the space requirement of an apron while Figure 3.7 depicts tie-down configurations.

Hangars:

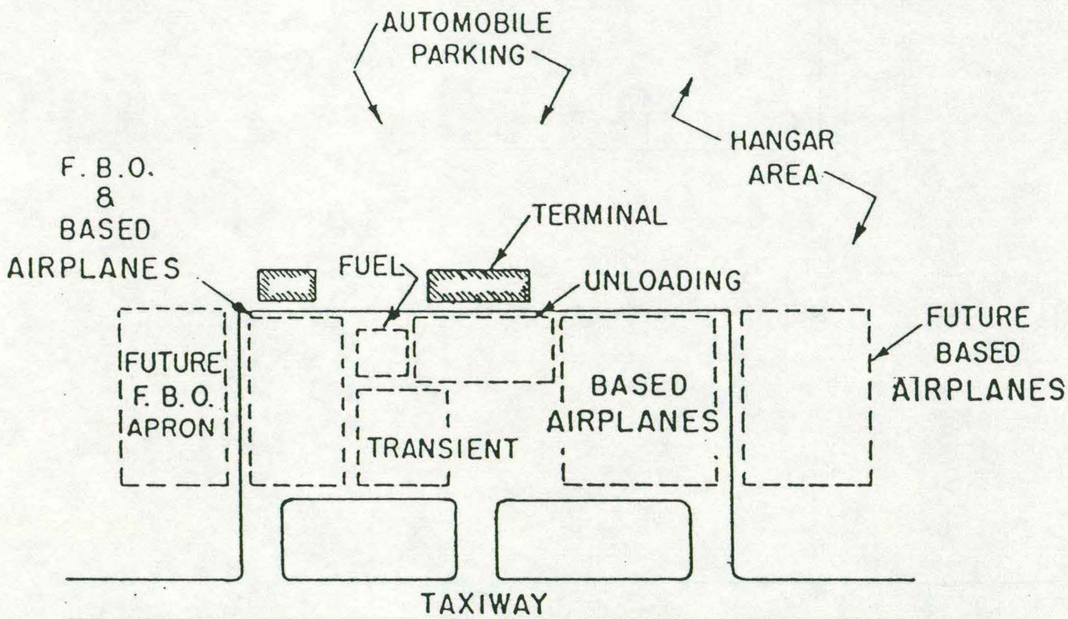
Hangar space requirements are normally in two forms - T-hangars and conventional hangars. In the past, Webster City has elected to develop carousel hangars in lieu of T-hangars. The majority of aircraft owners will prefer to store their aircraft in T-hangars or carousel hangars. This is the most economical form of aircraft storage for individual owners. Some aircraft owners, more specifically corporate aircraft owners, may prefer to hangar their aircraft in an individual conventional hangar. Lastly, conventional hangar space should be provided for fixed base operator facilities.

The criteria for the number of hangar spaces that should be planned for is as follows:

a. T-hangar or carousel hangar space should be provided for the number of based aircraft at the airport (use projected numbers for planning purposes). In addition, provide three to four spaces for itinerant aircraft which may need a space and as an attraction to new based aircraft.

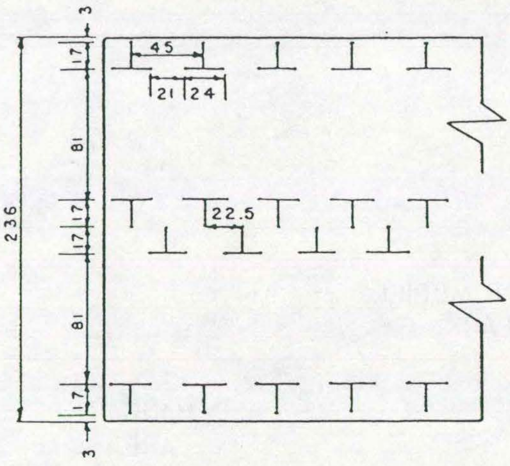
b. The number of conventional hangar spaces to be allowed for is difficult to estimate. It is highly dependent on the personal preferences of the local users. In general, two to three corporate hangars are adequate for the 20-year development of transport category airport.

c. Conventional hangar space should also be provided for the fixed based operator facilities. Initially, one such hangar will be

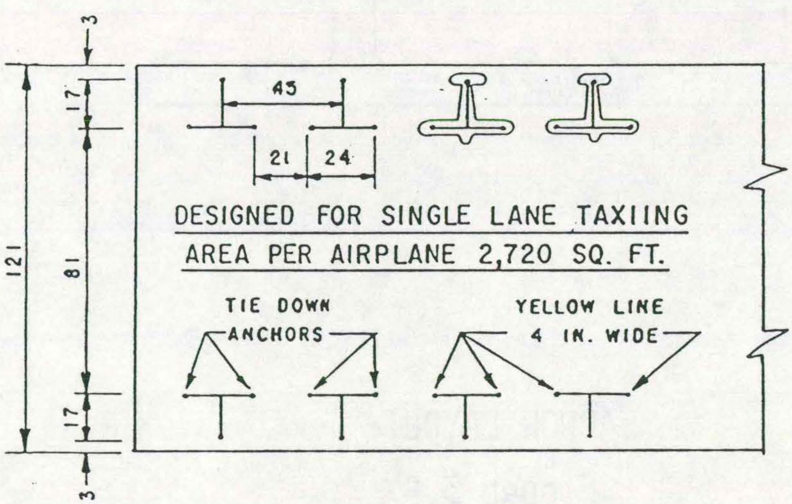


APRON LAYOUT

FIGURE 3.6



TYPICAL LAYOUT FOR
GENERAL UTILITY AIRPORT



TYPICAL LAYOUT FOR
BASIC UTILITY AIRPORT

TIEDOWN LAYOUTS

FIGURE 3.7

adequate with the potential for a second hangar in the long range development of the airport.

Based on the above criteria, the hangar requirements at the Webster City Airport are determined as follows.

YEAR	T-HANGAR SPACE	CONVENTIONAL HANGAR SPACE
1990	17	1
1995	22	1
2000	25	2
2010	29	3

Typical configurations of T-hangars and taxiways are depicted in Figure 3.8.

Administration Building:

An administration building provides accommodations for the general public along with those responsible for administration of the airport. At a minimum the building should provide room for the following facilities.

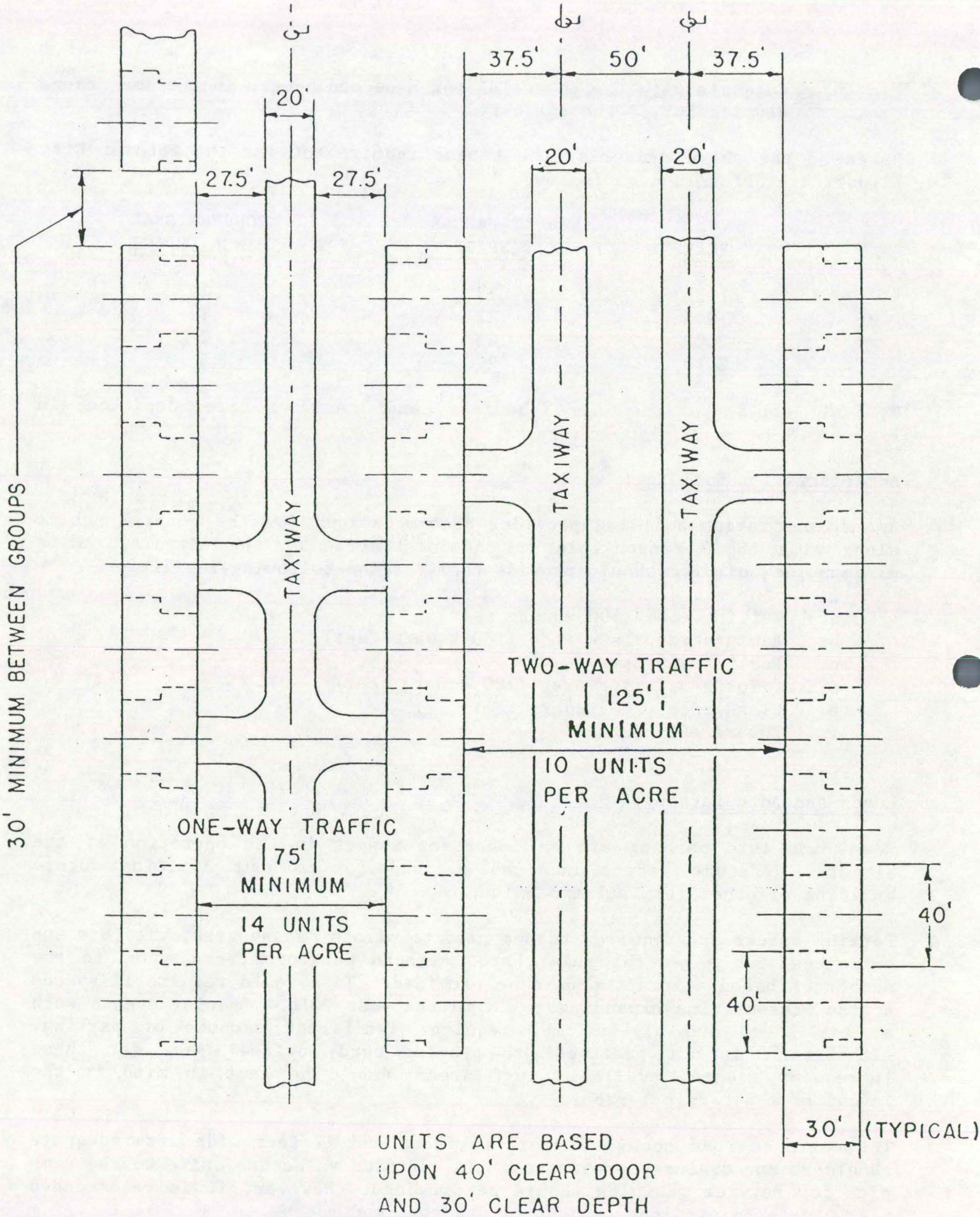
a. Waiting room (500 square feet)
b. Administrator's office (180 square feet)
c. Public restrooms
d. Pilot's briefing area (180 square feet)
e. Class room (200 square feet)
f. Future offices

Roads and Auto Parking:

Roads and auto parking are an important aspect in the operation of the airport. Adequate space must be planned for without limiting future building or other terminal expansion.

Parking spaces are required to accommodate pilots, passengers, visitors and employees. As a general rule, hard surfaced parking spaces equal to the number of based aircraft should be provided. This would require 17 spaces at the present time expanding to 26 in the year 2010. Special events such as air shows and fly-ins may require significant amounts of parking. Although it is not practical to provide hard surface space for these infrequent events, available turf areas should be kept in mind in the layout of the terminal area.

The entrance road should be hard surfaced and 22 feet wide with adequate shoulders and drainage provisions. In addition an access drive to the ramp area for service vehicles should be provided. However, it is recommended that a gate be provided to control unauthorized access.



T-HANGAR LAYOUT

FIGURE 3.8

OBSTRUCTIONS

This section sets forth the standards for determining obstructions in the navigable air space around the airport. This information should be incorporated into a tall structure zoning ordinance for future protection of air space. The information should also be provided to the FAA for use in analyzing notices of proposed construction in the area of the airport.

The following sections of this report will be quoting Federal Aviation Regulation Part 77 - Objects Affecting Navigable Air Space as it pertains to the Webster City Airport.

Obstruction Standards:

An obstruction is considered to be any object of natural growth, terrain, or structures of permanent or temporary construction if it is higher than any of the following heights or surfaces:

a. A height of 500 feet above ground level at the site of the object.

b. A height that is 200 feet above ground level or above the established airport elevation, whichever is higher, within 3 nautical miles of the established reference point of an airport. That height increases in the proportion of 100 feet for each additional nautical mile of distance from the airport up to a maximum of 500 feet.

c. The surface of a takeoff and landing area of an airport or any imaginary surface established under paragraphs 77.25, 77.28, or 77.29 (FAR Part 77). However, no part of the takeoff or landing area itself will be considered an obstruction.

The height of traverse ways to be used for the passage of mobile objects are increased as follows:

a. 17 feet for an Interstate highway.

b. 15 feet for any other public roadway.

c. 10 feet above the height of the highest mobile object that would normally traverse the road, whichever is greater, for a private road.

d. 23 feet for a railroad.

e. For a waterway or any other traverse way not previously mentioned, an amount equal to the height of the highest mobile object that would normally traverse it.

The following paragraphs describe the imaginary surfaces as they would apply to the Webster City Airport. Refer to Figure 3.9 for a graphic depiction of these surfaces.

Horizontal Surface - A horizontal plane 150 feet above the established airport elevation, the perimeter of which is constructed by swinging arcs of 10,000 feet radii from the center of each end of the primary surface of each runway and connecting the adjacent arcs by lines tangent to those arcs.

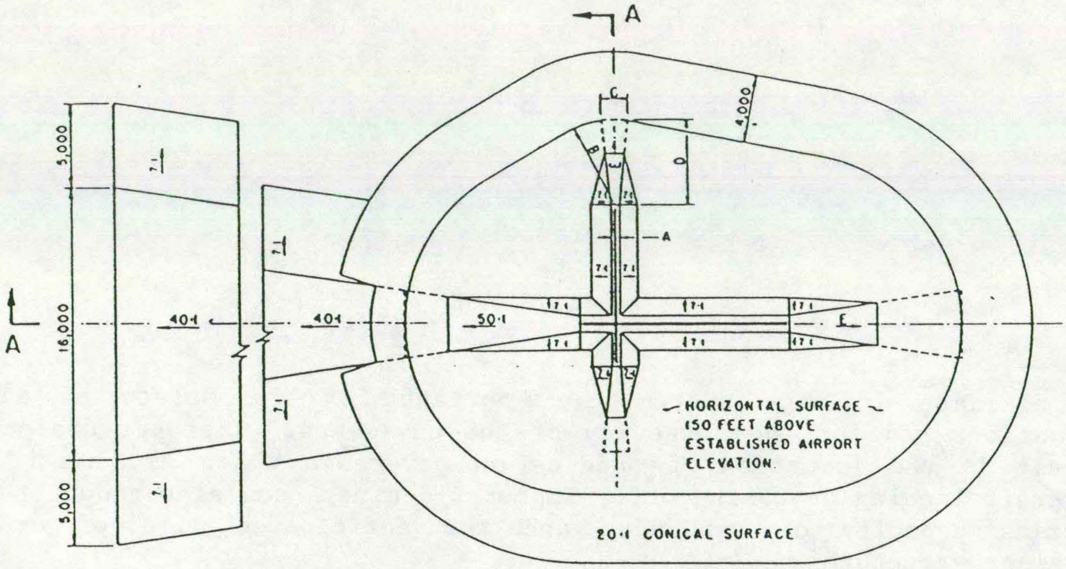
Conical Surface - A surface extending outward and upward from the periphery of the horizontal surface at a slope of 20 to 1 for a horizontal distance of 4,000 feet.

Primary Surface - A surface longitudinally centered on a runway and extending beyond the end of that runway. The elevation of any point on the primary surface is the same as the elevation of the nearest point on the runway centerline. The width of a primary surface is 500 for nonprecision instrument runways having visibility minimums greater than three-fourths statute mile and 1,000 feet for a nonprecision instrument runway having a nonprecision instrument approach with visibility minimums as low as three-fourths of a statute mile.

Approach Surface - A surface longitudinally centered on the extended runway centerline and extending outward and upward from each end of the primary surface. An approach surface is applied to each end of each runway based upon the type of approach available or planned for that runway end. The inner edge of the approach surface is the same width as the primary surface and it expands uniformly to a width of 1,250 feet for that end of a utility runway with only visual approaches; and 1,500 feet for that end of a runway other than a utility runway with only visual approaches; 2,000 feet for that end of a utility runway with a nonprecision instrument approach; 3,500 feet for that end of a nonprecision instrument runway other than utility, having visibility minimums greater than three-fourths of a statute mile; 4,000 feet for that end of a nonprecision instrument runway, other than utility, having a nonprecision instrument approach with visibility minimums as low as three-fourths statute mile; and 16,000 feet for precision instrument runways. The approach surface extends for a horizontal distance of: 5,000 feet at a slope of 20 to 1 for all utility and visual runways; 10,000 feet at a slope of 34 to 1 for all nonprecision instrument runways other than utility; and 10,000 feet at a slope of 50 to 1 with an additional 40,000 feet at a slope of 40 to 1 for all precision instrument runways.

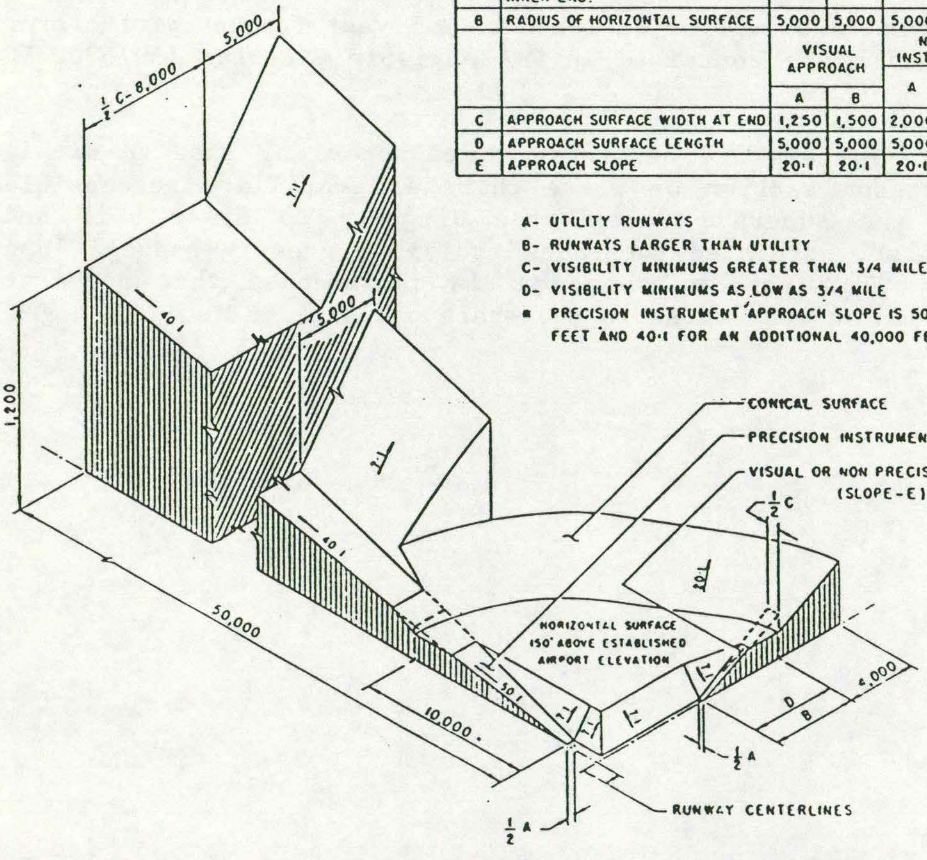
Transitional Surface - These surfaces extend outward and upward at right angles to the runway centerline and the runway centerline extended at a slope of 7 to 1 from the sides of the primary surface and from the sides of the approach surfaces.

The type of surface to be used shall be for the most precise approach existing or planned for that runway end.



DIM	ITEM	DIMENSIONAL STANDARDS (FEET)					
		VISUAL RUNWAY		NON-PRECISION INSTRUMENT RUNWAY			PRECISION INSTRUMENT RUNWAY
					B		
		A	B	A	C	D	
A	WIDTH OF PRIMARY SURFACE AND APPROACH SURFACE WIDTH AT INNER END.	250	500	500	500	1,000	1,000
B	RADIUS OF HORIZONTAL SURFACE	5,000	5,000	5,000	10,000	10,000	10,000
		VISUAL APPROACH		NON-PRECISION INSTRUMENT APPROACH			PRECISION INSTRUMENT APPROACH
					B		
		A	B	A	C	D	
C	APPROACH SURFACE WIDTH AT END	1,250	1,500	2,000	3,500	4,000	16,000
D	APPROACH SURFACE LENGTH	5,000	5,000	5,000	10,000	10,000	*
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 10,000 FEET AND 40:1 FOR AN ADDITIONAL 40,000 FEET



ISOMETRIC VIEW OF SECTION A-A

IMAGINARY SURFACES

FIGURE 3.9

DRAINAGE

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

Typical pavement cross sections are shown in Figure 3.2. It is recommended here that runway and taxiway cross slopes be designed at 1 1/2%. There should be a pavement edge drop of 1 1/2 inches to the shoulder to allow for turf build-up. The shoulder immediately adjacent to paved areas should be sloped at 5% for the first 10 feet from the pavement edge to assure positive surface runoff. Beyond 10 feet, turf areas should be sloped 2%.

Surface drainage systems should be designed on a 5-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 1 foot of the pavement section or where there are capillary susceptible soils. 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, it is recommended that pavement subdrains be provided at most sites in the state of Iowa.

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 distress. Pavement for the Webster City Airport should be designed to accommodate basic transport aircraft with a maximum gross weight of 30,000 pounds and a single wheel gear.

The various pavement courses are shown graphically in Figure 3.10 and described as follows.

Surface Course - includes Portland cement concrete, bituminous concrete, aggregate bituminous mixtures, or bituminous surface treatments.

Base Course - consists of a variety of different materials which generally fall into two main classes, treated and untreated. The untreated bases consist of stone, gravel, lime rock, sand-clay, or a variety of other materials. The treated bases normally consist of a crushed or uncrushed aggregate that has been mixed with cement or bitumen.

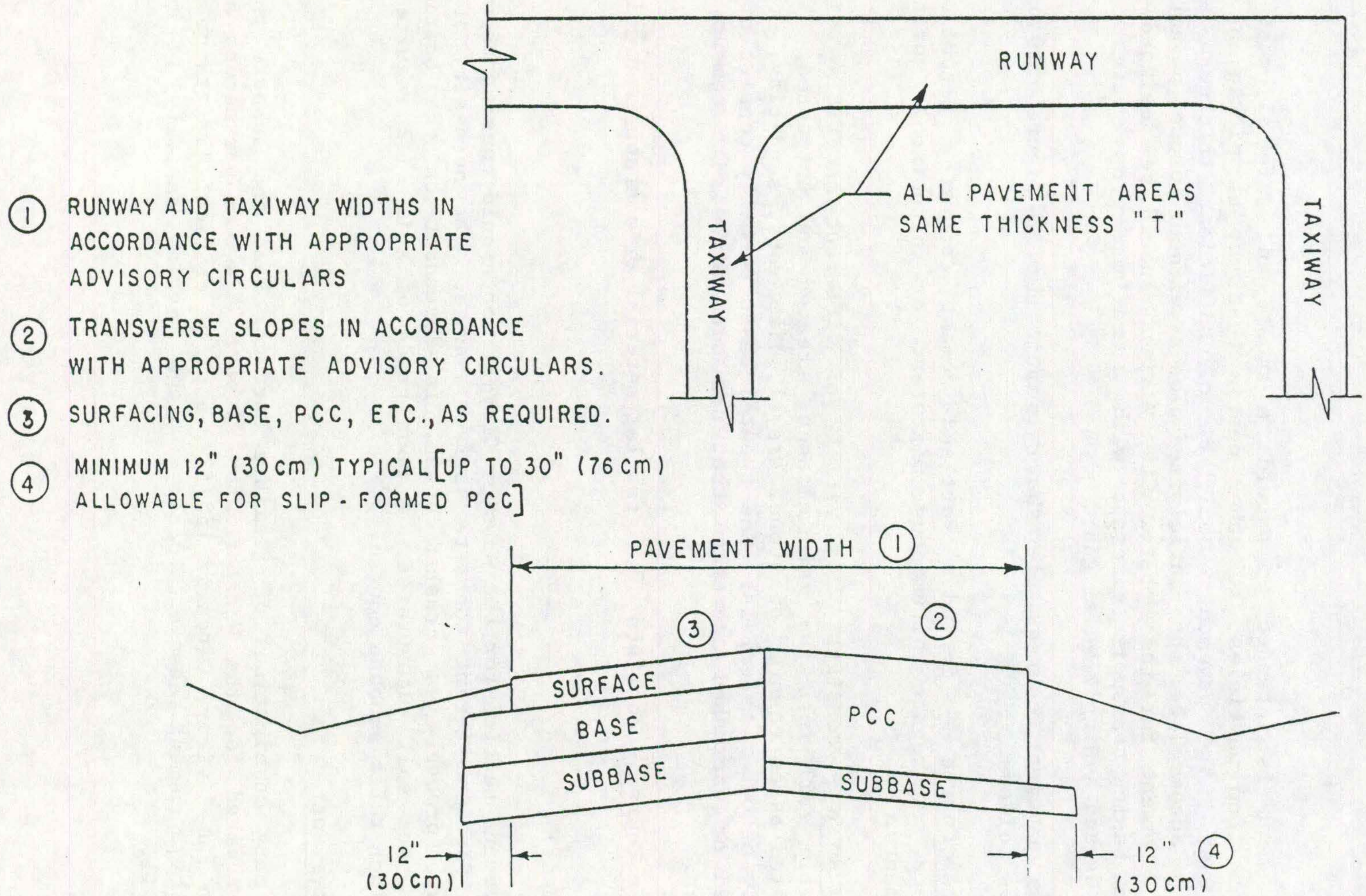
Subbase Course - consists of a granular material or a stabilized soil.

Rigid Pavement:

A rigid pavement section for the Webster City Airport would consist of a 6 inch thick Portland Cement Concrete surface course. The necessity of a base course, probably of crushed stone, is dependent on the bearing capacity of the soil encountered. A poor grade of soil will require a minimum 4 inch thick subbase course.

Flexible Pavement:

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



TYPICAL PAVEMENT SECTIONS

FIGURE 3.10

MARKING, LIGHTING AND VISUAL AIDS

Marking:

Pavement markings are an important aid in safely guiding aircraft on runways and taxiways. The specific details of marking layout are addressed in FAA Advisory Circular 150/5340-1E Marking of Paved Areas on Airports. The following describes some of the requirements as they would apply to the Webster City Airport. Refer to Figures 3.11 and 3.12 for details.

Visual Runway

a. Centerline marking - The runway centerline markings consist of a line of uniformly spaced stripes 120 feet in length and gaps of 80 feet. The minimum width is 12 inches.

b. Designation marking - The designation marking indicates the magnetic bearing of the runway centerline to the nearest 10 degree increment. For example, a magnetic bearing of 127 degrees would be represented by "13". The numbers are normally 60 feet high with a width dependent on the runway width.

c. Fixed distance marking - Required when there is jet activity. Two solid longitudinal bars located either side of the runway centerline 1,000 feet from the runway threshold.

d. Holding position markings (taxiways and intersecting runways) - holding position markings consist of a painted hold line and a sign indicating the runway designation numbers.

Nonprecision Instrument Runway:

a. Centerline marking - Same as for visual runway except the minimum width is 18 inches.

b. Designation marking - Same as for visual runway.

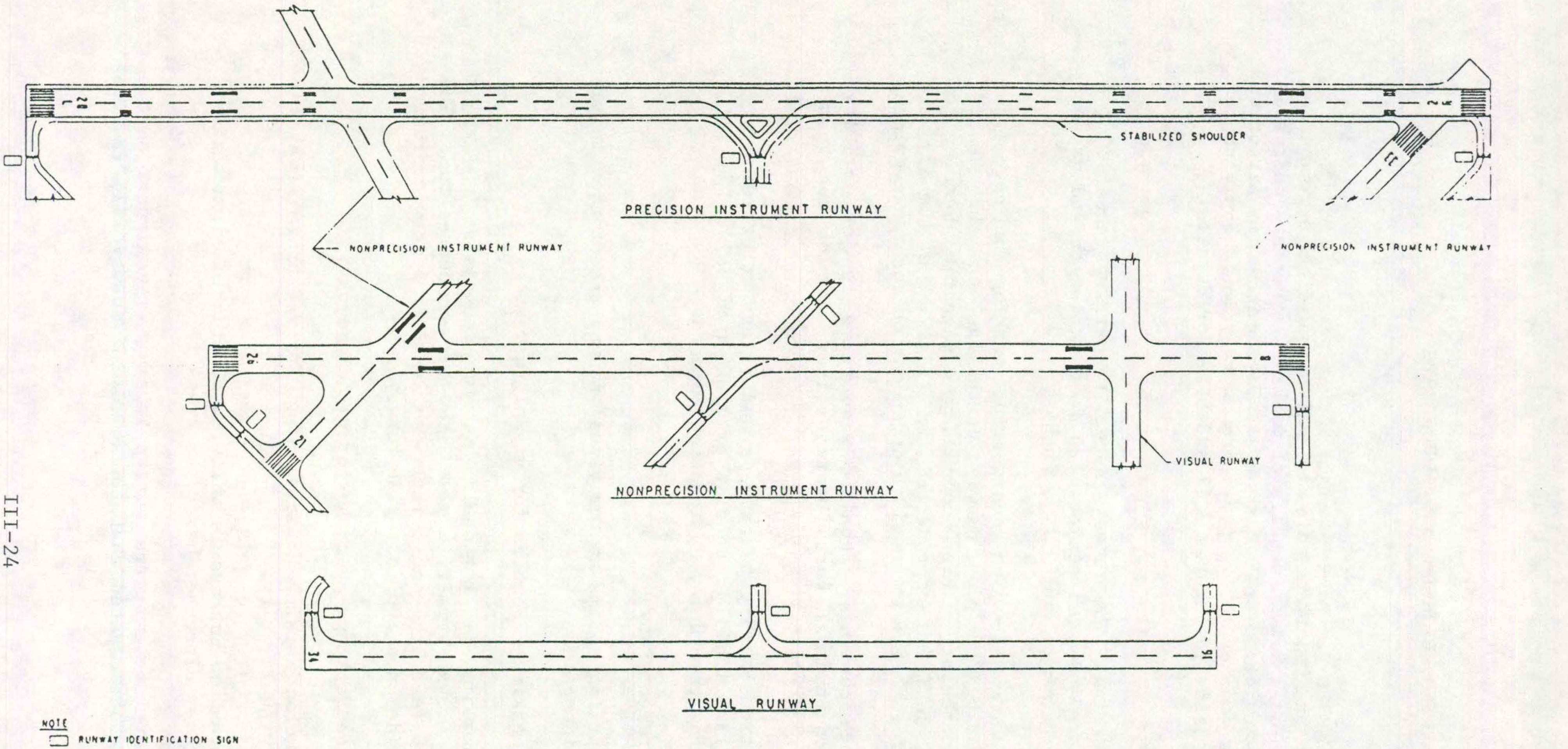
c. Threshold marking - threshold marking consists of eight longitudinal lines symmetric about the runway centerline. The lines are 150 feet long and 6 feet wide on a 75 foot wide runway and 8 feet wide on a 100 foot wide runway.

d. Fixed distance marking - Same as for visual runway.

e. Holding position marking (taxiways and intersecting runways) - Same as for visual runway.

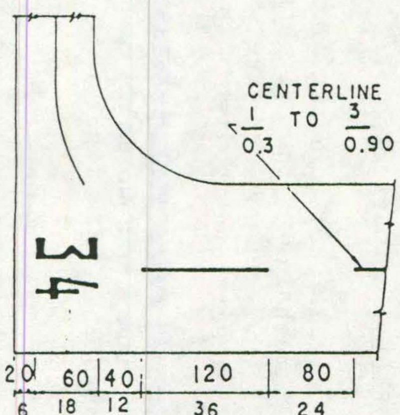
The color of marking used on runways is white, while that used on taxiways and for marking deceptive, closed or hazardous areas is yellow.

Nonprecision marking will be required at the Webster City Airport on the primary runway. It is anticipated that the crosswind runway will require



RUNWAY MARKINGS
FIGURE 3.11

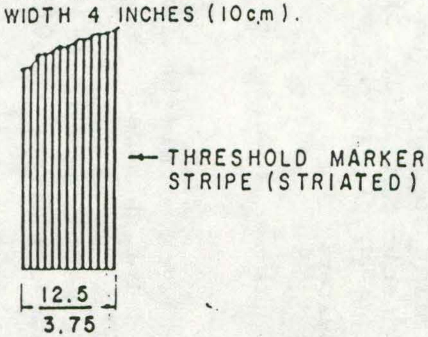
NOTE: UNITS ARE EXPRESSED AS $\frac{\text{FEET}}{\text{METERS}}$ e.g. $\frac{10}{3}$.



VISUAL RUNWAY

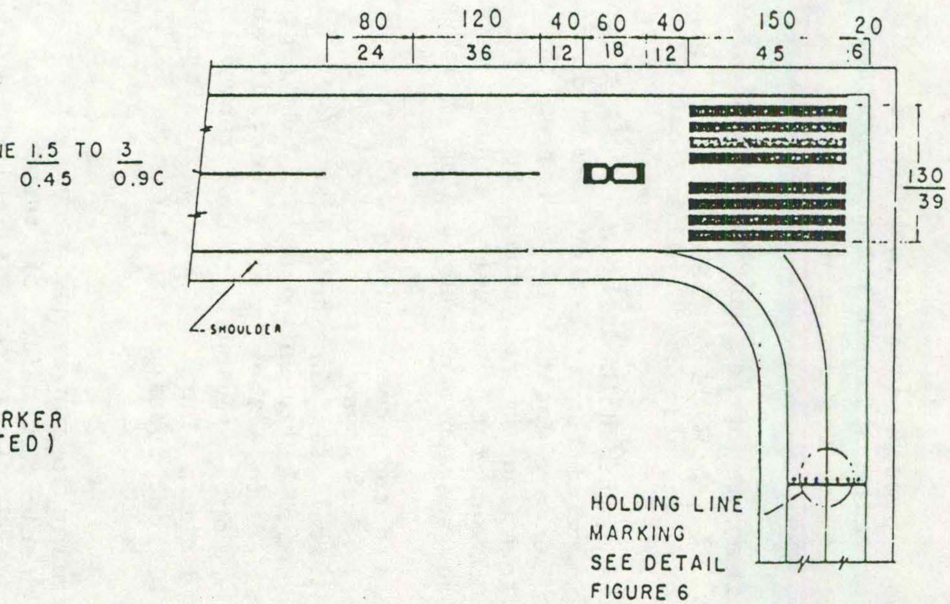
NOTES:

1. ALL STRIPES AND SPACES TO BE EQUAL WIDTH.
2. MAXIMUM WIDTH 6 INCHES (15cm)
   MINIMUM WIDTH 4 INCHES (10cm).



FROST AREA MARKING

(TYPICAL)



NONPRECISION INSTRUMENT RUNWAY

VISUAL AND NONPRECISION MARKING

FIGURE 3.12

visual marking until approach procedures are established. At that time, nonprecision instrument runway marking should be incorporated.

Lighting:

Airport lighting allows nighttime operations and enhances an airport's serviceability and safety. A lighting system consists of runway and taxiway lights, rotating beacon and a lighted wind indicator.

Runway lights include edge and threshold lights. It is recommended that the primary runway and cross wind runway employ medium intensity runway lights (M.I.R.L.). Edge lights are located 10 feet from the edge of the runway pavement with a uniform spacing not exceeding 200 feet. The edge lights have clear lenses except for instrument runway where the last 2,000 feet of runway away from the approach end have amber lenses.

Threshold lights have split red and green lenses. The red half faces the runway and the green half faces away from the runway. Although the standard arrangement is to install six threshold lights on a visual runway and eight threshold lights on an instrument runway, it is recommended here that eight lights be installed in either case. Thus, if an instrument approach should be developed for a previously visual runway, it would not be necessary to modify the lights. The threshold lights are installed in two groups of four and a 10 foot spacing with the outside light in line with the edge lights.

Blue taxiway lights are similar to runway lights as far as intensity and location are concerned. Specific details of runway and taxiway edge lighting systems can be found in FAA Advisory Circular 150/5340-24 Runway and Taxiway Edge Lighting System.

An airport rotating beacon has two rotating beams of light. One light is green and the other white.

The wind indicator or wind sock should be installed at the center of a segmented circle and lighted for enhanced visibility. The lighting should also illuminate any traffic pattern indicators associated with the installation. Specific information on wind indicators and rotating beacons can be obtained from FAA Advisory Circular 150/5340-21.

Airport Visual Aids:

A number of visual aids are available to assist a pilot in locating and navigating about an airport. Those recommended for the Webster City Airport are described in the following paragraphs.

Runway End Identifier Lights (R.E.I.L.) consist of two flashing lights located at the runway threshold. The lights provide positive identification of the end of the runway and are of particular use in featureless terrain or confusing surrounding lights.

Visual Approach Slope Indicators (V.A.S.I.) provide visual guidance for landing approaches. The light units are normally located on the left side of the runway as viewed on approach. Each light unit emits a red and white beam of light which enables a pilot to determine whether the approach is being made above, on or below the recommended approach. A two-box V.A.S.I. system is recommended for the Webster City Airport.

INDUSTRIAL PARK

An airport industrial park can be an attraction to those industries that rely heavily on air transportation for the movement of people and goods. A number of considerations influence an industry's decision to locate at an airport including: landside access, availability of land, utilities, and airport services and facilities.

In order for the Webster City Airport to be an attraction to industry, improvements need to be made to its utility services. Due to the airport's location with respect to existing utilities, upgrading of all the utilities may be cost prohibitive and would at least warrant a detailed study. It is perhaps more realistic to look at accommodation of industries that place a relatively low demand on utilities such as warehousing and service industries.

The general considerations to be made in the layout of an airport industrial park include:

Location on the Airport
Taxiway Access
Landside Access
Parking and Loading
Utilities
Building Setbacks and Limitations

The location on the airport should be such that it takes as much advantage of the airport situation as possible. However, it is advisable to keep the industrial area separate from the terminal area to facilite traffic flow and avoid conflicts and competition for airport ground facilities. Also, ground taxi time should be kept to a minimum. Landside access should include consideration of employee parking, visitor parking, truck loading and parking areas and entrance driveways. The building locations and related facilities should take into account the various setback requirements and Part 77 surfaces identified in this phase of the study.

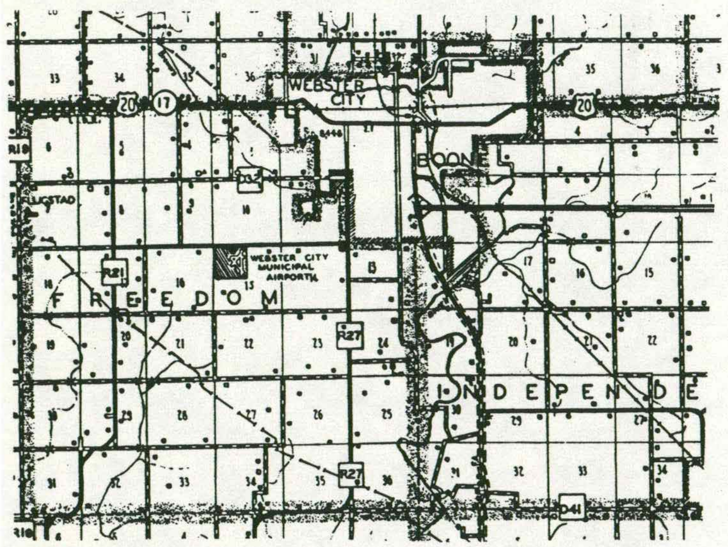
AIRPORT LAYOUT PLAN

AIRPORT LAYOUT PLAN
WEBSTER CITY MUNICIPAL AIRPORT
WEBSTER CITY, IOWA
~1989~

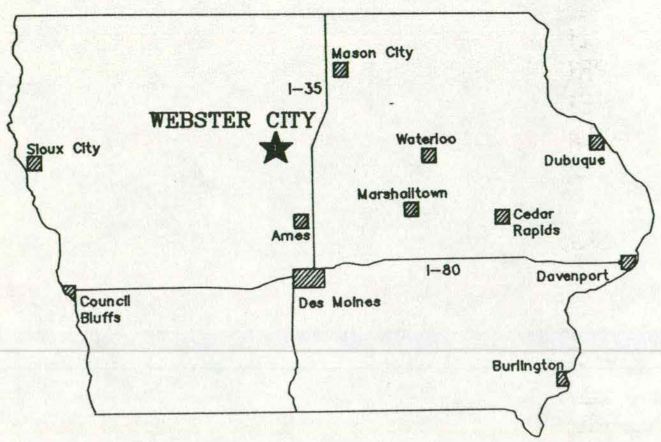
LEGEND

- Property or Right-of-Way Lines
- Railroad Tracks
- Building
- Power Pole w/Guy
- Telephone Pole
- Intakes
- Fences
- Manhole
- Hydrant
- Trees
- Bushes
- Stump
- Curb Stop
- Valve
- Street Light
- Street Signs
- Culvert
- Water Line
- Sanitary Sewer Line
- Storm Sewer Line
- Gas line
- Electric Cable
- Telephone Cable

REVISIONS	
DATE	SHEETS



LOCATION MAP



SHEET INDEX

APPROVED:

SIGNED, DATE

____________ ____________

CHAIRMAN:

I HEREBY CERTIFY THAT THESE PLANS WERE PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF IOWA.

SIGNED, DATE

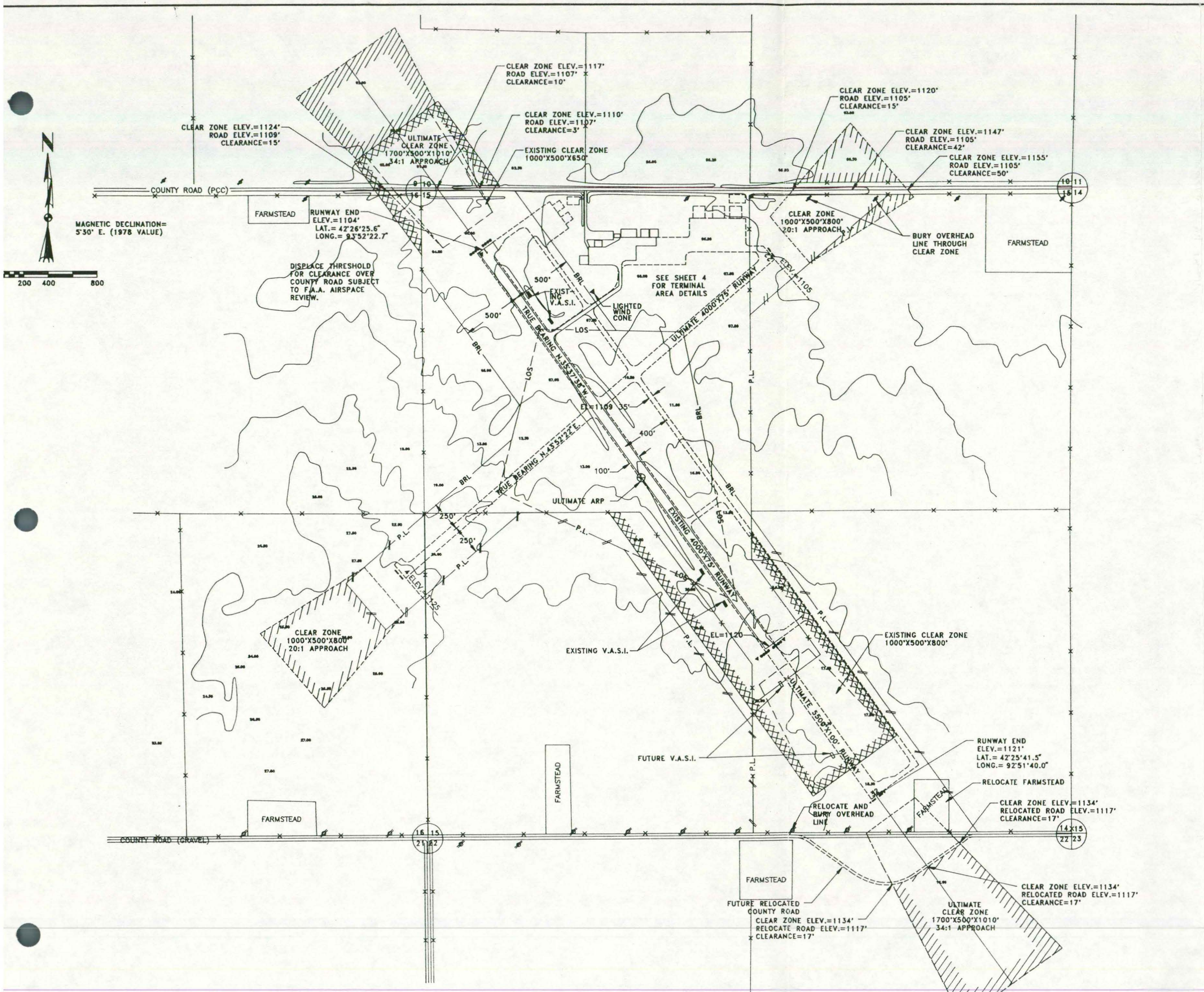
William R. Grabe Oct. 18 ,1989

WILLIAM R. GRABE, P.E.
IOWA REG. NO. 9221

CGA
CONSULTING ENGINEERS
MARSHALLTOWN AMES

P.N. 4092 SHEET 1

MAP 1



RUNWAY DATA

ITEM	RUNWAY 14 – 32		RUNWAY 4 – 22	
	EXISTING	ULTIMATE	EXISTING	ULTIMATE
EFFECTIVE GRADIENT, %	0.40	0.29		0.50
% WIND COVERAGE	83.8	90.1		72.4
CLASSIFICATION	NPIR	NPIR		VISUAL
PAVEMENT STRENGTH	12,500	30,000		12,500
APPROACH SLOPES	20:1	34:1		20:1
LIGHTING	MIRL	MIRL		MIRL
MARKING	NPIR	NPIR		BASIC
APPROACH AIDS	VASI & REIL	VASI & REIL		VASI & REIL
LENGTH	4000'	5500'		4000'
WIDTH	75	100'		75
APPROACH CATEGORY/ DESIGN GROUP	B/II	C/II		B/II
SAFETY AREA DIMENSIONS	150'X4600'	500'X6700'		150'X4600'
O.F.Z. DIMENSIONS	250'X4400'	400'X5400'		250'X4400'

ABBREVIATIONS

BRL	BUILDING RESTRICTION LINE
FBO	FIXED BASE OPERATOR
MIRL	MEDIUM INTENSITY RUNWAY LIGHTS
REIL	RUNWAY END IDENTIFIER LIGHTS
VASI	VISUAL APPROACH SLOPE INDICATOR
NDB	NON-DIRECTIONAL RADIO BEACON
ARP	AIRPORT REFERENCE POINT
LOS	LINE OF SIGHT
ILS	INSTRUMENT LANDING SYSTEM
VOR	VERY HIGH FREQUENCY OMNIRANGE
TVOR	TERMINAL VOR

AIRPORT DATA

ITEM	EXISTING	ULTIMATE
AIRPORT ELEVATION	1117	1125.0
NORMAL MAX. TEMP.	87° F	87° F
TAXIWAY MARKING	BASIC	BASIC
NAVIGATIONAL AIDS	NDB	NDB
AIRPORT COORDINATES { LAT.	42°26'25"	42°26'07.1"
AIRPORT COORDINATES { LONG.	93°52'00"	93°52'06.0"
WIND COVERAGE(12 M.P.H.)	83.5%	92.8%
CLASSIFICATION	G.U	TRANSPORT

LEGEND

EXISTING	ULTIMATE	ITEM
NOT SHOWN	BRL	BUILDING RESTRICTION LINE
1210	NOT SHOWN	GROUND CONTOURS
		AIRPORT PROPERTY LINE
●●●● ●●●●	oooo oooo	THRESHOLD LIGHTS
		FACILITIES
▲	△	RUNWAY END INDENTIFICATION LIGHT
●	○	RUNWAY LIGHTS
		BUILDING CONSTRUCTION
TL	FL	TILE LINE & INTAKE
P	NOT SHOWN	POWER LINE
xxxxxxxxx		EASEMENTS
NOT SHOWN	LOS	LINE OF SIGHT
		AIRPORT PROPERTY LINE
		CLEAR ZONE
x x x		AIRPORT FENCING
	NOT SHOWN	TELEPHONE OR POWER LINE
		ASIRCRAFT TIE-DOWNS

REVISION	DATE

AIRPORT LAYOUT PLAN

WEBSTER CITY MUNICIPAL AIRPORT

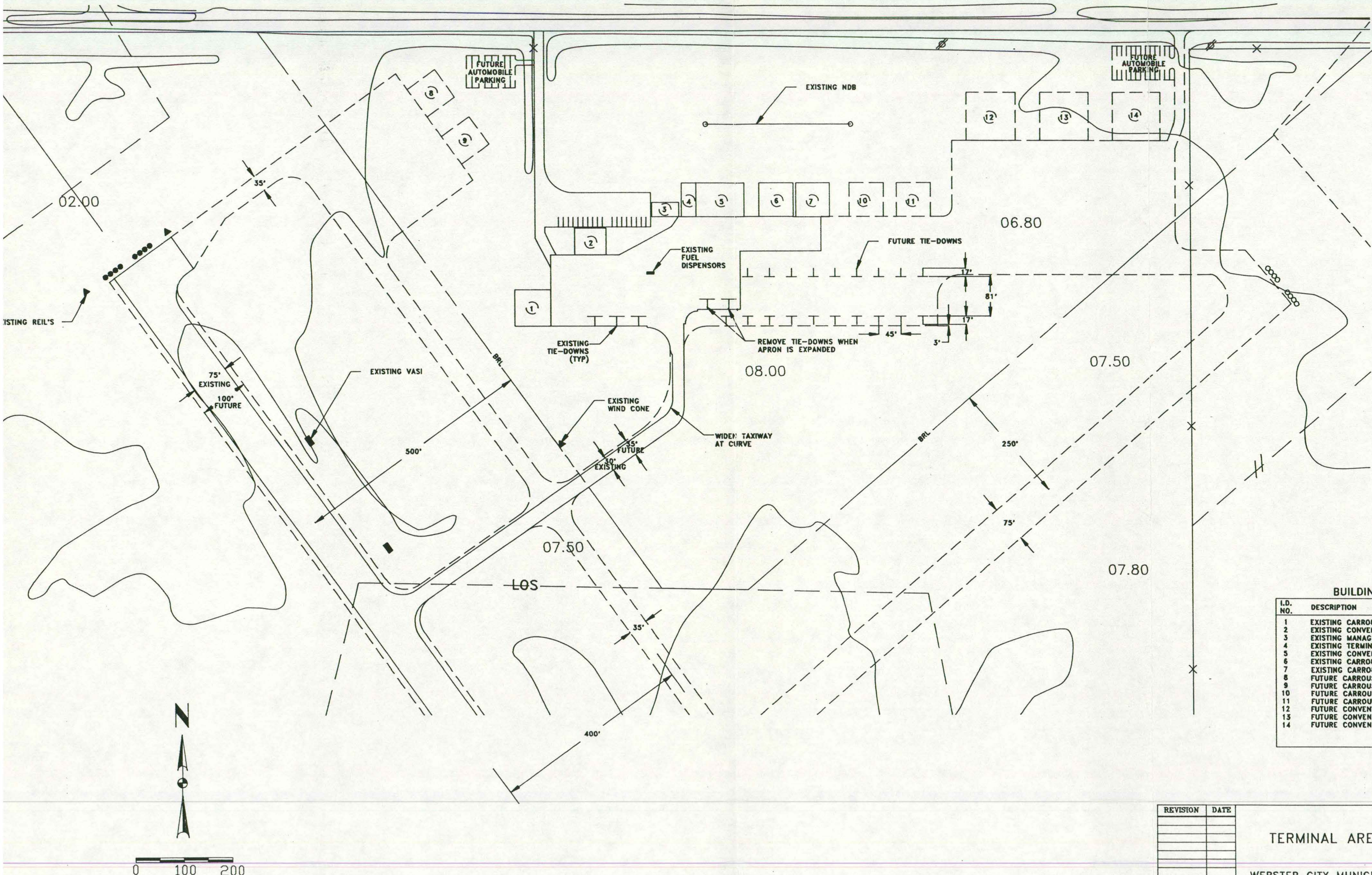
CGA CONSULTING ENGINEERS

DATE 8-89

P.N. 4092

SHEET 2 OF 6

MAP 2



BUILDING TABLE

I.D. NO.	DESCRIPTION
1	EXISTING CARROUSEL HANGAR
2	EXISTING CONVENTIONAL HANGAR
3	EXISTING MANAGER'S RESIDENCE
4	EXISTING TERMINAL BUILDING
5	EXISTING CONVENTIONAL HANGAR
6	EXISTING CARROUSEL HANGAR
7	EXISTING CARROUSEL HANGAR
8	FUTURE CARROUSEL OR CONVENTIONAL HANGAR
9	FUTURE CARROUSEL OR CONVENTIONAL HANGAR
10	FUTURE CARROUSEL HANGER
11	FUTURE CARROUSEL HANGER
12	FUTURE CONVENTIONAL HANGAR
13	FUTURE CONVENTIONAL HANGAR
14	FUTURE CONVENTIONAL HANGAR

REVISION	DATE

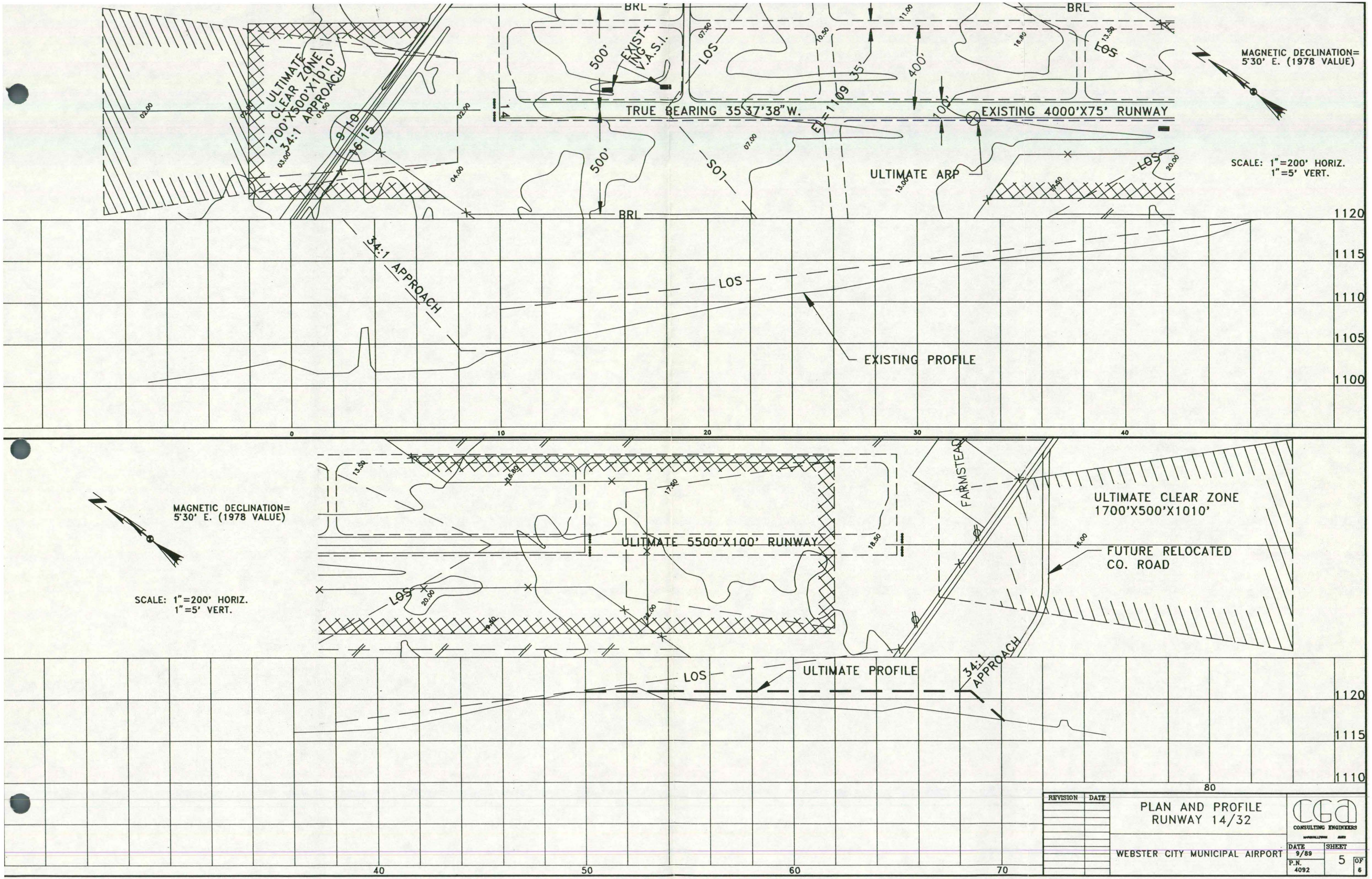
TERMINAL AREA PLAN

WEBSTER CITY MUNICIPAL AIRPORT

CGA CONSULTING ENGINEERS

DATE 8-89
P.N. 4092
SHEET 4 OF 6

MAP 3



PLAN AND PROFILE
RUNWAY 14/32

WEBSTER CITY MUNICIPAL AIRPORT

REVISION	DATE

CGA CONSULTING ENGINEERS

DATE 9/89
SHEET 5 OF 6
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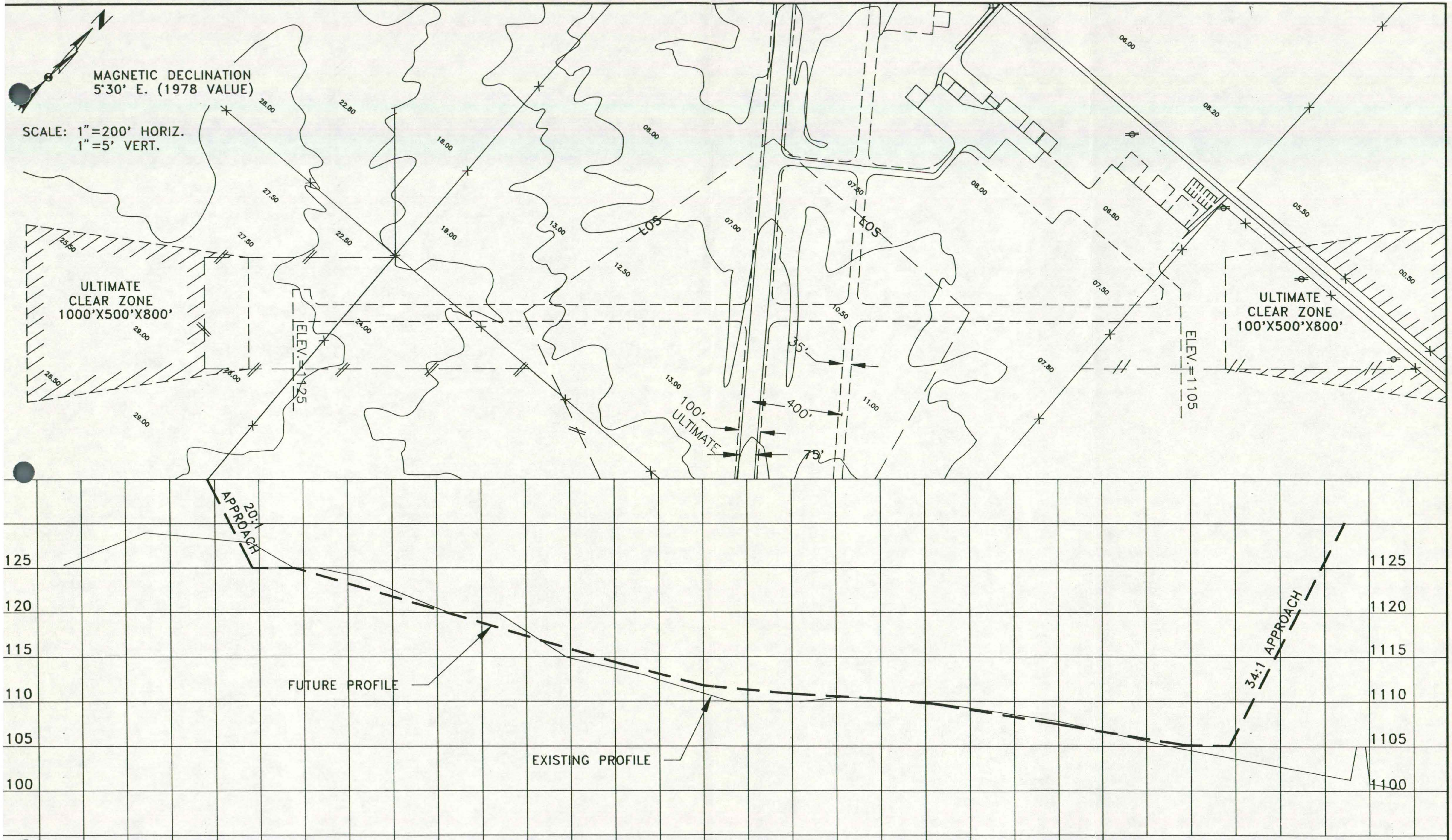

REVISION	DATE

PLAN & PROFILE
RUNWAY 5/23

WEBSTER CITY MUNICIPAL AIRPORT

CGA CONSULTING ENGINEERS

DATE 9/89
P.N. 4092
SHEET 6 OF 6

DEVELOPMENT SCHEDULE AND FINANCIAL PLAN

PROPOSED IMPROVEMENTS

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

Stage One (1 to 5 Years): The projects planned for Stage One accomplishment include reconstruction of a portion of the existing apron and expansion of the apron to the east. This project has been commonly referred to as phase III apron improvements. This project will provide improved access to the two existing carrousel hangars, access to two new carrousel hangars (also part of Stage One improvements) and an expanded tie-down area.

Improvement to the existing taxiway system are planned to alleviate congestion and safety problems that are currently occurring. The existing taxiway connecting the ramp with the runway is long and narrow and has a horizontal geometry making it difficult to navigate. The combination of the narrow taxiway and the point at which it connects with the runway often causes conflicts between aircraft. An aircraft taxiing to the runway for departure cannot allow an aircraft that has landed to get off the runway, which in turn will not allow any aircraft in the pattern to land. This type of congestion occurs frequently. To remedy the situation, it is planned to widen the existing taxiway from 30 feet to the standard 35 feet and provide additional width and realignment of the curve near the apron. Secondly, it is planned to provide a partial parallel taxiway and a second access point to the runway. It is felt these improvements are justified from a safety point of view and due to the large number of operations currently occurring at the airport.

During Stage One, it is planned to grade the portion of the cross wind runway situated inside of the existing airport property lines. This would then be seeded and maintained as a turf runway. The length would be approximately 3,000 feet from fence line to fence line. It is also recommended to pave the intersection of the cross wind runway with the existing runway and partial parallel taxiway to provide a smooth transition.

Stage Two (6 to 10 Years): The major development items anticipated during Stage Two include additional apron area expansion, taxiway improvements and possibly expansion of the primary runway.

A partial parallel taxiway is planned for the early part of Stage Two to provide a connection with runway end 14. This taxiway will enhance the safe movement of aircraft by eliminating the need to back-taxi to get into position for takeoff to the southeast.

Further ramp expansion is planned for Stage Two. This expansion would provide additional ramp space on the east side of the apron area. The expansion will nearly complete access to runway end 22 and will allow access to further hangar development.

It is anticipated that an additional carrousel hangar will be needed to accommodate increased based aircraft during the 6 to 10 year period.

Lastly, it is possible that expansion of the primary runway will become necessary in the later part of Stage Two. This expansion could involve development of the ultimate 5,500' x 100' runway depicted in the Airport Layout Plan or some lesser dimensions, depending on the demands of the critical aircraft. Any expansion of the primary runway will require additional land acquisition for construction of the improvements and clear zone protection.

Stage Three (11 to 20 Years): Stage Three improvements involve additional hangar development and further development of the cross wind runway.

The hangar development would provide additional carrousel hangar space to accommodate an anticipated increase in based aircraft.

Further development of the cross wind runway will involve land acquisition for additional length and clear zone protection along with grading, paving and lighting projects.

STAGE DEVELOPMENT COSTS

Based on the above described improvements, costs have been estimated for the stage development of the airport. The unit costs used represent an average for current 1989 pricing. Actual project costs may vary depending on several parameters such as construction conditions, specification requirements and time of construction.

Following are the estimated costs for the stage development.

ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	TOTAL PRICE
	STAGE ONE DEVELOPMENT (1 TO 5 YEARS)				
	PHASE III APRON IMPROVEMENTS				
1.	Remove Existing Pavement	1,300	S.Y.	$ 3.50	$ 4,550.00
2.	Excavation and Shouldering	3,800	C.Y.	2.50	9,500.00
3.	Subgrade Preparation	11,500	S.Y.	0.50	5,750.00
4.	Crushed Stone Base	2,400	Ton	10.00	24,000.00
5.	P.C.C. Paving	11,500	S.Y.	15.00	172,500.00
6.	Tie-Down Anchors	57	Each	75.00	4,275.00
7.	Drainage Improvements		L.S.		15,000.00
8.	Seeding and Fertilizing	1	Acre	1,000.00	1,000.00
9.	Contingencies	10%			23,657.50
10.	Legal, Admin., & Engineering	25%			64,767.50
					$325,000.00
	WIDEN AND IMPROVE ALIGNMENT OF EXISTING CONNECTING TAXIWAY				
1.	Excavation and Shouldering	500	C.Y.	$ 4.50	2,250.00
2.	Subgrade Preparation	750	S.Y.	1.00	750.00
3.	Crushed Stone Base	175	Ton	10.00	1,750.00
4.	A.C.C. Widening Paving	600	S.Y.	15.00	9,000.00
5.	3" A.C.C. Overlay of Taxiway	600	Ton	35.00	21,000.00
6.	Relocate Lights		L.S.		2,500.00
7.	Seeding and Fertilizing	0.5	Acre	1,000.00	500.00
8.	Contingencies	15%			5,662.50
9.	Legal, Admin., & Engineering	30%			13,587.50
					$ 57,000.00

ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	TOTAL PRICE
	PARTIAL PARALLEL TAXIWAY				
1.	Excavation and Shouldering	12,500	C.Y.	$ 1.50	$ 18,750.00
2.	Subgrade Preparation	10,000	S.Y.	0.50	5,000.00
3.	Crushed Stone Base	2,000	Ton	10.00	20,000.00
4.	P.C.C. Paving	9,000	S.Y.	15.00	135,000.00
5.	Seeding and Fertilizing	8.0	Acre	1,000.00	8,000.00
6.	Lighting System		L.S.		30,000.00
7.	Contingencies	10%			18,675.00
8.	Legal, Admin., & Engineering	25%			59,575.00
					$295,000.00
	GRADE A PORTION OF THE CROSS WIND RUNWAY				
1.	Excavation and Grading	20,000	C.Y.	$ 1.50	$ 30,000.00
2.	Drainage Structures	400	L.F.	20.00	8,000.00
3.	Pave Runway & Taxiway Intersec.		L.S.		100,000.00
4.	Seeding and Fertilizing	18	Acre	1,000.00	18,000.00
5.	Contingencies	10%			15,600.00
6.	Legal, Admin., & Engineering	25%			43,400.00
					$215,000.
	CAROUSEL HANGARS				
1.	Site Preparation		L.S.	$	$ 2,500.00
2.	Carousel Hangars	2	Each	60,000.00	120,000.00
3.	Ramp Approach to Doors	150	S.Y.	25.00	3,750.00
4.	Contingencies	10%			12,250.00
5.	Legal, Admin., & Engineering	25%			35,500.00
					$174,000.00

STAGE TWO DEVELOPMENT (6 TO 10 YEARS)

ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	TOTAL PRICE
	ADDITIONAL APRON AREA EXPANSION				
1.	Excavation and Shouldering	1,000	C.Y.	$ 4.50	$ 4,500.00
2.	Subgrade Preparation	14,000	S.Y.	0.50	7,000.00
3.	Crushed Stone Base	3,000	Ton	10.00	30,000.00
4.	P.C.C. Paving	14,000	S.Y.	15.00	210,000.00
5.	Seeding and Fertilizing	1	Acre	1,000.00	1,000.00
6.	Contingencies	10%			25,250.00
7.	Legal, Admin., & Engineering	25%			70,250.00
					$348,000.0

ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	TOTAL PRICE
	TAXIWAY CONNECTION TO RUNWAY END 14				
1.	Excavation and Shouldering	6,500	C.Y.	$ 2.50	$ 16,250.00
2.	Subgrade Preparation	5,200	C.Y.	0.50	2,600.00
3.	Crushed Stone Base	1,100	Ton	10.00	11,000.00
4.	P.C.C. Paving	4,700	S.Y.	15.00	70,500.00
5.	Drainage Improvements		L.S.		4,000.00
6.	Seeding and Fertilizing	3	Acre	1,000.00	3,000.00
7.	Contingencies	10%			10,735.00
8.	Legal, Admin., & Engineering	25%			29,915.00
					$148,000.00
	CAROUSEL HANGAR DEVELOPMENT				
1.	Site Preparation		L.S.	$	$ 2,000.00
2.	Carousel Hangar	1	Each	60,000.00	60,000.00
3.	Ramp Approach to Doors	75	S.Y.	25.00	1,875.00
4.	Contingencies	10%			6,200.00
5.	Legal, Admin., & Engineering	25%			$ 17,925.00
					$ 88,000.00
	LAND ACQUISITION FOR PRIMARY RUNWAY EXTENSION				
1.	Land Acquisition in Fee	70	Acre	$2,000.00	$140,000.00
2.	Land Acquisition in Easement	38	Acre	500.00	19,000.00
3.	Relocation		L.S.		75,000.00
4.	Land Survey & Legal Descriptions		L.S.		6,000.00
5.	Appraisals & Review Appraisals		L.S.		6,000.00
6.	Negotiations		L.S.		6,000.00
7.	Legal and Administration		L.S.		6,000.00
8.	Fencing	10,200	L.F.	1.75	17,850.00
9.	Miscellaneous & Contingencies	15%			42,150.00
					$318,000.00
	COUNTY ROAD RELOCATION				
1.	Excavation and Grading	2,500	C.Y.	$ 2.50	$ 6,250.00
2.	Gravel Surfacing	12,000	Ton	8.00	96,000.00
3.	Miscellaneous & Contingencies	15%			15,337.50
4.	Legal, Admin., & Engineering	25%			29,412.50
					$147,000.00

ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	TOTAL PRICE
	RUNWAY WIDENING, LENGTHENING, STRENGTHENING, AND LIGHTING				
1.	Excavation and Shouldering	35,000	C.Y.	$ 1.00	$ 35,000.00
2.	Subgrade Preparation	30,000	S.Y.	0.50	15,000.00
3.	Crushed Stone Base	6,500	Ton	10.00	65,000.00
4.	A.C.C. Pave-Widening & Exten.	73,000	S.Y.	8.00	584,000.00
5.	A.C.C. Overlay	11,000	Ton	32.00	352,000.00
6.	Drainage Improvements		L.S.		20,000.00
7.	Seeding and Fertilizing	20	Acre	1,000.00	20,000.00
8.	Lighting System		L.S.		75,000.00
9.	Contingencies	10%			109,100.00
10.	Legal, Admin., & Engineering	25%			318,900.00
					$1,594,000.00

STAGE THREE DEVELOPMENT (11 TO 20 YEARS)

ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	TOTAL PRICE
	CAROUSEL HANGAR DEVELOPMENT				
1.	Site Preparation		L.S.	$	$ 2,000.00
2.	Carousel Hangar	1	Each	60,000.00	60,000.00
3.	Ramp Approach to Doors	75	S.Y.	25.00	1,875.00
4.	Contingencies	10%			6,200.00
5.	Legal, Admin., & Engineering	25%			17,925.00
					$88,000.
	LAND ACQUISITION FOR CROSS WIND RUNWAY EXPANSION				
1.	Land Acquisition in Fee	35	Acre	$2,000.00	$ 70,000.00
2.	Land Acquisition in Easement	20	Acre	500.00	10,000.00
3.	Land Survey & Legal Description		L.S.		4,000.00
4.	Appraisals and Review Appraisals		L.S.		4,000.00
5.	Negotiations		L.S.		4,000.00
6.	Legal and Administration		L.S.		4,000.00
7.	Fencing	4,300	L.F.	1.75	7,525.00
8.	Miscellaneous & Contingencies	15%			16,475.00
					$120,000.00
	GRADING, PAVING AND LIGHTING OF CROSS WIND RUNWAY				
1.	Excavation and Shouldering	8,000	C.Y.	$ 1.50	$ 12,000.00
2.	Subgrade Preparation	39,000	S.Y.	0.50	19,500.00
3.	Crushed Stone Base	8,200	Ton	10.00	82,000.00
4.	P.C.C. Paving	35,000	S.Y.	12.50	437,500.00
5.	Drainage Improvements		L.S.		15,000.00
6.	Seeding and Fertilizing	15	Acre	1,000.00	15,000.00
7.	Lighting System		L.S.		60,000.00
8.	Contingencies	10%			58,100.00
9.	Legal, Admin., & Engineering	25%			174,900.00
					$874,000.00

FINANCING

There are a number of sources of finances available to the Webster City Airport Commission for airport improvement projects. The Commission should thoroughly investigate alternative sources in planning individual projects.

Government Grants: The Iowa Department of Transportation currently participates in eligible airport improvement projects through grants of 70% of the project cost with the remaining 30% to come from local sources. The D.O.T. in the past has had $1.5 to $2.5 million available per year for improvement projects. In general, eligible projects include any improvements serving public aviation. Projects not eligible for participation include hangars, aprons within 20 feet of a hangar, parking lots and driveways. Since demand for D.O.T. money exceeds the available funds, projects are funded in the following order or priority: safety projects, preservation of existing facilities, and construction of new facilities. The D.O.T. also maintains a reserve for airport facilities and equipment on a 50-50 matching basis. The facilities and equipment program has approximately $50,000 to $100,000 available annually.

The Federal Aviation Administration participates in similar general aviation airport improvement projects as the D.O.T. The current legislation provides for participation in projects at the rate of 90% of allowable project costs. The amount of money available for general aviation improvements is variable from year to year depending on the appropriation bill and the amount of discretionary funds. Current funding levels for general aviation airports is approximately $2.5 million per year.

Other grants are sometimes available through other state and federal agencies. Such grants for airport improvements are not very common, however, their possibility should not be overlooked.

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

Private financing may also be available through donations. Some communities have had successful industrial fund drives soliciting private funds to help defray the local share of government participation grants.

Revenue Bonds: Revenue bond financing can be used for some airport improvements such as hangars. The advantage of revenue bonds is that it provides a method of financing necessary improvements without a direct burden to the taxpayer. The disadvantage is that the financing cost of revenue bonds is usually greater than general obligation bonds and it is very difficult to obtain sufficient rent on a hangar to retire revenue bonds.

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

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

Implementation: Development of the proposed improvements will probably involve many of the above sources of funding. The following table presents one possible scenario for financing of the proposed development. It should be noted that while these cost estimates reflect anticipated needs, they may not be representative of the funds that may be available. Actual funding levels will be dependent on the priorities of the Webster City Airport Commission, Webster City Council, and the grant agencies.

PROJECT	TOTAL COST	FEDERAL SHARE AT 90%	DOT SHARE AT 70%	LOCAL SHARE
STAGE I IMPROVEMENTS				
Phase III Apron Improvements	$ 325,000		$227,500	$ 97,500
Widen and Improve Alignment of Existing Connecting Taxiway	57,000		39,900	17,100
Partial Parallel Taxiway	295,000		206,500	88,500
Grade a Portion of the Cross Wind Runway	215,000		150,500	64,500
Carousel Hangars	174,000			174,000
	$1,066,000		$624,400	$441,600
STAGE II IMPROVEMENTS				
Additional Apron Area Expansion	$ 348,000		$243,600	$104,400
Taxiway Connection to Runway End 14	148,000		103,600	44,400
Carousel Hangar Development	88,000			88,000
Land Acquisition for Primary Runway Expansion	318,000	286,200		31,800
County Road Relocation	147,000	132,300		14,700
Runway Widening, Lengthening, Strengthening & Lighting	1,594,000	1,434,600		159,400
	$2,643,000	$1,853,100	$347,200	$442,700
STAGE III IMPROVEMENTS				
Carousel Hangar Development	$ 88,000			$ 88,000
Land Acquisition for Cross Wind Expansion	120,000		84,000	36,000
Grading, Paving & Lighting of Cross Wind Runway	874,000	786,600		87,400
	$1,082,000	$ 786,000	$ 84,000	$211,400