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Terminal Building: Gallatin Field

Bozeman, Montana

By

William M. Podobnik

AN AIRPORT TERMINAL FOR GALLATIN FIELD:

BOZEMAN, MONTANA

UNDERGRADUATE THESIS IN ARCHITECTURAL DESIGN

By

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INTRODUCTION

With present technology developing so rapidly, and air travel increasing in monstrous steps, airport facilities are becoming inefficient and inadequate to handle the volume of air traffic. Although the industry is moving ahead in the air, ground facilities are sadly behind.

The Gallatin Field Terminal is an example of this lacking technology. Congested areas are beginning to show, and soon these spaces will be overcrowded. As Mr. Edwin Iverson, Gallatin Airport Manager, stated, "The planning of a completely new terminal in five years is a very real possibility."

The following is an analysis of the considerations and facilities necessary for a terminal to be built at Gallatin Field in 1975.

CONDITIONS CREATING A NEED

CONDITIONS CREATING THE NEED

Airport Growth

Airport History

In the early day of the airport, the mid twenties and thirties, the terminal consisted of only a small ticket counter and perhaps a snack bar.

Bus-like terminals were prevalent in the mid thirties to 1939. The plane taxied up to and parked parellel to the building, with the passengers walking 200 to 300 feet from the entrance of the terminal to the plane. Interline transfers took place right on the apron.

The post war years (1945-1958) saw the terminal sprout fingers. Tickets were collected before the passenger boarded and the space became known as the holding area. This gathering space created a greater effect on terminal design than any other single development. (27-26) By the end of the period the walking distance was 1000 feet or more. More parking and a wider range of services were offered to the passengers and planes.

A new look to air travel and terminal planning came with the jet age. Technicians experimented with loading bridges and mobile lounges. Also, ideas of terminal clusters or satellites with walking distances of 500 feet were introduced.

Airport Growth in General

Since commercial air travel's beginning, the industry's expansion has never ceased. This year the largest plane ever built will come into commercial use. The Boeing 747, which is capable of carrying up to 490 passengers, is 231 feet long and can produce 170,000 pounds of thrust. With the advent of this giant, terminals will face a surface-transport gap, a hotel gap, and a parking lot gap.

Forecasts of passenger volumes, aircraft speeds, and capacities for the seventies will begin an era of air travel surpassing anything previously imagined. An annual growth of 15 to 20 per cent will continue unabated for the next decade. (33-126)

In 1967, 128,479,000 persons were carried by domestic airlines. A predicted 167,700,000 passengers will travel by air in 1970, and by

1980 the number will approach 400,000,000. The airline jet fleet is now approximately 1,600 planes, and in 1980 3,600 jets will be in commercial use. (33-127)

Along with increases in passenger service, the air industry is experiencing a "boom" in cargo movement. Historically freight has been a profit maker for most forms of transportation and this is now proving evident in airports. Cargo shipment by air has been increasing 15 to 20 per cent annually, and is predicted to augment even more rapidly in the seventies. (133-126)

Another feature to see increased application will be VTOL (vertical take-off and landing) craft. Terminals have already been planned to exclusively accommodate this type of transportation.

Air transportation has been augmented by the utilization of newer and more efficient aircraft, the increase of a population with a more disposable income, and the industrial reliance upon face to face communication. In the future there will be a need for more support facilities and access systems to provide effective and economical traffic of planes, people, and cargo moving to and through the airport and beyond to their prospective destinations.

Airport Growth in Montana

From 1962 to 1967, air traffic in Montana has increased from 229,000 to 544,000 flights. With a very strong tie existing between Montana and the markets to the south and west, a maximum of 1,867,860 flights will originate or pass through the state in 1980. See Table 1.1.

The Montana air increase is predicted to progress along with the rest of the air industry of the country. Studies have already been conducted in the state, and plans ~~already~~ made to handle the future growth of air transportation. Airport facilities needed-runways, taxiways, aprons, navigational aids, and terminals and associated facilities-are an important facet of total aeronautics planning for the state. See Appendix A.

Air cargo will also see an increase in Montana, but the growth patterns for freight, express, and mail have not been as constant and as clearly identified as they have for passenger traffic. The key items that will be important to the expected surge of activity in air cargo movement include the following:

Table 1.1 Historic Origin and Destination Traffic for the State of Montana with Projections 1969 - 1980.

Total O & D Traffic by Year 1962 - 1967					
1962	1963	1964	1965	1966	1967
229,280	279,880	318,820	386,480	474,990	544,280

Projected O & D Traffic by Year 1969 - 1980		
Year	Lower Limit Projection	Upper Limit Projection
1969	703,460	737,680
1970	784,950	862,180
1971	864,810	999,410
1972	944,670	1,148,360
1973	1,024,530	1,264,320
1974	1,104,390	1,350,010
1975	1,184,260	1,435,900
1976	1,264,210	1,521,940
1977	1,343,980	1,608,160
1978	1,423,830	1,694,560
1979	1,503,710	1,781,120
1980	1,583,570	1,867,860

Table 1.2 Projections for Freight, Mail, and Express for the State of Montana 1970 to 1980 (in tons)

	Freight		Mail		Express	
	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit
Average Annual Rate of Increase Assumed for Freight, Mail, and Express Projections						
1966-1975	20%	16%	14%	10%	8%	6%
1975-1980	17%	13%	4%	4%	8%	6%
1970	971	1111	672	775	192	207
1971	1126	1334	739	884	203	223
1972	1306	1600	813	1007	216	241
1973	1515	1921	883	1149	229	261
1974	1757	2305	972	1309	242	281
1975	2038	2766	1069	1493	257	304
1976	2303	3236	1112	1553	272	328
1977	2602	3786	1156	1615	289	354
1978	2941	4430	1202	1679	306	383
1979	3323	5183	1251	1747	324	413
1980	3755	6064	1301	1816	344	446

Total Air Traffic, All Classes of Service Inbound Plus Outbound for Bozeman 1959-1965.

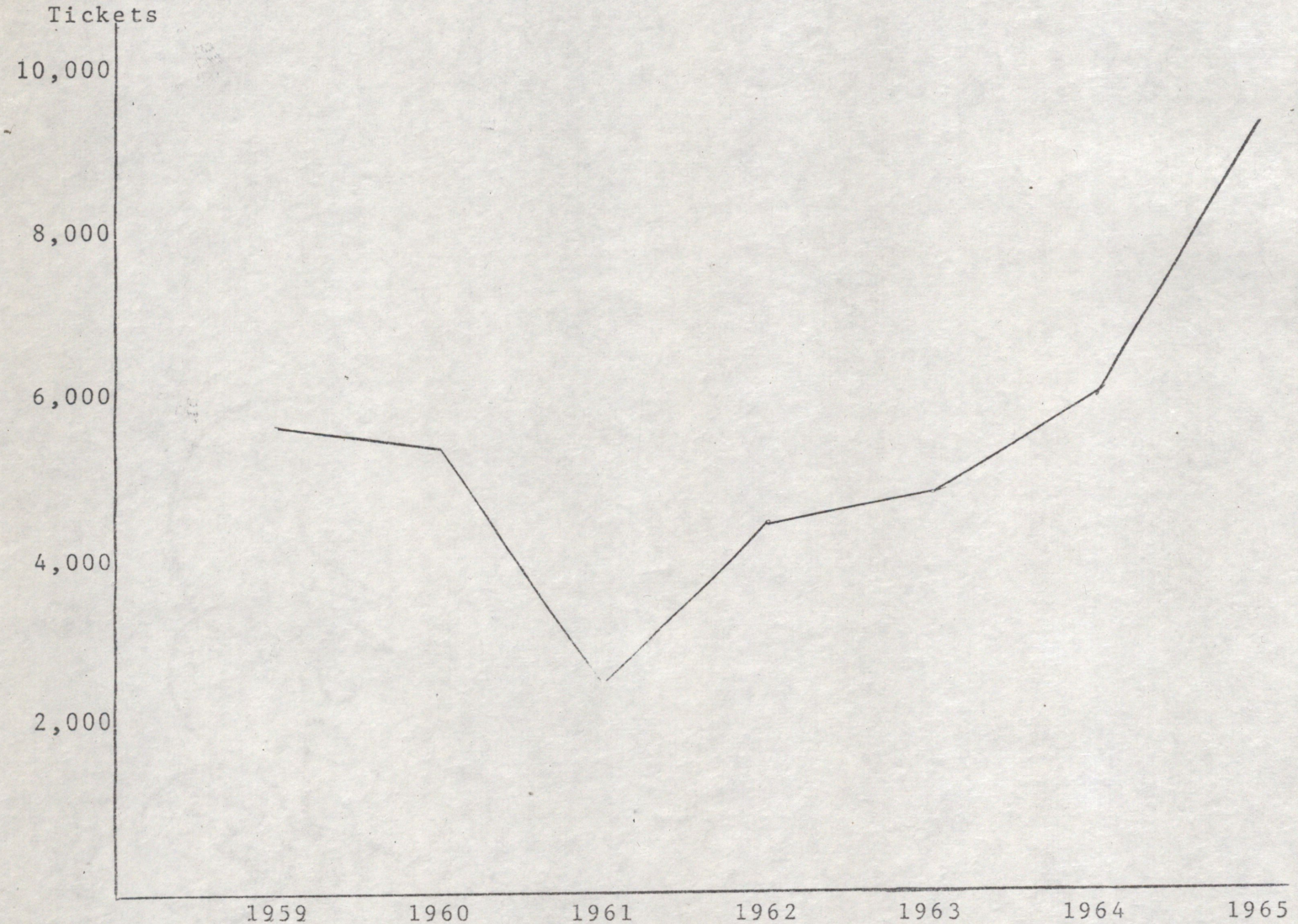


Figure 1.1

(44-902, 2 of 2)

Technical innovations in equipment more adequately designed for the handling of large volumes of air freight
Interest of air carriers to increase the volume of business
Lowering of air cargo rates
Increase in the value of time
Reduction in costs for packing and shipping of goods
Possible cuts in warehouse and inventory costs
Lowering of insurance costs for shipping goods by air
Faster turn over of merchandise and a cut in interest cost
See Table 1.2. (43-21)

With the substantial increases in airline passenger and cargo movement which has been projected for Montana, it is extremely important that a long range planning effort be undertaken to insure the best possible development of the Montana air system. This plan should be directed at fulfilling the needs related to the two major air hubs of Billings and Great Falls; the five major air markets of Bozeman, Butte, Helena, Kalispell, and Missoula. The five major markets should be provided with frequent one-plane service to Spokane, Portland, Salt Lake City, Denver and Seattle. (43-23)

Airport Growth in Bozeman

Gallatin Field has consistently shown an increase in passenger and cargo service for the last decade. (See Table 1.3). From 1968 to 1969, passenger service has expanded 16.5 per cent, while cargo has grown 20 per cent each year.

TABLE 1.3 PASSENGER LOADING-GALLATIN FIELD

Year	Northwest-Orient	Frontier	Total
1964	3,728	--	3,728
1965	4,919	--	4,919
1968	10,801	7,040	17,841
1969	13,426	7,841	21,267
1969 Trend	24.3%	4.6%(44-195,1 of 4)	16.5%

Presently each airline has four flights daily, but in March of this year, both Frontier and Northwest-Orient are bringing in an additional flight, totally ten commercial flights at the airport daily.

Present Facilities

Terminal, Flying Service, and Hanger

The terminal building for the Bozeman airport is an L-shaped structure. The concrete-framed building is the only lasting construction at the airport. Within the terminal are the offices of

Figure 1.2



FEB 1970

Southeast Side of Terminal

Southwest Side of Terminal



FEB 1970



FEB 1970

Northeast Side of Terminal

Figure 1.3



FEB 1970

Hangar Area



FEB 1970

Gallatin Flying Service



FEB 1970

Entrance Road



FEB 1970

Northeast Hangar Area and Terminal

Northwest-Orient Airlines and Frontier Airlines, the airport manager, FAA, which also functions as the weather bureau, and the car rental services. See Figure 1.2.

In the hangar area are the offices of two local flying services: Gallatin Flying Service and Flightline Incorporated, which are housed in a quonset hut and a wood-framed structure respectively. There are six hangers suitable for medium and small aircraft. The remaining buildings include an aged residence, a repair shop, and the National Guard Amory garage and storage depot. See Figure 1.3.

Except for the terminal, none of the forms need be thought of as justifiably existing in their present state. The nature of their structure and materials and their current condition suggest that the moving of their functions and replacement of them should be considered in this project.

Areas within the Terminal

Inside the terminal is a waiting area which will soon be too small to accommodate the number of people using the newer jets. The airline and rental service area is adequate, but their lobby is already overcrowded and congested. More room is presently needed for the volume of cargo and baggage passing through the airport building. As the air transportation in Bozeman increases, the FAA will require further facilities to serve the greater traffic flow.

Servicing of Planes on the Apron

Having landed at the Bozeman Airport, a commercial plane taxies to the loading apron. A gas truck drives to the craft for refueling and the air conditioning is attached to the airplane. Airline personnel begin manually unloading the baggage and freight as the Bozeman bound travelers deplane. The craft, having been serviced and loaded, then taxies unto the runway and takes off.

Circulation within the Terminal

People leaving Gallatin Field by air enter the terminal through the South entrance and proceed to their desired airline counter. At the airline desk, the baggage is checked in and loaded unto a push-cart. The prospective passengers await the loading of the plane in the holding area. Exiting from the North door and walking about 60 feet, the traveler embarks the plane by means of loading stairs.



FEB 1970

Boeing 727 Taxing Up
To the Terminal



FEB 1970

Servicing the 727



FEB 1970

Servicing the 727

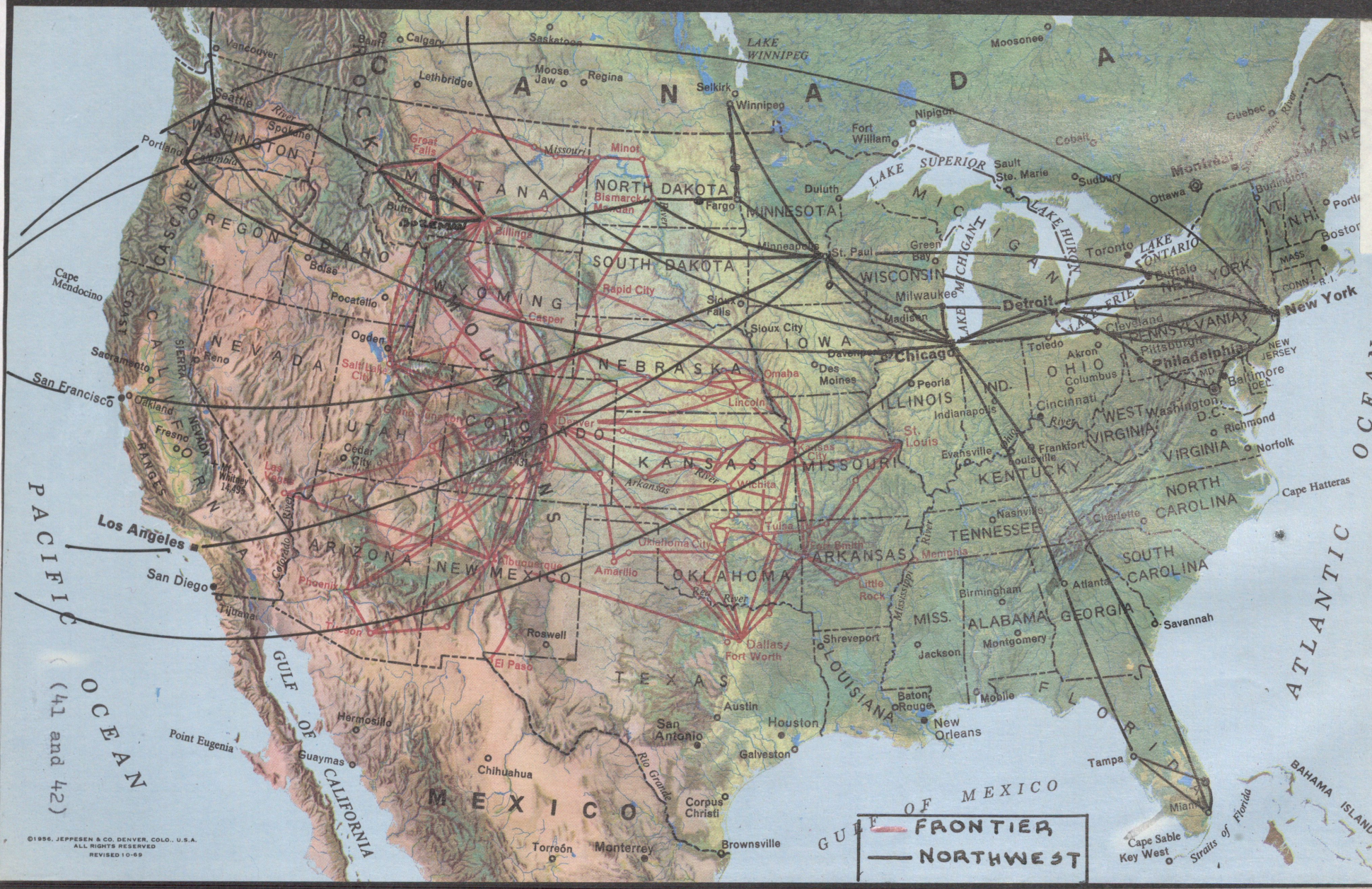
Figure 1.5



Airline Desk and Luggage Area



Rows of Shrubs and Trees Lining Main Road


Figure 1.6
(41 and 42)
FRONTIER
NORTHWEST
©1956, JEPPESEN & CO. DENVER, COLO., U.S.A.
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REVISED 10-69

The deplaning passengers follow the same proceedure in reverse; unloading from the plane, crossing the apron to the building, claiming the luggage at the airline desk, and going to the parking lot through the South door. See Figure 1.5.

The luggage is manually removed from the aircraft and taken into the terminal by a push-cart; The outbound baggage and cargo is then loaded in the same manner.

Present Routes

Table 1.4 Non-stop Service from Bozeman

Frontier Airlines
- Billings
- Great Falls
- Missoula
- Salt Lake City

Northwest Airlines
- Butte
- Billings

Population and Econimic Growth

Montana

Between 1950 and 1960, the population of Montana increased from 591,000 to 675,000 -- a 14.2 per cent rise for 10 years. The projection for 1980 has been predicted to be from 800,000 to 900,000 people. See Figure 1.7 and Appendix B.

With 674,767 people in the state in 1967, approximately 51 per cent lived in the urban areas. By 1980, a maximum of 795,000 individuals will reside in the cities of Montana.

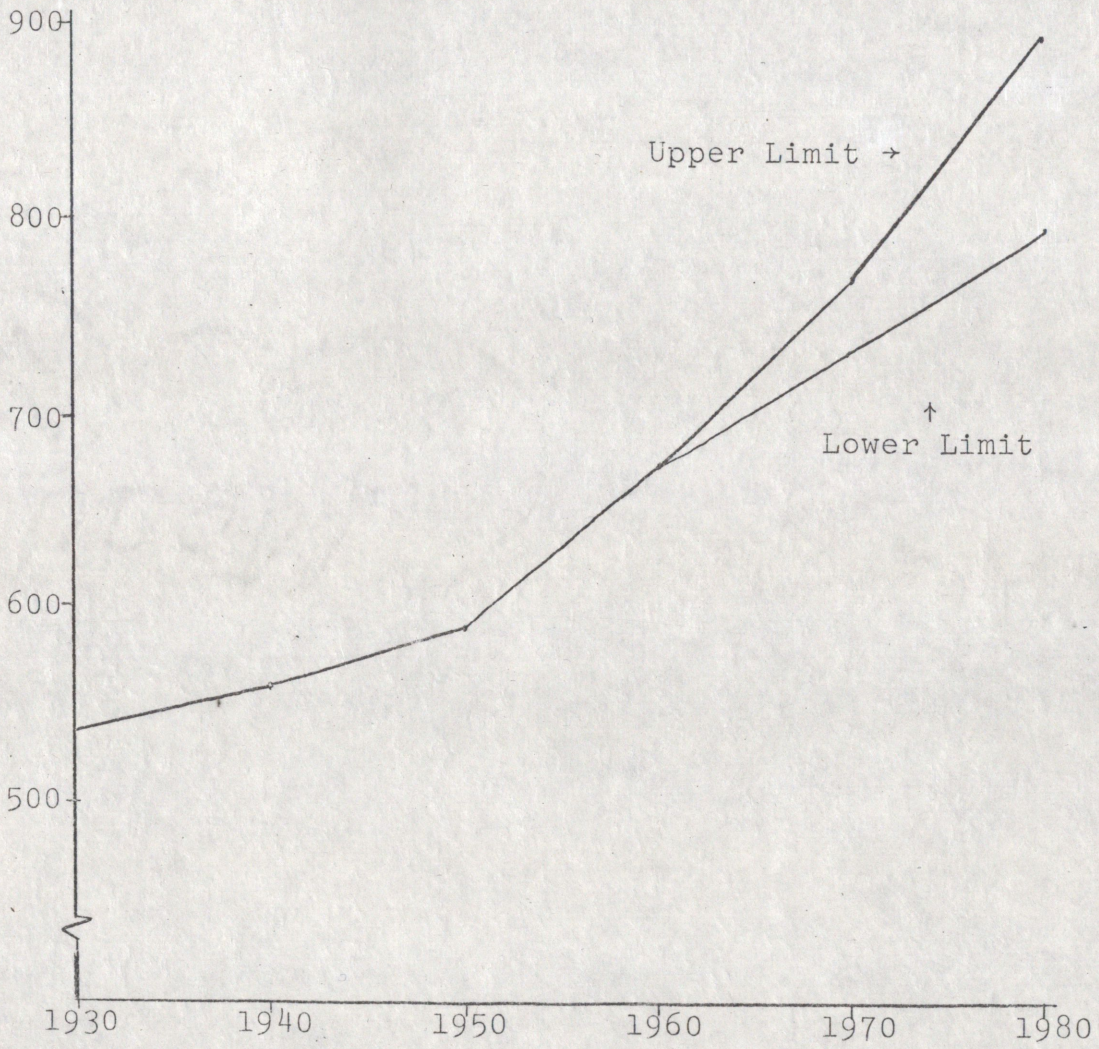
The states personnel income is predicted to increase by 3.28 per cent each year, and the per capita income is expected to grow 2.45 per cent annually until 1980. (43-17)

Gallatin County Area

Gallatin County had a total population of 26,618 in 1969, which amounts to ten people per square mile. (40-331) Along with Gallatin County the surrounding counties of Park, Meagher, and Madison had a total of 54,288 people in 1970. See Table 1.5. (44-900,701-12)

Since 1950, Gallatin County has been a fast growth area, with an annual increase rate of 2.4 per cent. (44-900,50F 12) Such recent developments as the Gallatin Field Industrial-Commercial Park

Figure 1.7 Montana's Population 1930 - 1960 with Projections to 1980.



(43-2)

Table 1.5

Population of Gallatin, Park, Madison and Meagher Counties for 1950, 1960 and Projections for 1968 and 1970.[5]

Place	1950	1960	1968	1970
Gallatin County	21,902	26,045	31,331	32,653
Park County	11,999	13,168	13,808	13,971
Madison County	5,998	5,211	4,478	4,295
Meagher County	2,079	2,616	3,218	3,369
TOTAL	41,978	47,040	52,835	54,288
Gallatin plus Park Counties	33,901	39,213	45,139	46,624

(44-900, 7 of 12)

[5]County population data from the Montana State Board of Equalization, Helena, Montana; urban area population data by John R. Borchert and Russel B. Adams, "Projected Urban Growth in the Upper Midwest: 1960-1975," Upper Midwest Economic Study, Urban Report No. 8, September 1964.

and the Big Sky Resort are two major projects effecting the airport.

The Industrial - Commercial Park has been planned South of the air field and would be incorporated into the airport grounds. With this new land use so near the terminal building, the air cargo industry would greatly expand. See Figures 1.8, 1.9, 1.10 and 1.11.

The potential businesses to be located at the park would be:

A general air freight and warehouse business which would serve many small firms in the region

Farm machinery retailing and manufacturing firms, typical of those who would fly customers to see their wares rather than move the products

Perishable goods rapid transit businesses

Manufacturing of electronic and other small bulk, high value products

Sporting equipment sales and manufacturing interprises -- With the year round outdoor recreation possibilities looming as an ever-larger attraction to people from outside the region, the number of recreational travelers can be expected to increase at the airport

Businesses which sell and service private aircraft

Service facilities which cater to the traveler, including restaurants, bars, motels, markets, shops, banks, etc.

Vehicle - rental businesses

Helicopter, airplane, and auto taxi and chartered services

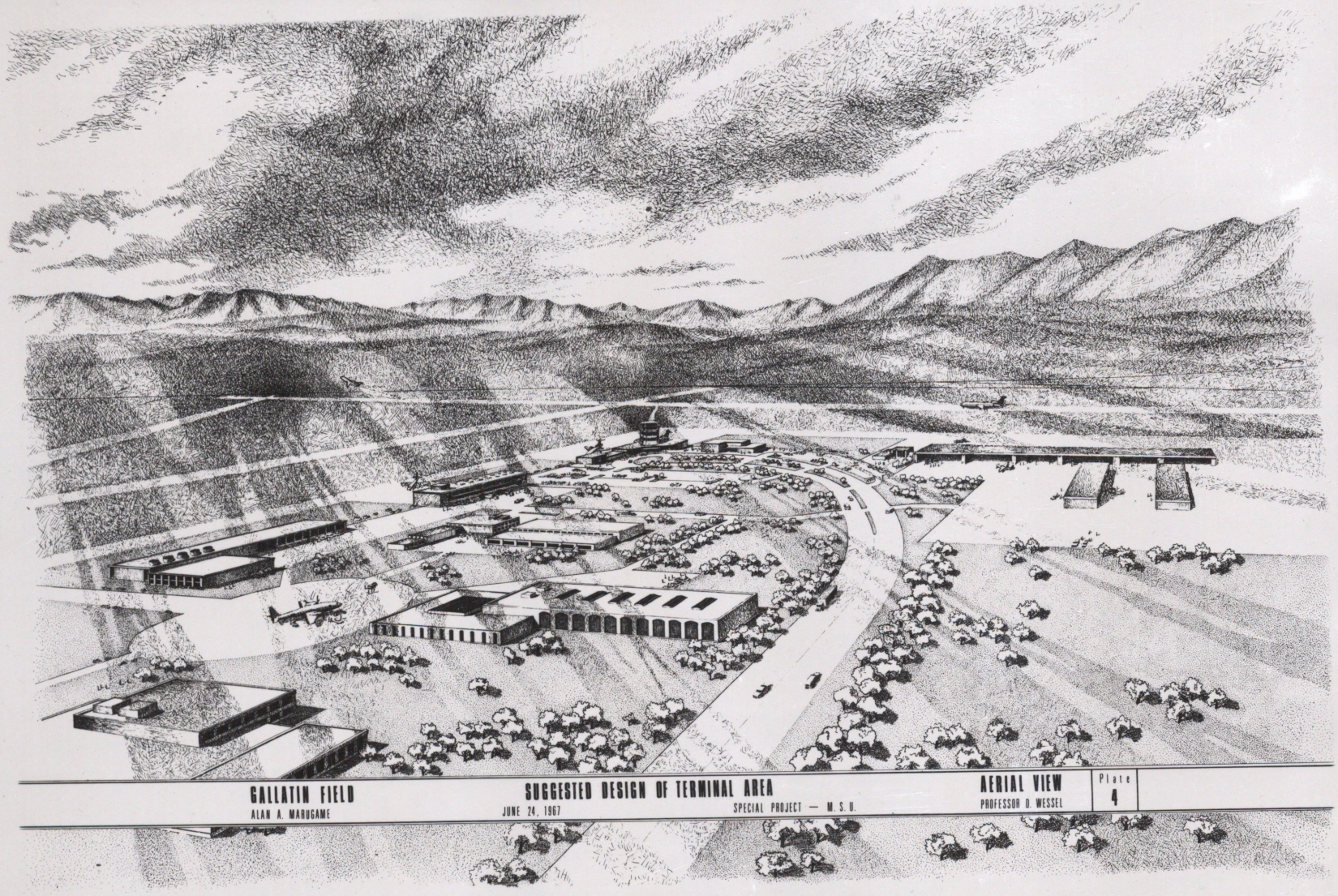
Travel services

Offices and hangars of regional enterprises which operate their own business aircraft (46- Land Use)

An even more recent project to come to this county is Chet Huntley's Big Sky Resort Area. This recreational complex, consisting of a ski area, dude ranch, golf course, and small village, will be located near Lone Mountain, 40 miles South of Bozeman. The initial investment of 14 million dollars will later be augmented to 100 million dollars.

The year-round facilities will also have a small airstrip to service light aircraft and possibly VTOL. Big Sky will result in a definite increase of air traffic to Bozeman in the form of commercial

Figure 1.8


GALLATIN FIELD
ALAN A. MARUGAME
SUGGESTED DESIGN OF TERMINAL AREA
JUNE 24, 1967
SPECIAL PROJECT — M. S. U.
AERIAL VIEW
PROFESSOR D. WESSEL
Plate
4

(46)

Figure 1.9

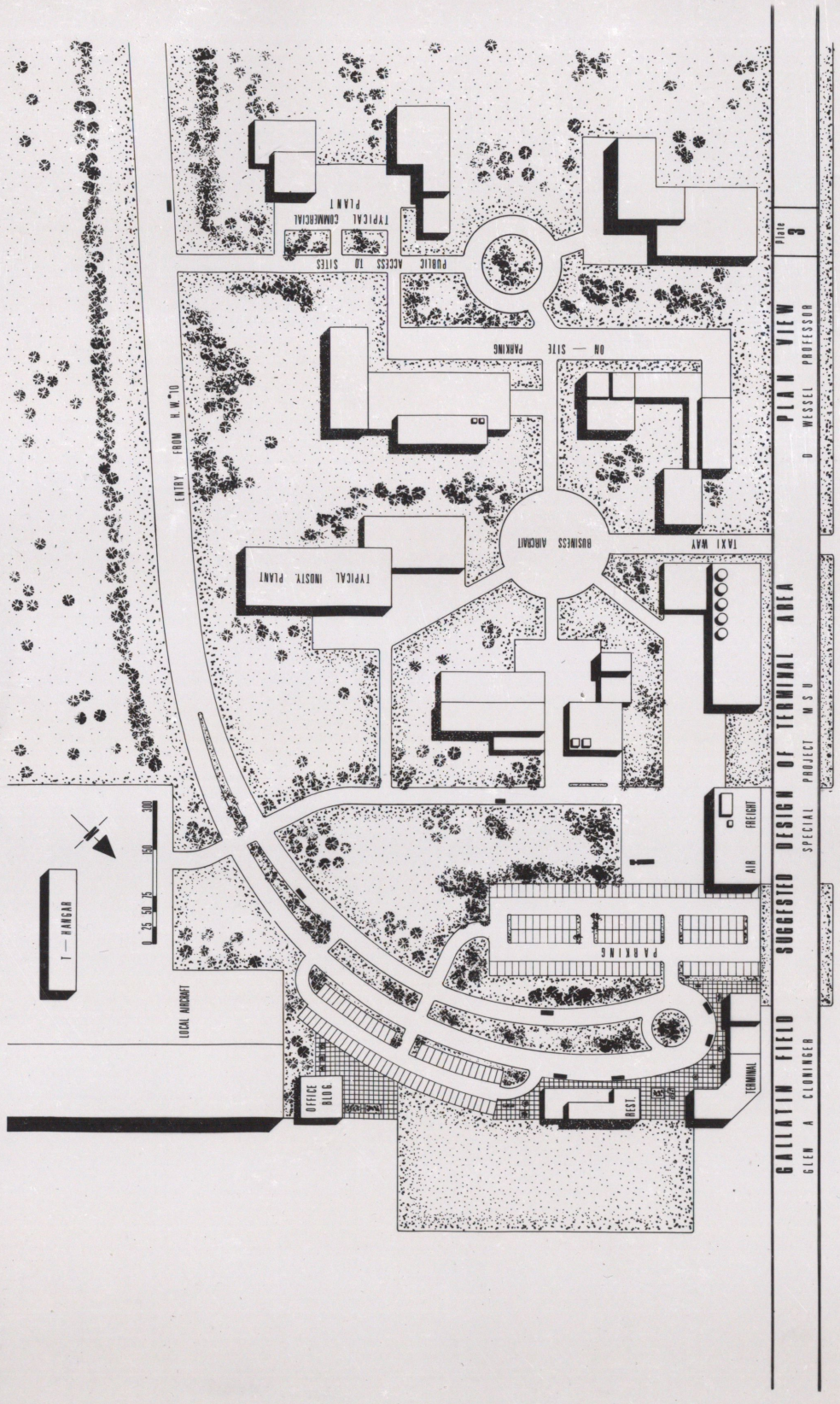
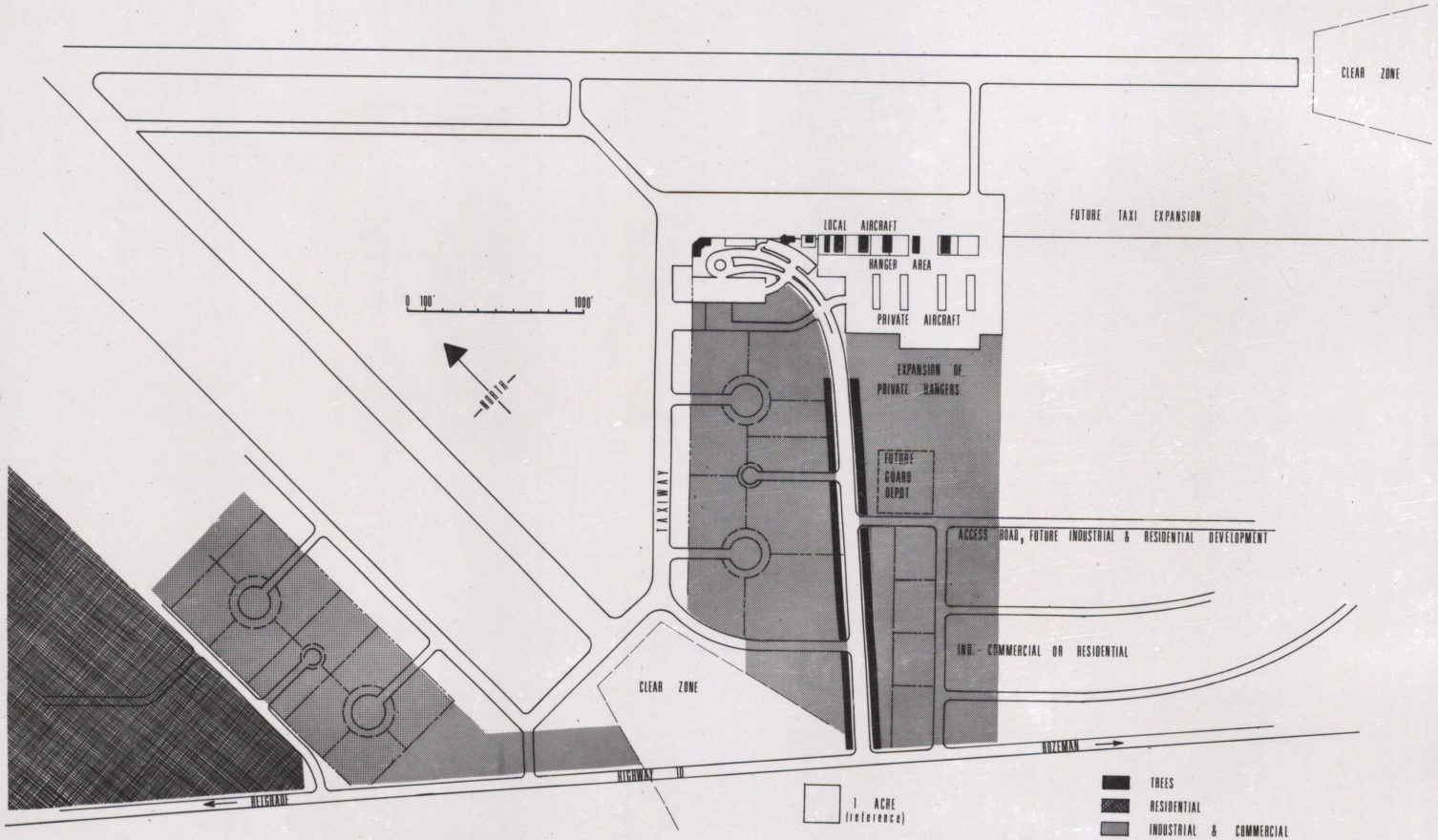

GALLATIN FIELD
GLEN A CLONINGER
SUGGESTED DESIGN OF TERMINAL AREA
SPECIAL PROJECT M S D
PLAN VIEW
D WESSEL PROFESSOR
Plate 9
T — HANGAR
LOCAL AIRCRAFT
OFFICE BLDG
TERMINAL
REST.
AIR FREIGHT
PARKING
TAXI WAY
BUSINESS AIRCRAFT
TYPICAL INDSTY. PLANT
ON — SITE PARKING
PUBLIC ACCESS TO SITES
TYPICAL COMMERCIAL PLANT
ENTRY FROM H.W. 70
25 50 75 150 300

Figure 1.10



PROTOTYPE AIR PARK SUBDIVISION DESIGN

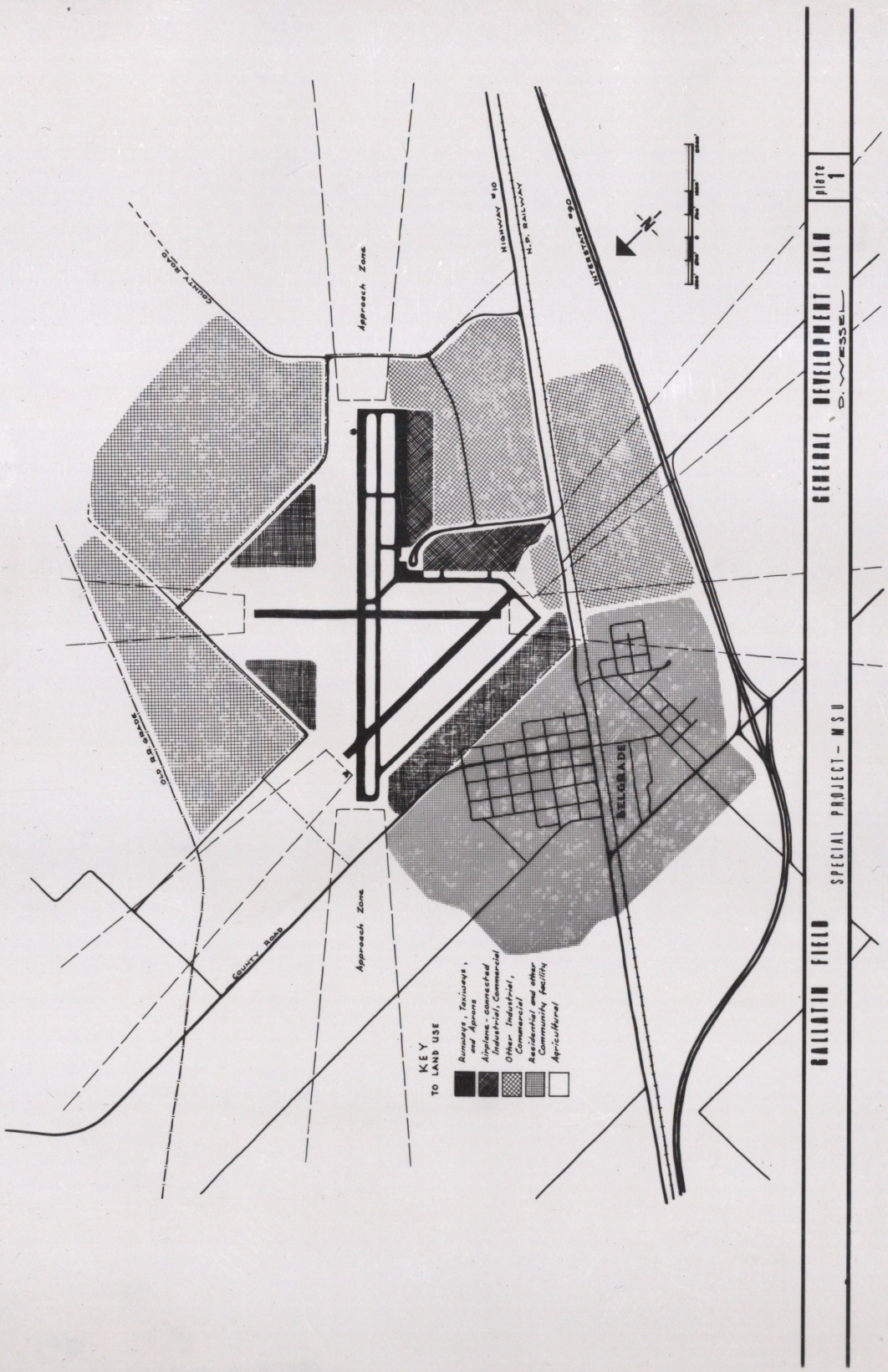
RONALD A. PATTERSON · SPECIAL PROJECT MSU

GALLATIN FIELD

D. WESSEL PROFESSOR

PLATE 2

Figure 1.11


GENERAL DEVELOPMENT PLAN
SPECIAL PROJECT - M S U
D. WESSEL
plate 1
INTERSTATE 96
HIGHWAY # 10
N.P. RAILWAY
COUNTY ROAD
Approach Zone
Approach Zone
COUNTY ROAD
OLD U.S. 16 ROAD
BELGRADE
KEY TO LAND USE
Runways, Taxiways, and Aprons
Airplane - connected Industrial, Commercial
Other Industrial, Commercial
Residential and other Community facility
Agricultural

jets and privately chartered planes. An air taxi service will also be possible from Gallatin Field to Big Sky's airstrip.

Bozeman

Bozeman proper is expected to grow more than 30 per cent by 1980. With a 1960-1969 population increase of 13,361 to 15,700, the city is predicted to enlarge to 31,000 in 1990. See Figure 1.12 Presently, Bozeman's annual growth rate is 2.4 per cent. (36-2)

M.S.U.

Another major factor in the growth of air travel in this area is Montana State University. With a campus rapidly expanding in enrollment and research, an adequate and convenient airport is extremely important.

The enrollment chart for M.S.U. shows the present 7,500 students to increase to 20,000 by 1990. See Figure 1.13 and Appendix B

Research programs of the university are increasingly using "existing but inconvenient and inadequate commercial air service." (44-912, 2 of 2) The continuing growth in research activity at M.S.U. indicates the need for an airline connection from Bozeman to the southern markets will become greater each year. More conferences, work shops, and meetings would be attracted to the school, if it were not so difficult to arrive here by air.

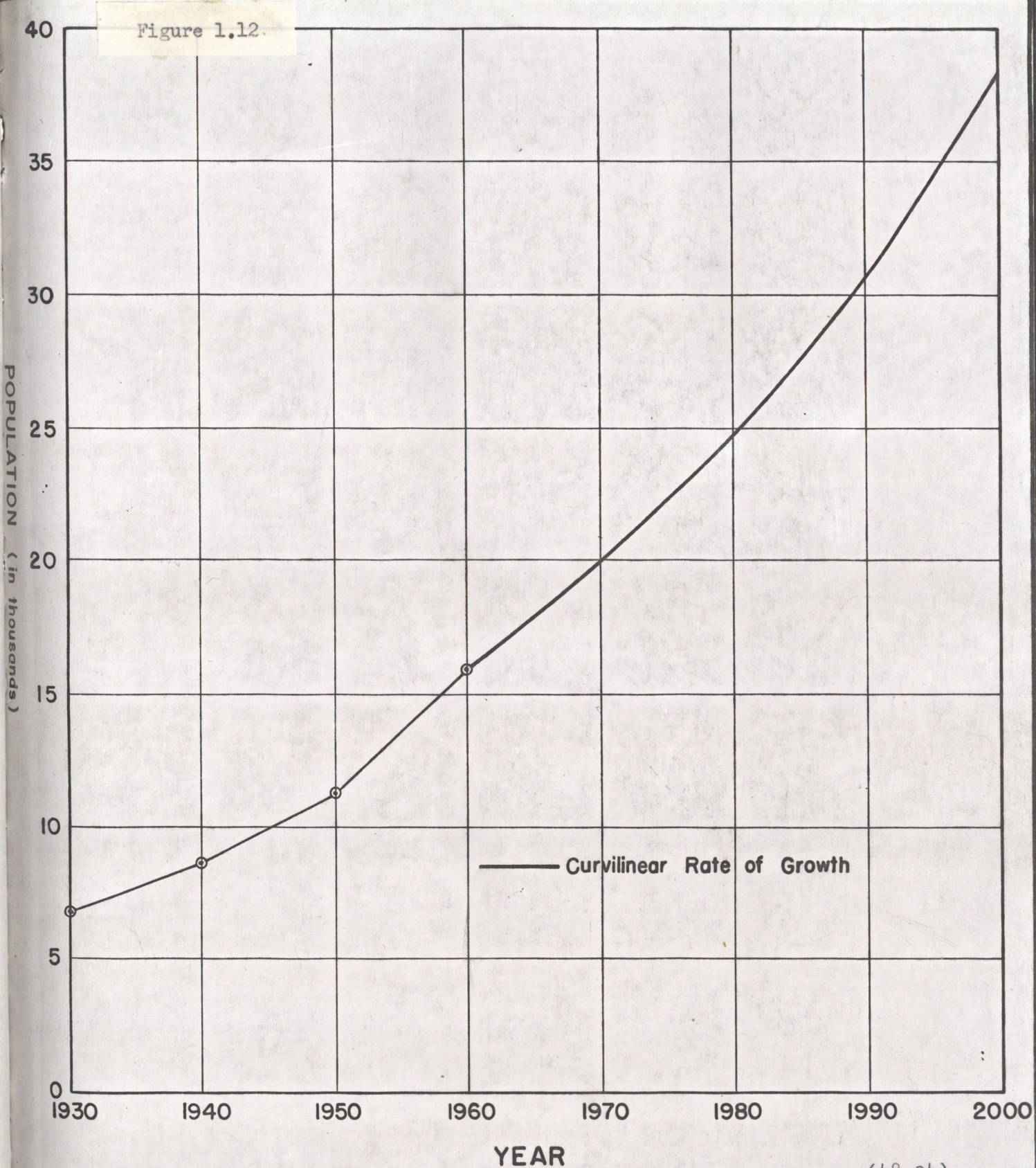
Future Needs and Expansion

Present and near future plans made for Gallatin Field on the basis of required facilities and funds are as follows:

Table 1.6 Expansion Program

Year	Project	Federal Aid	Local Aid	M.A.C.
1969	2,000-foot extension to runway 12/30 Runway lights extended Taxiway "D" extended and lighted Warmup apron on end of 12 Blacktop road relocated Land acquisition Reconstruct and Enlarge apron at Terminal	($192,125)	($110,375)	($60,000)

Figure 1.12



(48-24)

POPULATION TREND
1960 - 2000
BOZEMAN, MONTANA

Figure 1.13

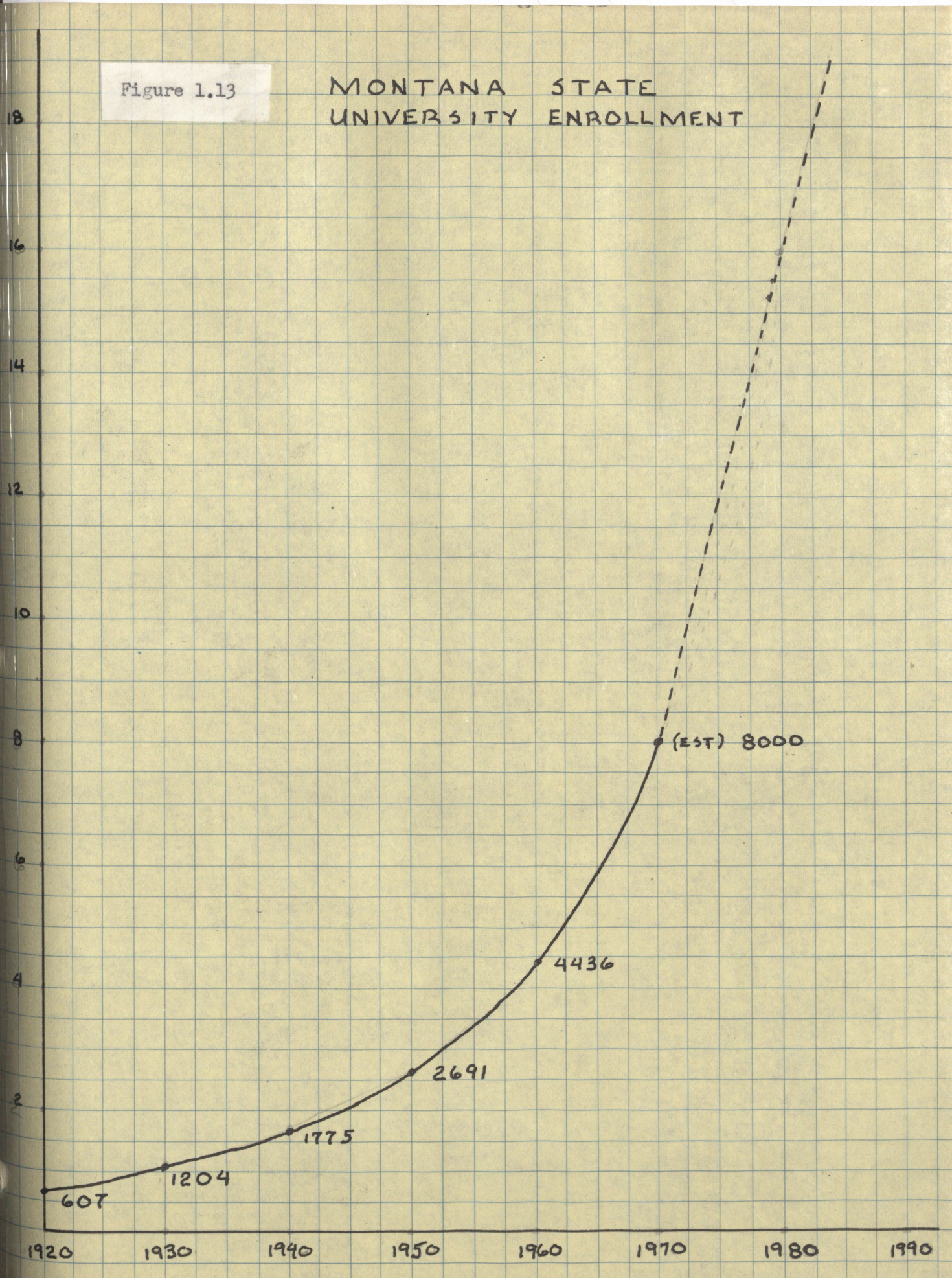

MONTANA STATE
UNIVERSITY ENROLLMENT
18
16
14
12
10
8
6
4
2
607
1204
1775
2691
4436
(EST) 8000
1920
1930
1940
1950
1960
1970
1980
1990

Table 1.6 Expansion Program (Continued)

Year	Project	Federal Aid	Local Aid	M.A.C.
1970	Changes in Administration Building for Increased Traffic		($15,000)	
1971	Light Aircraft Parking Area			
1972	I.L.S. Lighting System			
	Acquiring land and relocating county roads		($8,000)	

(44-918, 3 of 5)

In 1975, this program calls for the construction of a new terminal building and the gradual phasing out of the old structure. The apron will be changed to accommodate the new structure and runway 3/21 will be removed. Runway 16/34 will probably be lengthened to facilitate the Industrial-Commercial Park. The hangars and flight services will be relocated and a new runway constructed in order to segregate the commercial and private flights. Some VTOL service may also be included for both passengers and the park. Along with the building of the Industrial-Commercial area by private organizations, U S Highway No. 10 will have direct access to the airport grounds.

LOCAL CONDITIONS

LOCAL CONDITIONS

Geographic

The southern half and extreme east of Gallatin County is predominantly mountainous, while the northern portion consists of the Gallatin Valley and the foothills to the north. The 1,626,000 acre county is located in the south-central portion of Montana.

Gallatin Field is situated in the east end of the large Gallatin Valley. Three major rivers, The Madison, Jefferson and Gallatin, flow into the west end of the valley forming the Missouri River. Foothills and plains form the west and north boundaries of the valley, while on the south is located the Spanish Peaks and Gallatin Range. To the east are the Bridger Mountains, which rise 8,500 feet. The plains of eastern Montana begin on the opposite side of the Bridgers.

Through most of the valley flows the Gallatin River. The area is wide and flat with cottonwoods and willows lining the streams. Wild grass and sagebrush cover the foothills, while the sharply rising mountains are heavily timbered. The Bridger Range quickly reaches above the timberline and is rocky and snow covered.

Economic

Gallatin Field services Gallatin, Park and portions of Madison and Meagher Counties. The two principal urban areas of Bozeman and Livingston are within 30 minutes of the airport. Five smaller population areas -- Belgrade, Manhattan, Three Forks, Amsterdam, and Ennis -- also lie near the airfield. The wellbeing of air travel is interrelated with agriculture, the growth of M.S.U., the increase of trade and service in Bozeman, and the rapidly expanding recreational and tourist activities. See Appendix C.

Gallatin Valley's principle industry is agriculture, with diversified farming, grain, dairy farms, and outstanding registered and breeding herds. Although this is not an industrial center, several existing small plants, include; lumbering operations, cement manufacturing, food processing, grain milling, electronics, and livestock auctions. The area also maintains a substantial work force. See Tables 2.1 and 2.2

Another principal factor in Gallatin Counties economy is education. M.S.U. contributes 30,000,000 dollars annually to the community through students, faculty, staff,and services required.

Bozeman is the major retail center for the area, with 24,465 square miles of retail trade. The city is also the main trade and service center between Butte, 90 miles west, and Billings, 140 miles to the east. The 1969 retail sales for Bozeman and the County were 57,776,000 and 68,401,000 Dollars respectively. (38-275)
See Appendix C

Table 2.1 Agriculture

Number of Farms	Value of Crop	Value of Livestock
858	$4,935,000	$6,767,000

Total acres in Farmland - 939,700 acres
Harvested Cropland ---- 193,000 acres
Pasture ---------- 335,000 acres
Irrigated ---------- 81,000 acres

Table 2.2 Labor Force

Total	7,350
Agriculture (hired workers)	600
Construction	340
Logging	400
Manufacturing	360
Transportation and Utilities	300
Wholesale and Retail Trade	2,000
Service and Finance	2,700
Government	650

(38-276)

The transportation system in and through the Bozeman area consist of:

Northwest-Orient Airline (4 flights)
Frontier Airline (4 flights)
Northern Pacific Railway
Chicago, Milwaukee, St. Paul and Pacific Railroad
Three motor freight carriers
Greyhound Bus Line
U.S. Highway No. 10 East-West, which is part of Federal Interstate Highway No. 90
U.S. Highway No. 191 South, with connections to No. 89 and No. 287 North

Recreation and tourism is abounding in the Gallatin area. Seven dude ranches are within 60 minutes of the airfield.

Excellent hunting, fishing and hiking are to be found in the County along with all summer and winter sports. Some of the finest skiing in the state is located at Bridger Bowl, and now the Big Sky complex will begin construction in the spring of 1970. The Northwest's greatest tourist attraction, Yellowstone National Park, is also only 90 miles from Bozeman and within the southern tip of the county.

History

Gallatin County takes its name from the river which rises in in Yellowstone National Park and provides the water for irrigating the rich lands of the area. The low, wide valley was the common hunting hunting ground of the indians; the first known white men to visit the area was The Lewis and Clark Expedition in 1805.

At the southeast end of the valley is the city of Bozeman, which was officially founded August 9, 1864. Location of Bozeman near the mountain passes caused it to grow rapidly. Traditionally, agriculture has been the basis for the city's growth. In 1893, Bozeman was chosen as the site for the Montana College of Agriculture and Mechanical Arts.

In 1929, the town of Belgrade leased one and one-half acres of land for airport purposes. A civilian pilot training school was started under the direction of John F. Keyes.in 1940. In this same year, the Federal Government funded 47,00 dollars to the airport for developing the field for national defense purposes.

The name Gallatin Field was officially adopted in 1941. At that time there were four runways, 4700 feet long and 150 feet wide. They were lengthened to 5100 feet and later still, the northwest-southeast runway was extended to 6500 feet. In 1968, another 2500 feet were added to this runway.

In 1943, seven private aircraft and eighteen government planes were based at the field. With the areas growth in population, and commercial and private flying, the number of airplanes has continually increased.

Regular scheduled commercial airline service was inaugurated in 1948 by Northwest-Orient Airlines and, with the exception of a brief period in 1950, has continued to the present time. Now Frontier Airlines has also started service in the Gallatin terminal with four flights daily.

The present terminal was designed by Fred Wilson, Architect, and dedicated in 1951. Gallatin Field is owned jointly by the County of Gallatin and the City of Bozeman, and is governed by a Board composed of citizens appointed by the City and County Commissions. The airport is directed by a manager employed by the Bozeman and Gallatin County Airport Board. (44- History of Terminal)

Climatic

The climate of Gallatin Valley is mild, dry, and invigorating with clean mountain air. The summers are generally pleasant and are characterized by warm days, cool nights, and a high proportion of sunshine. Uncomfortable humid conditions are rarely experienced. Summer precipitation falls mostly as showers, occasionally with some hail.

Winters are relatively cold and occasionally a winter month has had a week or more of severly cold weather, but mild winter weather is not unusual. Most winter precipitation falls as snow.

Table 2.3 Weather for Bozeman Area

Average Mean Temperature	43°F
January Average Minimum	13.8°F
January Average Maximum	33.8°F
January Mean Temperature	23.8°F
July Average Minimum	51.3°F
July Average Maximum	81.5°F
July Mean Temperature	66.4°F

Average growing Days - 115 Days

The sun shines approximately 53 per cent of the possible time during an average year. It shines a minimum of 24 per cent of the time during December and a maximum of 75 per cent in July.

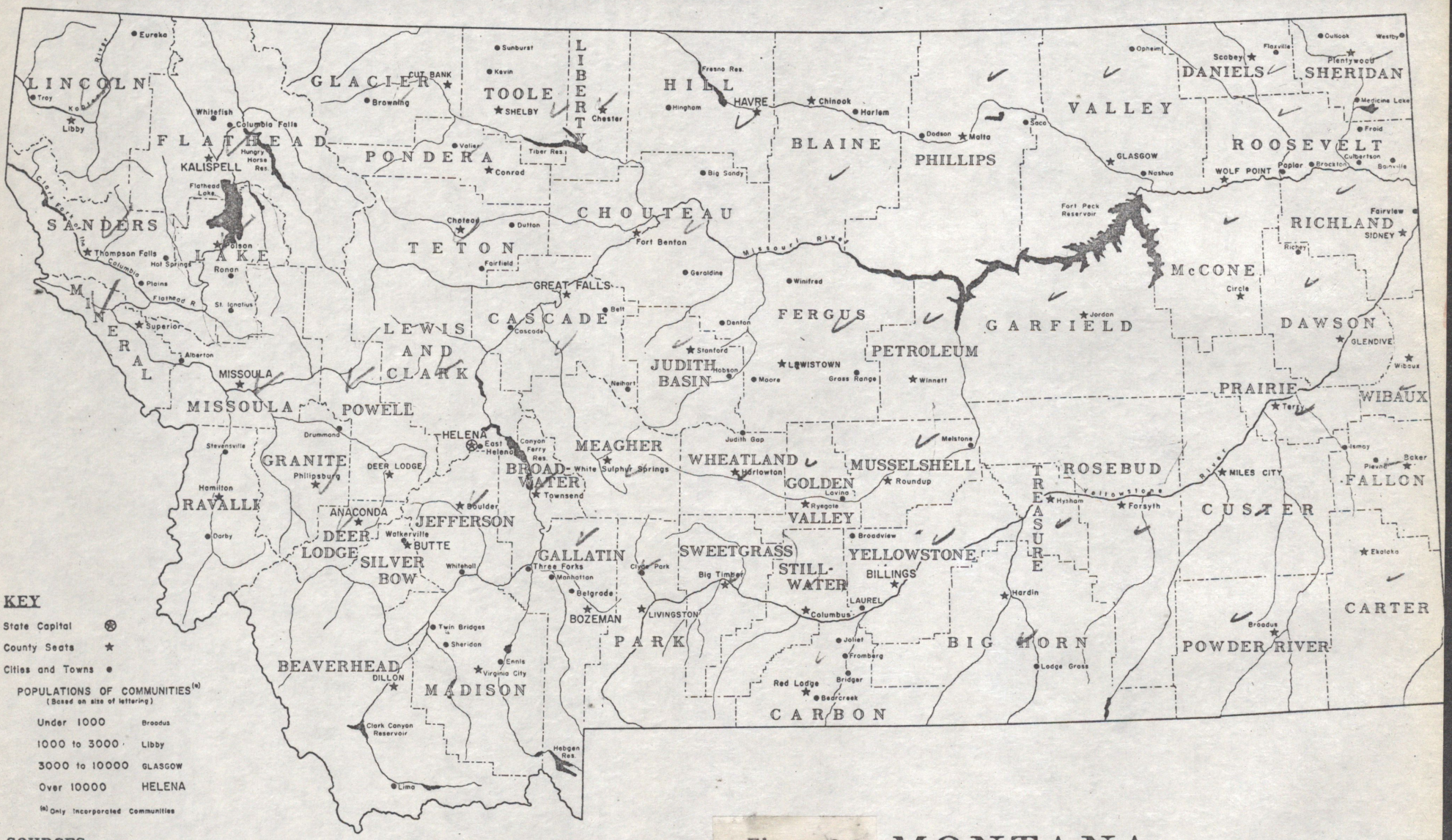
On the shortest day of the year, December 22, the sun angle is 21 degrees. During the longest day of the year, June 22, the sun angle is 68 degrees.

Gallatin Field receives an average precipitation of 17.38 inches a year. The heaviest amounts occur during May and June, when approximately two inches are received each month as rain. Snow begins to fall in substantial amounts during October and lasts until late March. As much as 18 to 24 inches could remain on the ground

during December, January, or February.

The prevailing wind is from the northwest to west in the spring and summer. Throughout the winter the wind also comes from the same directions, except for occasional shifts to the north, which usually accompanies storm systems and seldom lasts no more than several days at a time.

SITE CONDITIONS



KEY

State Capital ⊗

County Seats ★

Cities and Towns ●

POPULATIONS OF COMMUNITIES[a]
(Based on size of lettering)

Under 1000	Broadus
1000 to 3000	Libby
3000 to 10000	GLASGOW
Over 10000	HELENA

[a] Only Incorporated Communities

SOURCES

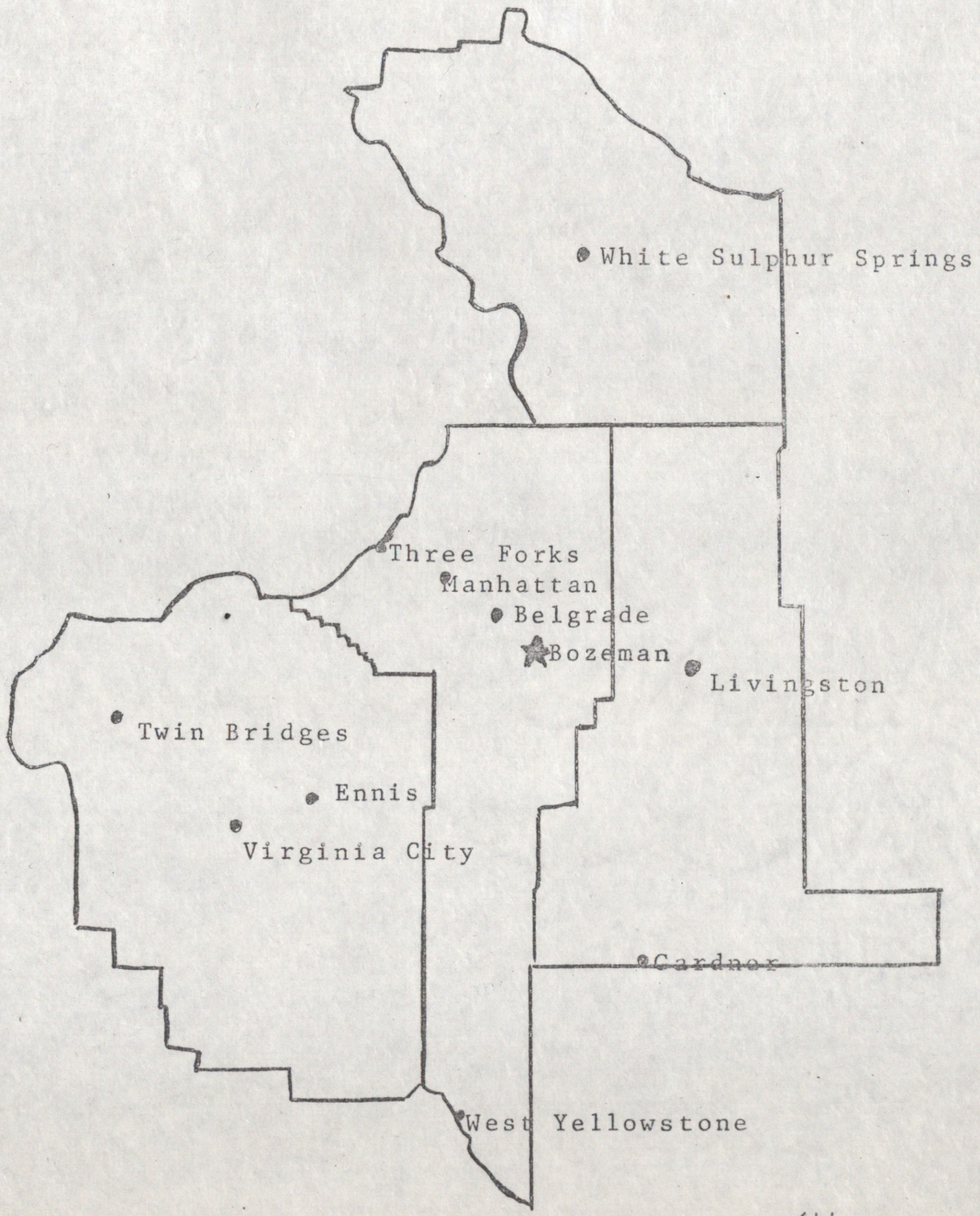
U.S. Census of Population, 1980

Base map after U.S.G.S.

Figure 3.1 **MONTANA**

Figure 3.2

EXHIBIT
BOZEMAN 900
Page 2 of 12



SITE CONDITIONS

Orientation

The site of the present terminal is southeast of runway 12/30 and north of U.S. Highway No. 10. To the west of the building are runways 3/12 and 16/34. The prominent view from the existing structure is across the airstrip to the northwest and northeast. On the south side of the airport is the parking lot entrance, but no exceptional view is seen in this direction. East of the terminal is located the flying services and hangars.

Adjacent Environment

Bozeman, the largest city of the area, is located about 10 miles southeast of the airfield. Three-quarters of a mile in the opposite direction is the community of Belgrade. All other land around the region is agriculture or native grassland. No significant amount of trees or structures interrupt the open land, sky, or views of the mountains rimming the Gallatin Valley. Many of the preliminary zoning codes for airport use have already been set for the area. See Appendix D.

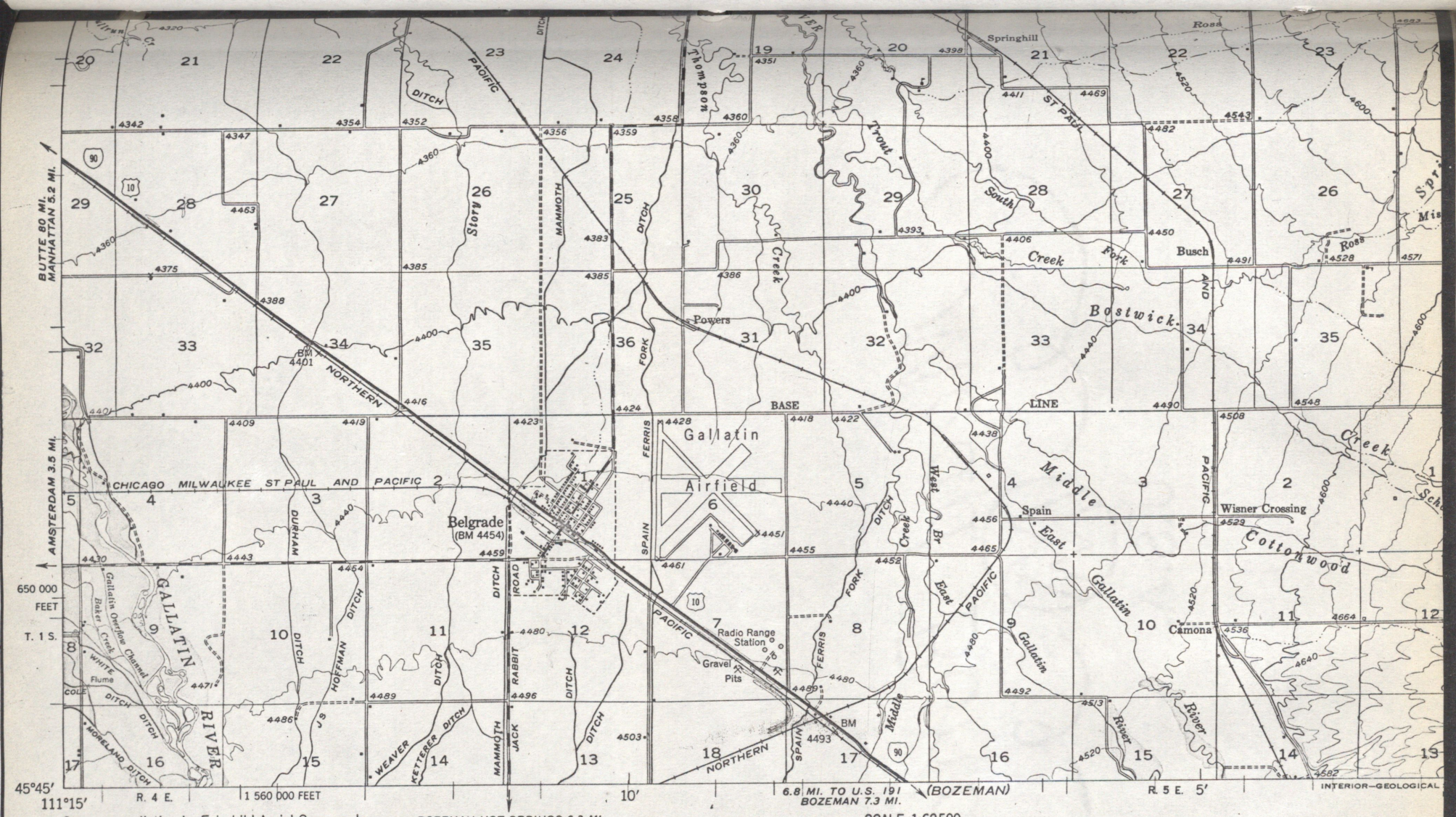
The only significant vegetation nearby consists of several newly planted rows of trees lining the entrance road. An irrigation ditch runs through the property roughly parallel to the main access road, and then follows along side the county road bounding the south, east, and north sides of the airfield.

Topography

The land around the airport is nearly flat with very slight sloping downward to the north. The only significant change occurs in the rising foothills of the Bridger Mountains. Throughout the entire area, the slope is no more than 20 feet for every 3,000 feet in distance, and with an average elevation of about 4,440 feet above sea level. See Figure 3.3.

Immediate and Distant Views

The most prevalent view is of the rugged snow capped Bridger Mountains which rise abruptly to the east and northeast. To the southeast, the lower and heavily timbered Gallatin Range slope up



Stereo compilation by Fairchild Aerial Surveys, Inc. for the Bureau of Reclamation
Field examination and publication by the Geological Survey as part of the Department of the Interior program for the development of the Missouri River Basin

Control by USGS and USC&GS

Topography from aerial photographs by stereoplanigraph methods 1948. Aerial photographs taken 1947
Field check 1948-1950

Polyconic projection. 1927 North American datum
10,000-foot grid based on Montana coordinate system, south zone

Unchecked elevations are shown in brown

Dashed land lines indicate approximate locations

1000-meter Universal Transverse Mercator grid ticks

SCALE 1:62500

1 ½ 0 1 2 3 4 MILES

3000 0 3000 6000 9000 12000 15000 18000 21000 FEET

1 5 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

18½°
TRUE NORTH
MAGNETIC NORTH
APPROXIMATE MEAN DECLINATION, 1950

MONTANA
QUADRANGLE LOCATION

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER 25, COLORADO OR WASHINGTON 25, D. C.
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

Figure 3.3

Figure 3.4



North View



Northeast View



East View



Southeast View

Figure 3.5



South View



Southwest View



West View



Northwest View

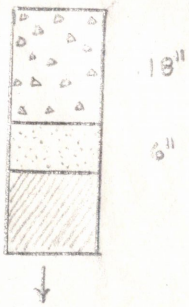
from the valley floor. As the Gallatin Mountains end, the more distant Spanish Peaks dominate the southwestern view. The entire westerly direction is low and flat, with the only interruption being the small community of Belgrade. All the immediate views are of the low, flat grasslands of the Valley. See Figure 3.4 and 3.5.

Soil Analysis

Under the site lies a layer of mixed gravels, approximately one hundred feet deep, underneath which lies volcanic ash and clays. For 18 inches below grade is a gravely soil with small amounts of silt and clay. Below this is six inches of gravelly silt with slight plasticity, and then a well graded course, granular gravel which is non-plastic.

The frost line is about two and a half to three feet below grade.

Figure 3.6 Soil Test



Utilities Available

Electricity and natural gas service the airport. A three-inch gas line runs from Belgrade, along Highway No. 10 and then into the airfield, extending past the eastern runway and reaching the terminal along the building line.

The electric power line runs overhead from near U.S. Highway No. 10 in a northwesterly direction to the junction of the major access road near the Armory Depot; then southwest with a branch line extending underground to supply all hangars and the terminal building.

Domestic water is supplied by a single well to all of the buildings. Another well is currently contemplated to supply water for fire-fighting equipment.

Sewage is taken care of by a septic tank and drainage field which is located north of the airport building, across the runway. The current condition of utilities, while adequate for the present, is obviously not capable of absorbing much expansion of the land use facilities. A study has been made of the feasibility of a joint Belgrade-Gallatin Field sewage and water supply system, but as of late, nothing definite has developed.

The main access road from Highway No. 10 is a two-lane, bituminous paved artery. Other roads on or around the property are gravel graded.

Traffic Patterns

Air

Within the state, Gallatin Field has flights to Butte, Missoula, Great Falls, and Billings, and a direct flight to Salt Lake City. All other locals have intermediate stops as described before.

The main commercial runway, 12/30, runs northwest by southeast. All large passenger craft approach from these directions and either come directly in or circle to land from the opposite direction. See Figure 3.7.

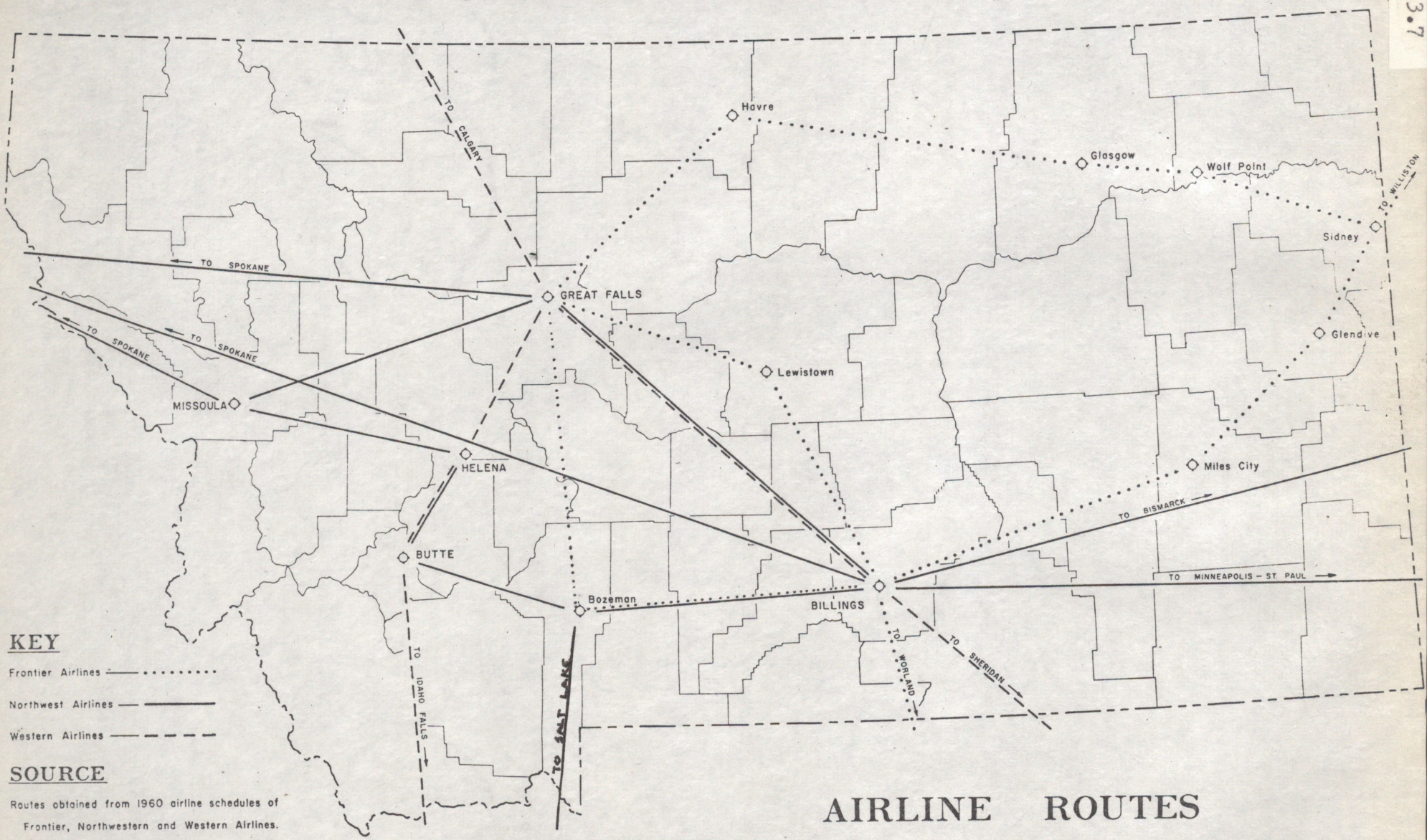
The smaller Electra and private craft occasionally use runway 16/34. Because no excessive air traffic exists, holding patterns are seldom used.

Ground

Vehicular traffic flow not directly on the airline property is concentrated on the interstate highway one-half mile to the southwest. Access to the field's main road is from the frontage road, the old highway, which runs between Belgrade and Bozeman. No direct exit from the highway has been provided to the airport.

Within Gallatin Field grounds the main access road joins a large bituminous lane connecting the terminal and hangar area. A dirt county road runs parallel to the southern and eastern sides of the airport, but is seldom used.

Figure 3.7



KEY

Frontier Airlines ——— ·····

Northwest Airlines ———

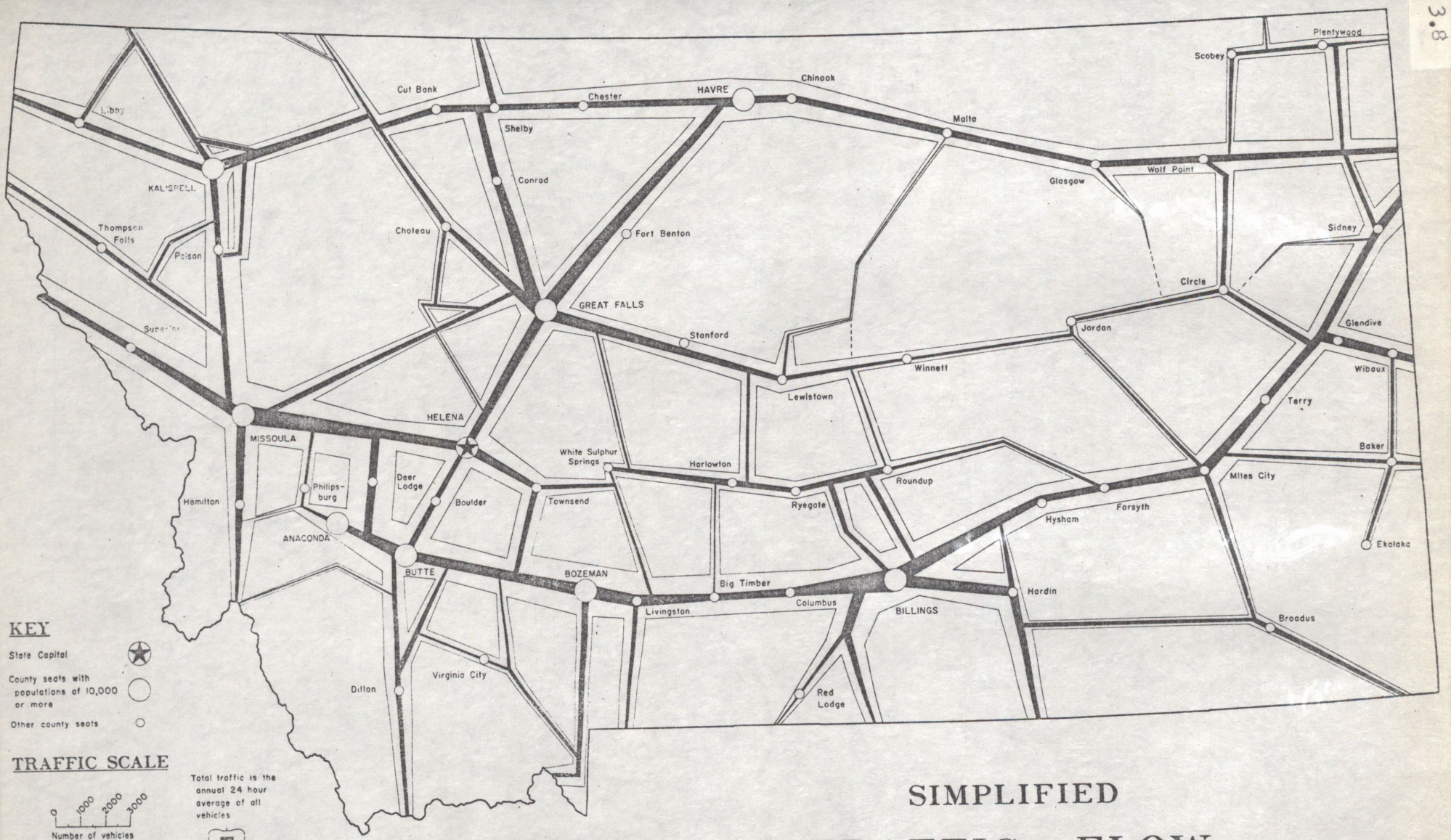
Western Airlines — — —

SOURCE

Routes obtained from 1960 airline schedules of Frontier, Northwestern and Western Airlines.

AIRLINE ROUTES

Figure 3.8



KEY

State Capital

County seats with populations of 10,000 or more

Other county seats

TRAFFIC SCALE

0 1000 2000 3000

Number of vehicles

Total traffic is the annual 24 hour average of all vehicles

Commercial traffic is the annual 24 hour average of commercial vehicles

SOURCE

1958 Traffic Flow Map of Montana, prepared by Montana Highway Planning Survey

SIMPLIFIED TRAFFIC FLOW 1958

DESIGN CONSIDERATIONS

DESIGN CONSIDERATION

Attitude of People Toward Flight and The Terminal.

Flight and Terminal Personnel

An efficient and pleasant environment is desired by those working in and around the terminal. These people do not wish to spend wasted time performing their jobs or unnecessarily assisting passengers. Enjoyment of the building will result in a more amiable atmosphere and more competent work.

The flight personnel basically want a system which can orderly and adequately service the plane, passengers and their baggage, and the cargo. To spend valuable time with undue complications is a hinderance to the entire schedule of a flight.

Passengers and Visitors

Passengers who are flying for the first several times are excited about traveling in a plane. They are awed by the monstrous craft appearing "lighter than air" while they are aboard. The terminal should stimulate and yet appear secure to these individuals.

No longer does the frequent air traveler experience this initial arousement. Air travel has become so common, that the passenger feels nothing special with each flight. For this person, the airport should be especially stirring and friendly in an attempt to make the idea of flying exciting again. Also, just as important, the terminal should be well-ordered and efficient. The principal concern of these individuals is to check in at the airline desk, board the plane, disembark, claim their baggage, and proceed to their destination with as little difficulty as possible.

The sightseer is only visiting the airport for a short time, so he should not have to walk through the airline area, which may have lines of waiting people. An observation area must be provided from which the visitor can observe the view, the planes, and the movement of the people, and yet not interrupt the other functions of the terminal.

Local Residents

The neighbors of an airfield have traditionally been annoyed by the noise associated with an airport. To keep a better good

neighbor policy, zoning codes should be set up around the airport to control land use. Thus a closer association will exist between the airfield and the surrounding community. Local residents should feel pride in the design of an airport rather than contempt.

Mood or Character

The modern aircraft is clean and simple with functional contours. Planes are designed for survival through simplicity and efficiency of form, and so also the terminal building should be inspired by, and reflect this concept. The structure must illustrate these qualities of free, vigorous, and graceful movement associated with flight.

Air travel is an elegant and exciting manner of transportation, and the terminal which houses this modern movement, should compliment the industry. The jetage airport should be non-static and visually stirring to approach and be within.

As a person approaches the airport by the main entrance road, he should be aware of entering a new era. The terminal should represent a transition from surface transportation to air transportation.

Interior spaces should be planned so the traveler can orient himself quickly and easily, no matter what his location inside the building. The layout and traffic flow should be almost self-evident from the terminal's plan.

Along with the concept of flight, the Gallatin Field Terminal should imply the local expression. In both the use of materials and structures, the influence of the surrounding area should be seen.

(Hard to make this concrete!

PHYSICAL FACILITIES

PHYSICAL FACILITIES

Organization of the Area

The proposed terminal building will be located as near as possible to the present facility, but to the south or west of the existing structure. In this way, the old terminal will be gradually phased out so as not to interrupt the service of the airfield. When constructed, the newer building will operate as the terminal and the older building torn down to make way for additional construction.

Orientation of the 1975 building will be similar to the present concrete-form, utilizing the Bridger Mountain view. In this way, most of the present utilities, runways, taxi lanes, and aprons will retain the same relationship.

The terminal should have a life expectancy of 15 to 20 years. Most of the facilities will be larger than needed in 1975, so the building will not so rapidly become obsolete. According to Mr. Iverson, Gallatin Field Manager, "At the time of construction, the terminal should be larger than believed necessary ~~at the present time.~~" Even with the over-built terminal, a certain balance must be maintained between available or proposed runways and corresponding air space and terminal facilities being developed.

Flexibility should also be one of the key points of the structure, so as to allow easy and integrated expansion in later years, and yet still retain the design balance and character of the initial construction. The plan will accommodate the increase in traffic and the maximum number of people which may use the facility.

A new control tower will not be necessary at this time, since one is presently in the planning stage. This new tower might be a completely separate structure, not connected to any of the present facilities.

Although no hangars, garages of flying services will be designed in this phase, some planning for future facilities will be undertaken. All of the private flying services and their functions will be moved farther northeast of their present location. The snow removal and safety equipment will also be established in this sequence, along with the integration of the industrial-commercial park.

The facilities of this airport will be able to service the Boeing 747 in both passenger and cargo functions, but the terminal will not be directly geared toward this service. Use of the jet will be mainly for nonstop flights and excessive cargo movement, so flights into Bozeman will be rare occasions. If the 747 should begin making daily flights to this airfield in the future, the terminal will then be more easily adapted to the change.

Spaces Required

Entrance Lobby

The entrance lobby is the first contact the passenger has with the interior environment of the airport. A transition should occur here to make the person aware he is leaving conventional types of surface transportation and entering the era of flight. This small and amiable area should assure and invite the traveler along with orientating him. Direct access from this lobby will be to the ticket areas and onto the ticket lobby and waiting lounge. No exit traffic should move through this entrance, nor should any cargo be brought in here.

Ticket Lobby

The ticket lobby should be spacious to accommodate a large number of people in lines at the various airline counters. Airline desks shall enclose or face this space, which leads to the waiting or holding area and the administration facilities.

Airline Operations

Space should be provided for four airline rentals; each equiped with a manager's office, baggage collection and storage, counter space and back of counter work area, reservations, communications, dispatching, and locker space for employees. For every two airlines, a small restroom should also be provided. Any other business offices for the particular airlines will be located elsewhere. An excitement should result from this area due to each airline displaying their own colors and trademarks.

Waiting or Holding Lounge

The waiting room will be able to adequately and comfortably seat at least 200 people and have more than ample circulation. Enplaning passengers will congregate here while awaiting their respective flights. Concessions, restrooms, and other passenger services will be closely associated to this region. The dining room, cocktail lounge, and

game room might also be located adjacent to the waiting lounge. A snack bar will definitely be found within this space.

The exterior walls of the holding room should be entirely glass, in order to allow passengers and relatives an uninterrupted view of the landing and servicing of the planes. Views of the nearby mountains should also be prominent, with many of the seats orientated in this direction. An individual should be able to proceed directly from the entrance lobby to the waiting area without running into congestion or people moving in the opposite direction.

Concessions

While the traveler waits for his flight, he may find amusement or diversion in the concession area. Within this space will be situated a curio shop large enough to move around in, banks of vending machines, and a newstand.

A telephone and telegraph service may be established either near the shop or elsewhere in the waiting lounge. Along with the communication facilities, the flight insurance service will be located in the holding area, but should not be to permanently established. Although insurance exists in terminals today, in the forseeable future the facility will be abolished in the airport system.

Snack Bar

A standup, quick service snack bar is an important feature of the concession -- waiting lobby area. Here the passenger in a hurry can "grab" a small snack without waiting more than several minutes. Forcing the people to remain standing will keep them circulating and not allow passengers to congregate within the small eating area. Such an operation can be efficiently operated by one employee, utilizing pre-heated and pre-cooked foods and throw away utensils.

Dining Room

Two possible locations for the dining room are on the waiting lounge level or the level above. Those using the restuarant are in no necessary rush and are probably wasting excessive time. The dining room should also facilitate visitors and patrons from the surrounding communities, offering them a pleasant evening in an unique environment. The exterior walls of this area will be glass to allow enjoyment of the view and observation of the activities of the airfield.

A private dining room should also be included here for separate dining parties wishing to entertain at the airport. Also relating to the dining area will be the restrooms, kitchen, storage and coat room.

Cocktail Lounge and Game Room

Near the dining room should be located a medium size cocktail lounge with an intimate atmosphere. Both the dining room and lounge should reflect the building's overall concept of air travel, being comfortable and rather light or airy. The traveler should know he is in an airport lounge and dining area.

Along with the cocktail lounge will be a separated game room for the amusement of the passengers. The room will contain such items as pool tables, amusement machines, etc.

Both the cocktail lounge and dining room will commonly use the restrooms and coat room. Some of the storage areas to be considered for the lounge are:

Liquor and soft drink storage
Empty bottles
Linen and dry goods

A small office will also be necessary for record storage and management of the restuarant and cocktail lounge.

Kitchen

Food preparation, food storage, food service, and dish washing will be fundamental areas within the kitchen. Access to the kitchen will be provided from the exterior service entrance, along with an interior door. This space will be rather small, but efficiently designed to provide maximum service.

Baggage Claim

The baggage claim is the space provided for deplaning passengers to pick up their property. In the Gallatin Field terminal, a common luggage pick-up area will be utilized. All deplaning passengers from the various airlines will be serviced from this one facility.

Establishment of this utility will be in the general area where Bozeman-bound passengers exit from the terminal, and yet still be apparent as to its location. This method will eliminate people carrying their baggage through the building. An automated system will also have to be developed in which the luggage will be unloaded from the plane and transported to the claim area without interfering with the flow of traffic. This system will remove

the inevitable congestion from the airline desks.

Rent-A-Car Service

Within the exiting space will be located four car rental stalls. The principal people employing these facilities will be traveling to the neighboring regions, so the desks will be concentrated in the deplaning exit area.

This convenience, however, must not be isolated from the rest of the terminal. Access from the waiting room must also be maintained for the convenience of those individuals requiring this service.

Taxi and Bus Counter

Counter space will also be provided for those wishing temporary transportation to Bozeman or the surrounding area. The location of this facility will be similar to that of the car rental.

Baggage Lockers

Several small lockers should be provided for the waiting passengers who do not desire to carry their smaller baggage while in the terminal. Situation of these cubicals will be near or in the waiting lobby.

Rest Rooms

Accessibility of the public rest rooms from the waiting lounge, ticket lobby, exit area, lounge and dining room should be convenient and visible. If more than one set of rest rooms should exist, their location should be somewhat private and yet obvious.

The rest rooms will be spacious and contain facilities for "freshening up," shaving, changing clothes, etc.

Airport Manager

Receptionist

The airport manager will have one secretary whose office controls entrance to the manager's office. A small waiting area should also be included within this room.

Manager

A larger, comfortable, and yet formal, office will be provided for the airport manager. Included in the space will be a desk, cabinets and a work table.

Conference Room

For business meetings, a small conference room, seating 10 to 15 people, will be situated so as to be accessible from both the lobby and the manager's office.

Office

A small extra office might also be provided for such part-time administration or accountants that may prove necessary.

Separate Pilots' and Stewardess' Lounge

A pilots' lounge should be established to accommodate both commercial and private flyers. During layovers, bad weather or business delays will be the major time for use of the room.

The area should be rather spacious, containing comfortable chairs, a flight planning desk and necessary equipment, a restroom, and a small bedroom alcove.

The stewardess's room will be similar to that of the pilots. Also, the restroom should ~~also~~ contain a powder room.

Both of these spaces will be separated from the public areas, but not completely isolated from them.

Airline Operations Lounge

A small lounge will also be designed for the service crews working on the apron. The purpose of the room will be for coffe breaks, lunch and relaxation; the lounge should be separated from public circulation.

Observation Deck

An enclosed observation deck will be provided for waiting passengers and sightseers to view the distant mountains, the movement of planes, and the servicing of these craft. Establishment of the deck will be on the upper level of the terminal. Care will be used to guard against the observation deck blocking the view of the other facilities. Depending upon the weather, the area will be flexible as to the enclosure or exposure. The platform will be accessible to both waiting passengers and visitors, but no real need is concieved for deplaning traffic.

FAA - Weather Bureau

Currently the FAA serves as the Weather Bureau for Gallatin Field. In the new terminal, the two functions will be separate, but adjacent to each other. Then they will be able to function individually or as one facility, whichever will be necessary. Also, the two could operate together until the need arises that they be separated.

The Weather Bureau will consist of:

A large equipment room
Teletype room
Maintenance Chief's Office

General Office
Entrance Lobby
Display Racks
Wall Space for Displays
Large Operations Room
Area for Preparation of Charts

The FAA space will include:

Chief's Office
General Office
Entrance Lobby
Wall Space for Displays
Assembly Area for 30 or 40 pilots
Briefing Room

Both of these facilities should have a visibility from the northwest to the east. They must also be accessible to the outside in order to read and control the instruments on the roof, such as the flood lights, anometer, antanaes, becon, and other weather instruments.

Cargo Area

Movement of freight, mail and cargo will be completely separate from all passenger circulation. The cargo room will be very large to handle the volume of freight moving through this facility. Baggage traffic from the check-in desk to the plane, and from unloading to pick-up, will also pass through this area. The luggage handling will be separate, and yet within the same region.

All freight moving through the airport will initially be handled by the new terminal, but as these facilities become overcrowded, the bulk cargo will be placed in a separate building away from the terminal. When the industrial park is in full operation, such an expansion may be necessary, but not until then. After this shift has taken place, the original cargo area will efficiently handle baggage, mail and smaller freight. Later, a separate post office and express space might be also established, but not in the primary construction.

Janitor Facilities

Each level shall have a small janitor area with a central room on the main level. This larger area will contain most of the supplies and equipment required.

Power Vault

A power vault for the airfield will be located in the building. This separate area will also be adjacent to the mechanical room.

Accommodation of a larger generator and other heavy equipment will be necessary here.

Mechanical Room

The mechanical room will contain the heating, electrical, and water supply. Most of the existing facilities will be utilized except, concievably a water line will be brought out from Belgrade by then.

Service Area Facilities

Space will be necessary for placement of equipment used in servicing the planes on the apron. Entrance to this facility will be through large doorways opening unto the apron. The equipment will easily travel from the terminal to the jet without interfering with passanger traffic. Although the service holding area will not be excessively large, flexibility for possible expansion for newer and larger equipment will be important.

Offices

Several small offices will be provided for rental management and unrelated businesses located at the airport. These areas should be placed away from the public spaces so as to provide more privacy.

Parking Lot

Parking areas and their relationship to the terminal building are:

Closest to the building - taxi and bus service to the surrounding communities -- bus parking will include public and chartered services
Next Closest - short time parking for enplaning passangers and his family or friends
More remote - Commercial parking for those at the airport for the day or part of the day -- This will involve both employees and visitors
Most Remote Area - Overnight parking for traveler leaving their vehicles for several days
The rental car parking will be separate from those above and will be situated very near to the terminal, or even possibly within the building.

The parking lot may be divided by painted lines, signs, curbs, or even fences, and will not be completely separate areas.

Roads and Access

One-way traffic will be established for the main entrance road. An emphasis should be placed on getting the surface vehicles as close to the point of embarkation or debarkation as possible.

The service road will totally or at least partially be separated from the public entrance. A two lane, paved access will run to the service loading area of the terminal. Some division should also occur between the freight loading and unloading at the building. This road would be integrated into the industrial-commercial park area also.

The private flying services will be accommodated with a partially private road so as not to interfer with the commercial traffic.

All areas of Gallatin Field will be connected by paved roads for convenience, safety and fire protection.

Gas Station

Possibly a small public gas station may be established with car wash facilities for the rentals. Construction of the station would be near the parking area or main entrance road.

Mechanical Equipment

Loading Bridges

Some type of flexible passanger loading-unloading bridge will be designed for the passengers. With such equipment, the travelers will be protected from the weather from the time he enters the terminal until he reaches his destination. Since Montana often has severe cold and snowy periods, this utility is of particular importance.

The bridge will be flexible in both height and plane door adjustment, due to the varied size of craft being used or to be flown in the future. Although the terminal will not be specifically equipped to service the Boeing 747, the loading ramp will be able to accommodate the jet if necessary.

Apron Service Equipment

While the commercial plane is on the loading apron, certain functions must be performed. These include fuel, air-conditioning, and electricity supplied to the jets and electras.

Elevator

A central freight or service elevator might be a possibility for the terminal building. The elevator will service all levels of the building including the basement.

Sewage

The sewage system of the building will utilize a septic tank and existing drainage field. Although some expansion might be

necessary, the present facilities will be utilized as much as possible.

Graphics

Suitable, legible placards illuminated at night will direct and inform the people within the terminal. These should increase both the usefulness and functional attractiveness of the structure.

Miscellaneous

An incinerator will be located in the building and be accessible to all principle users. Special attention would be given to the size and height of the chimney in relation to hindering views, planes and the Weather Bureau.

Special Equipment

Snow removal and fire fighting equipment need to be housed near the runways and apron areas. Repair shops will also be required for maintenance of this equipment. These garage-like structures will be large enough to adequately house the machinery and also provide space for additional equipment to be supplied in the future.

Activities and Circulation

People entering the terminal should not meet debarking passengers in the lobbies to prevent congestion. The distance from the parking area to the loading bridge should be as short as possible. Once the individual is in the holding area, excessive room would permit uncontrolled circulation, so one might "wander" around. Clear designation of the loading area and one way traffic at the time of enplaning would be important considerations.

Those arriving at Gallatin Field by air will unload through the covered ramp and meet no opposing traffic or congested lines. From the debarkation point, these passengers will have the option of entering the waiting lobby or proceeding directly, by controlled circulation, to the luggage claim area and exit into the parking lot or transportation service area.

A visitor will also enter through the main entrance and proceed directly into the holding lounge. Possibly a separate entrance might be provided to the dining room and cocktail lounge, so these spaces may be used when the terminal is closed.

Luggage is carried into the terminal by the traveler and deposited at the airline collection desk. From here the baggage is moved to the baggage-cargo room by an automated system and dispatched to the plane for loading. Unloaded bags are moved in the same manner, except from the freight room the luggage is transfered to the common claim area.

Cargo, freight, and mail will arrive at the building by a segregated road and be unloaded from the surface vehicle directly into the cargo room. In this facility, the goods will be received, sorted, stored, consigned to the proper aircraft, and loaded. The best plan will spend the least time and energy expended in loading the planes.

ECONOMIC CONSIDERATIONS

ECONOMIC CONSIDERATIONS

Costs

Since the building design has not begun, nor the material or construction chosen, it is difficult to make a valid cost estimate at this time. A rough estimate by the Gallatin Field Manager indicated from 1,500,000 to 2,000,000 Dollars might be made available in 1975 for the building construction, grading and drainage, landscaping, runways and parking lots, utilities, elimination of existing buildings, and architectural fees.

An approximate cost per square foot study was made by consulting the Marshal Valuation System. This book gave a general idea of the cost in relation to the type of construction and materials used in the building. Although no specific reference was made to airport terminals, several similar types of buildings were described. After modifying and combining costs per square foot figures for these buildings, a figure was chosen for an airport terminal. See Tables 6.1 and 6.2.

The buildings are divided into four classes according to the type of frame (supporting columns and beams), walls, floors, and roof structure. Then the cost per square foot is determined by these factors.

Financing

In order to finance this structure, several sources of money will be solicited. Approximately 50 per cent of the construction will be funded by the Federal Government. By 1975, an air travel head tax will be in effect in Montana. Every commercial passenger will be taxed one dollar, and a possible seven cent tax will also be placed on flight fuel. This money will then be returned to the airport for such projects as the Gallatin Field Terminal. (5)

Other sources of money will be from airport revenues set aside for this particular project, general obligation bonds, and a revenue bond voted on by the tax payers.

A program will be enacted to have Park, Madison and Meagher Counties utilize the airport on a more regular basis. Once this use has been established, revenue bonds could also be voted on by

the tax payers of the areas, and a tax base collected from them to help finance the terminal. With these counties using the airfield more often, additional income will also be contributed once the structure is built.

Airport Revenue

The airport income will consist of several sources, and will be used to finance the new construction, return money borrowed, and provide for operating and maintenance costs of the terminal once it is built. Within the building, income will be contributed by the rental spaces (airlines, taxies, car rentals, and offices), cargo and freight fees, and the concessions, which will be owned by the airport. Along with these, additional money will come from hangar rentals, landing fees, flying club dues, plane servicing and the public gas station.

A last source to be considered will be the industrial-commercial park. Land for this development will either be purchased from the airport board or leassed by the businesses established there.

APPENDICES

Table 6.2

CLASS OF CONSTRUCTION

Class	Type	Exterior walls	Interior walls	Light, plum	Heat	Cost
A	municiple	metal panel conc., brick large glass area	plaster, terrazzo, vinyl tile	good fluores-cent, large rest rooms	steam	$24.19
B	"	"	"	"	"	$22.30
C	"	brick bearing wall, wood trusses	plaster, ceramic tile, vinyl tile	good fluores-cent, good rest rooms	"	$18.26
D	"	brick veneer	plaster, hardwood, asphalt tile	adequate	"	$17.70

Table 6.1

CLASS OF CONSTRUCTION INDICATOR

Class	Frame	Floor	Roof	Walls
A	structural steel columns and beams fireproofed	concrete and or steel deck fireproofed	formed conc. precast slabs gypsum on steel deck and fireproofed	non-bearing, cavity, curtain, masonry, conc.
B	reinforced conc. columns and beams	concrete and or steel deck fireproofed	formed conc. precast slabs gypsum on steel deck fireproofed	non-bearing cavity, curtain, masonry, conc.
C	masonry or concrete load bearing walls	wood or steel floor joists	wood or steel joists, wood or steel deck	brick or conc. block
D	wood or steel studs in bearing wall, wood or steel frame	wood or steel joists wood or steel deck	wood or steel joists wood or steel deck	Any material except masonry or conc. may have masonry veneer

APPENDIX A

Figures and charts illustrating Montana's air traffic growth in recent years and the destination of commercial planes leaving Bozeman.

Figure 3. State of Montana, Total Yearly Origin and Destination Traffic.

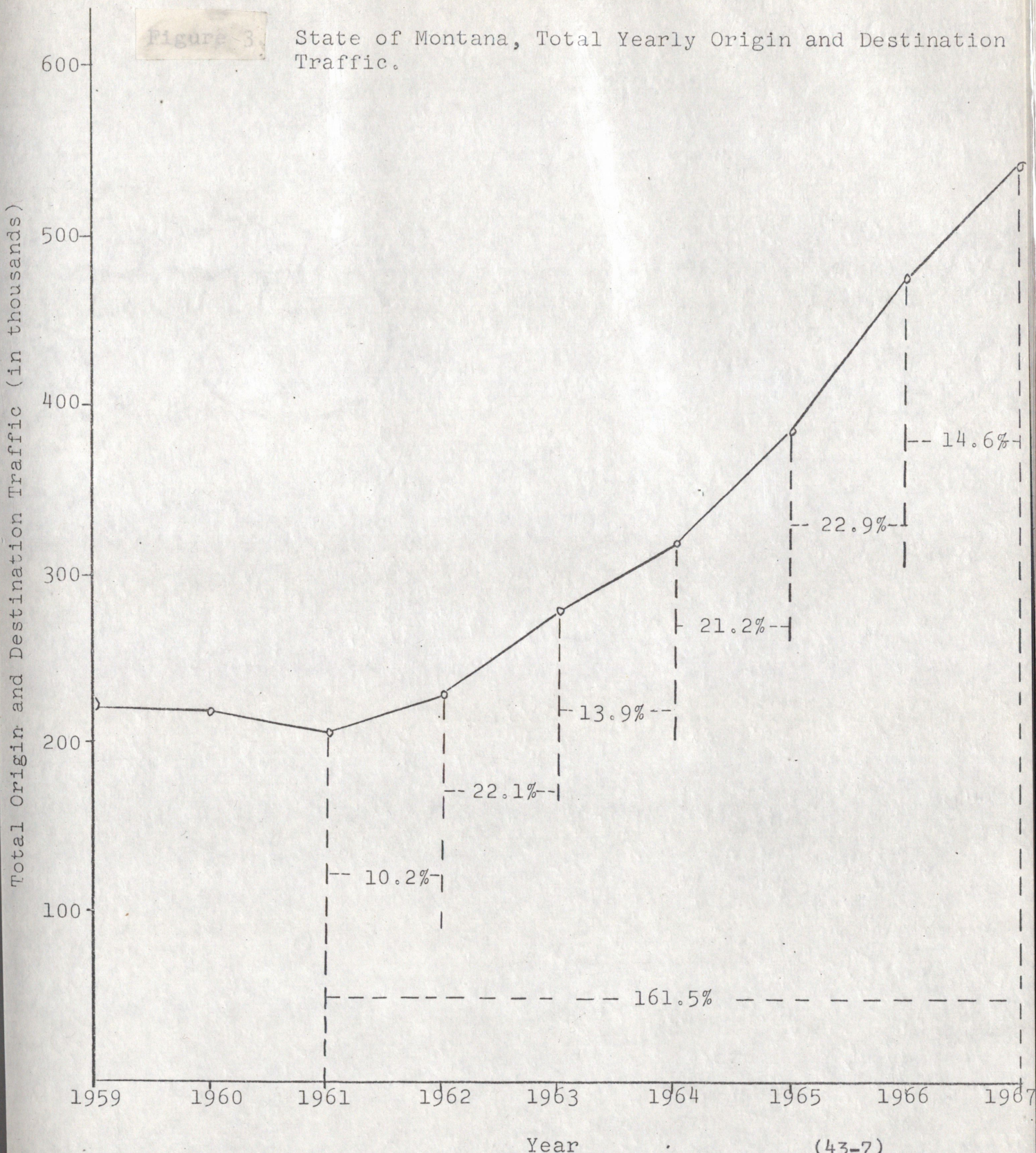


Table 3. Major Out-of-State City Markets for Montana, 1965, 1966, and 1967.

City	1965		1966		1967*	
	Total	Per Day	Total	Per Day	Total	Per Day
Seattle	31,060	85.1	34,950	95.8	46,710	128.0
Denver	28,020	76.8	36,060	98.8	38,150	104.5
San Francisco	22,980	63.0	23,270	63.8	27,150	74.4
Los Angeles	21,050	57.7	22,200	60.8	26,700	73.2
Spokane	19,050	52.2	20,120	55.1	26,170	71.7
Minneapolis	17,720	48.5	18,730	51.3	22,700	62.2
Salt Lake City	17,010	46.6	22,160	60.7	22,090	60.5
Portland	15,080	41.3	16,470	45.1	20,130	55.2
Chicago	10,920	29.9	11,560	31.7	14,220	39.0
New York City	11,490	31.5	10,870	29.8	14,030	38.4
Washington, D. C.	5,940	16.3	6,520	17.7	8,030	22.0
Las Vegas	4,240	11.6	5,060	13.9	6,030	16.5
Casper	5,120	14.0	4,920	13.5	5,570	15.3
San Diego	4,630	12.7	5,140	14.1	4,860	13.3
Kansas City	2,870	7.9	3,540	9.7	4,170	11.4
Total	217,180	595.1	241,570	661.8	286,710	785.6

*Data for 1967 consists of first three quarters of 1967 plus fourth quarter of 1966.

Table 4. Major Rotating Terminal Points for Montana Cities, 1967, With Total Amount of Connecting Traffic.*

City	Denver	Salt Lake City	Chicago	Minne-apolis
Billings	12,710	10,480	6,340	3,280
Great Falls	16,090	4,030	7,030	2,800
Helena	850	1,410	780	610
Bozeman	460	.280	880	880
Missoula	1,390	130	3,120	1,850
Butte	2,350	4,080	1,850	1,070
Nine Smaller	2,840	3,220	620	300
Total State	36,690	23,630	20,620	10,790

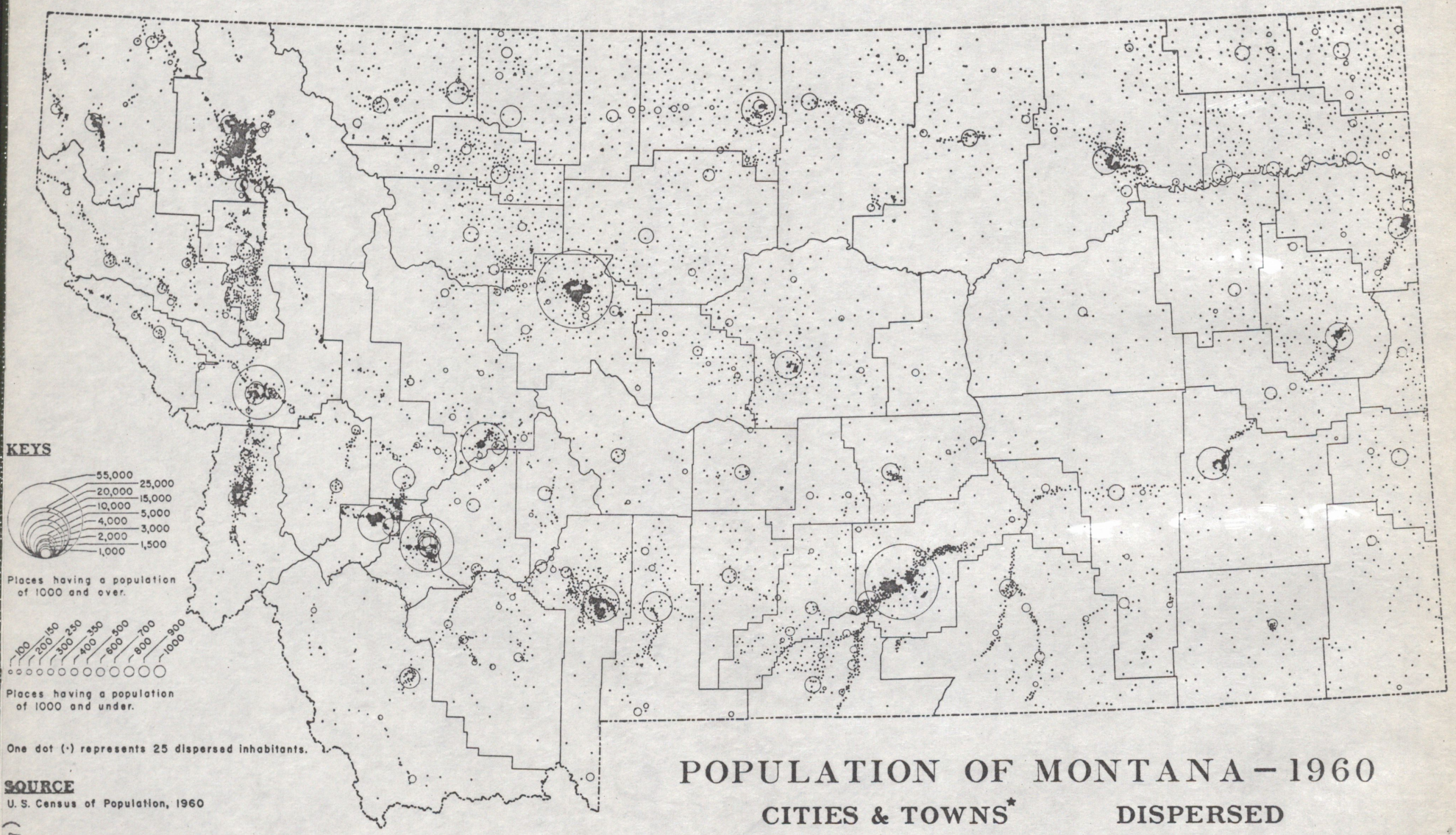
Table 5. Summary of Major Out-of-State City Markets for Montana, 1967, Including Origin, Destination, and Connecting Traffic.*

City	Traffic	City	Traffic
Denver	74,840	Minneapolis	33,840
Seattle	46,710	San Francisco	27,150
Salt Lake City	45,720	Los Angeles	26,700
Chicago	34,840	Spokane	26,170

*Data for 1967 consists of first three quarters of 1967 plus fourth quarter of 1966.

APPENDIX B

Figures and charts illustrating the growth of Montana, the counties, and Montana State University.



POPULATION OF MONTANA — 1960

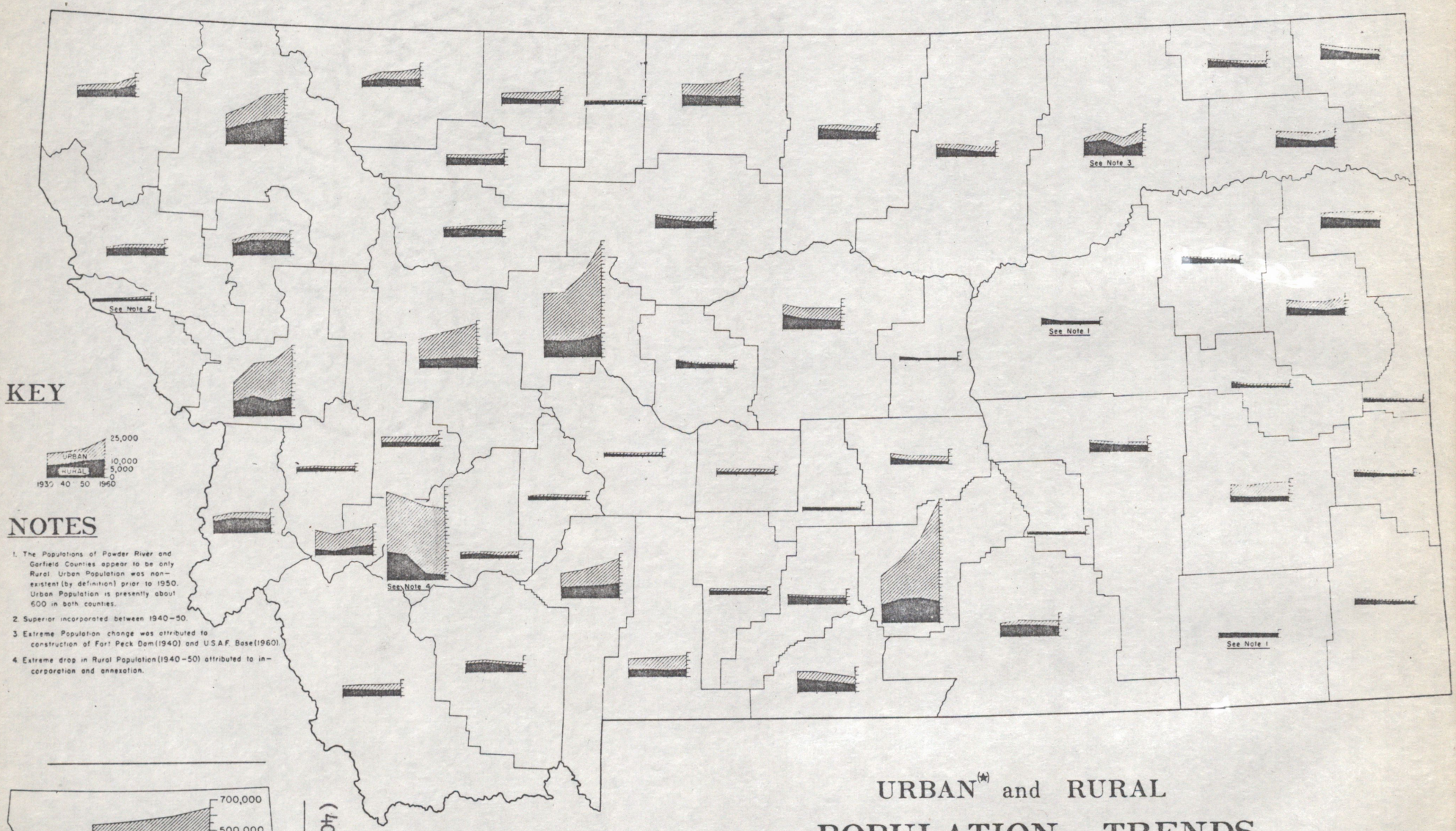
CITIES & TOWNS* DISPERSED

*Includes all incorporated places; and those unincorporated places having populations of 100 or more.

(6-04)

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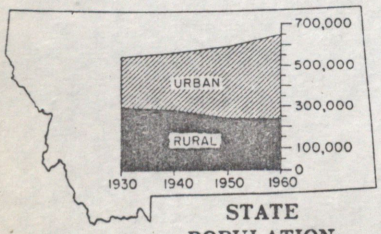
Compiled and drawn in the Dept. of Earth Sciences, M.S.C., by N. Holburn, M.J. Edie, J.M



KEY

NOTES

1. The Populations of Powder River and Garfield Counties appear to be only Rural. Urban Population was non-existent (by definition) prior to 1950. Urban Population is presently about 600 in both counties.
2. Superior incorporated between 1940–50.
3. Extreme Population change was attributed to construction of Fort Peck Dam (1940) and U.S.A.F. Base (1960).
4. Extreme drop in Rural Population (1940–50) attributed to incorporation and annexation.



STATE POPULATION TREND

(40-12)

SOURCES

U.S.D.C., Bureau of the Census, Census of Population Characteristics for 1930, 1940 and 1950. 1960 Census of Population—Preliminary Report.

URBAN(*) and RURAL POPULATION TRENDS

1930 to 1960

(*) Urban Population based on all incorporated places; and, unincorporated places with populations of over 1,000.

PROJECTED ENROLLMENTS - AUTUMN QUARTER

MONTANA STATE UNIVERSITY

Year	Growth Factor	Net	FTE	Cum. Growth Factor	%LD	LD	%UD	UD	%Gr.	Gr.
1967		6768	6966		63	4389	33	2299	4	278
	1.067			1.067						
1968		7274	7433		62 1/2	4646	33	2453	4 1/2	334
	1.048			1.118						
1969		7560	7787		62	48]8	33	2570	5	389
	1.029			1.150						
1970		7780	8013		62	4968	32 1/2	2604	5 1/2	441
	1.028			1.183						
1971		8000	8240		62	5109	32	2637	6	494
	1.029			1.217						
1972		8230	8476		61 1/2	5213	32	2712	6 1/2	551
	1.030			1.254						
1973		8480	8734		61	5328	32	2795	7	611
	1.024			1.283						
1974		8680	8940		60 1/2	5409	32	2861	7 1/2	670
	1.028			1.319						
1975		8920	9188		60	5513	32	2940	8	735
	1.021			1.347						
1976		9110	9383		59	5536	32	3003	9	844
	1.027			1.384						
1977		9360	9641		58	5592	32	3085	10	964
	(1.025)			1.417						
1978		9594	9882		56	5534	33	3261	11	1087
	(1.020)			1.454						
1979		9834	10129		55	5571	33	3343	12	1215

Notes: 1967 & 1968 actual
1969 thru 1977 from Executive Secretary's Office as per phone conversation with

APPENDIX C

Charts of economic conditions in the Gallatin County and the City of Bozeman.

RETAIL SALES

Number of stores and 1969 estimate of sales

Hardware	32	10,418
General Merchandise	13	6,553,000
	10	6,376,000
Food	29	15,073,000
	15	12,835,000
Auto	13	9,883,000
	11	N.A.
Gasoline	53	6,982,000
	31	4,939,000
Apparel	20	3,628,000
	16	3,311,000
Furniture	16	2,365,000
	14	N.A.
Eat, Drink	73	5,765,000
	26	3,086,000
Drugs	10	1,781,000
	15	1,313,000

First number indicates Gallatin County.

Second number indicates Bozeman.

AGRICULTURE

Top Crops and Yield

Wheat	2,232,000	Bushels
Barley	1,343,000	Bushels
Oats	283,000	Bushels
Hay	6	Tons "Tame" hay per acre
	2	Tons "Wild" hay per acre

LIVESTOCK NUMBERS

Cattle	20,800
Sheep	19,500
Hogs	5,200
Poultry	36,000
Dairy Cattle	6,100

RETAIL SALES

Total Sales

	1963	1968	1969
Bozeman	$33,630,000	$53,741,000	$52,776,000
Gallatin County	$42,275,000	$64,047,000	$68,401,000

APPENDIX D

Zoning regulations relating to the Gallatin County Airport.

REGULATION OF DEVELOPMENT OF GALLATIN FIELD AIR PARK

The land uses of Gallatin Field property and the surrounding areas must be regulated for mutual protection and convenience of both the land users and the air traffic. This regulation can be affectuated by two primary means: Zoning and Land Use Covenants. An Airport Zoning Resolution enacted by the County Commission of Gallatin would establish the controls of land use, in privately held land around the airport, which are needed to ensure suitable clearances for aircraft. Such a zoning resolution follows hereinafter.

Recommendations are also given hereinafter for Covenants which would run with lease or land sale agreements between the Gallatin Field Board and the enterprises which obtain property rights from it.

In addition to the above-mentioned zoning provisions, it would be wise to prepare and enact zoning provisions for the lands surrounding airport property which would define residential, industrial-commercial, and agricultural neighborhoods and induce the best possible characters for them. Criteria for these neighborhoods should be similar to those which are found in modern municipal zoning laws. It appears logical for such a zoning law to include neighboring Belgrade in its scope. Therefore, efforts should be made toward enactment of a joint Town - County Zoning Law using the legal techniques allowable under Montana Statutes.

FORM OF AIRPORT ZONING RESOLUTION

AN ORDINANCE REGULATING AND RESTRICTING THE HEIGHT OF STRUCTURES AND OBJECTS OF NATURAL GROWTH, AND OTHERWISE REGULATING THE USE OF PROPERTY, IN THE VICINITY OF THE GALLATIN FIELD AIRPORT BY CREATING AIRPORT APPROACH ZONES, TRANSITION ZONES, HORIZONTAL ZONE AND CONICAL ZONE, AND ESTABLISHING THE BOUNDARIES THEREOF; PROVIDING FOR CHANGES IN THE RESTRICTIONS AND BOUNDARIES OF SUCH ZONES; DEFINING CERTAIN TERMS USED HEREIN; REFERRING TO THE GALLATIN FIELD AIRPORT ZONING MAP WHICH IS INCORPORATED IN AND MADE A PART OF THIS ORDINANCE ; PROVIDING FOR ENFORCEMENT; ESTABLISHING A BOARD OF APPEALS; AND IMPOSING PENALTIES.

This resolution is adopted pursuant to the authority conferred by The Revised Code of Montana. It is hereby found that an airport hazard endangers the lives and property of users of Gallatin Field Airport and of occupants of land in its vicinity, and also, if of the obstruction type, in effect reduces the size of the area available for the landing, taking-off and maneuvering of aircraft, thus tending to destroy or impair the utility of Gallatin Field Airport and the public investment therein. Accordingly, it is declared: (1) that the creation or establishment of an airport hazard is a public nuisance and an injury to the region served by Gallatin Field Airport; (2) that it is necessary in the interest of the public health, public safety convenience and general welfare that the creation or establishment of airport hazards be prevented, and; (3) that the prevention of these hazards should be accomplished, to the extent legally possible, by the exercise of the police power without compensation. It is further declared that both the prevention of the creation or establishment of airport hazards and the elimination, removal, alteration, mitigation, or marking and lighting of existing airport hazards are public purposes for which political subdivisions may raise and expend public funds and acquire land or interests in land.

Be it resolved by the Commissioners of Gallatin County:

SECTION I: SHORT TITLE

This ordinance shall be known and may be cited as "Gallatin Field Airport Zoning Ordinance".

SECTION II: DEFINITIONS

As used in this Ordinance, unless the context otherwise requires:

(1) AIRPORT - Means Gallatin Field Airport.
(2) AIRPORT ELEVATION - Means the established elevation of the highest point on the usable landing area.
(3) AIRPORT HAZARD _ Means any structure, tree or use of land which obstructs the airspace required for or is otherwise hazardous to the flight of aircraft in landing or taking-off at the airport.
(4) AIRPORT REFERENCE POINT - Means the point established as the approximate geographic center of the airport landing area and so designated.
(5) BOARD OF ADJUSTMENT - Means a board consisting of five members.
(6) HEIGHT - For the purpose of determining the height limits in all zones set forth in this ordinance and shown on the zoning map, the datum shall be mean sea level elevation unless otherwise specified.

(7) INSTRUMENT RUNWAY - Means a runway equipped or to be equipped with electronic or visual air navigation aids adequate to permit the landing of aircraft under restricted visibility conditions.

(8) LANDING AREA - Means the area of the Airport used for the landing, take-off or taxiing of aircraft.

(9) NON-CONFORMING USE - Means any structure, tree, or use of land which is lawfully in existence at the time the regulation is prescribed in the Ordinance or an amendment thereto becomes effective and does not then meet the requirements of said regulation.

(10) NON-INSTRUMENT RUNWAY - Means a runway other than an instrument runway.

(11) PERSON - Means an individual, firm, partnership, corporation, company, association, joint stock association, or body politic, and includes a trustee, receiver, assignee, administrator, executor, guardian, or other representative.

(12) RUNWAY - Means the paved surface of an airport landing strip.

(13) STRUCTURE - Means an object constructed or installed by man, including, but without limitation, buildings, towers, smokestacks, and overhead transmission lines.

(14) TREE - Means any object of natural growth.

SECTION III - ZONES

In order to carry out the provisions of this Resolution, there are hereby created and established certain zones which include all of the land lying within the Instrument Approach Zones, Non-instrument Approach Zones, Transition Zones, Horizontal Zone and Conical Zone. Such areas and zones are shown on Gallatin Field Airport Zoning Map which is attached to this Resolution and made a part hereof. The various zones are hereby established and defined as follows:

(1) INSTRUMENT APPROACH ZONE - An instrument approach zone is established at each end of the instrument runway for instrument landings and take-offs. The instrument approach zones shall have a width of 1,000 feet at a distance of 200 feet beyond each end of the runway, widening thereafter uniformly to a width of 16,000 feet at a distance of 50,200 feet beyond each end of the runway, its centerline being the continuation of the centerline of the runway.

(2) NON-INSTRUMENT APPROACH ZONE - A non-instrument approach zone is established at each end of all non-instrument runways on Gallatin Field Airport for non-instrument landings and take-offs. The non-instrument approach zone shall have a width of _____* feet at a distance of 200 feet beyond each end of the runway, widening thereafter uniformly to a width of _____* feet at a distance of 10,200 feet beyond each end of the runway, its centerline being the continuation of the centerline of the runway.

(3) VFR APPROACH ZONE - A visual flight rules approach zone shall have a width of 200 feet at a distance of 100 feet beyond each end of the runway widening thereafter uniformly to a width of 500 feet at a distance of 3,100 feet beyond each end of the runway.

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* The applicable distance in feet must be based on runway lengths as set forth in Sections 77.27 and 77.25 of Part 77 of the Federal Aviation Regulations.

(4) TRANSITION ZONES - Transition zones are hereby established adjacent to each instrument and non-instrument runway and approach zone as indicated on the zoning map. Transition zones symmetrically located on either side of runways, have variable widths as shown on the zoning map. Transition zones extend outward from a line _____* feet on either side of the center line of the non-instrument runway, for the length of such runway plus 200 feet on each end; and 500 feet on either side of the center line of the instrument runway, for the length of such runway plus 200 feet on each end, and are parallel and level with such runway center lines. The transition zones along such runways slope upward and outward (1) foot vertically for each (7) feet horizontally to the point where they intersect the surface of the horizontal zone. Further, transition zones are established adjacent to both instrument and non-instrument approach zones for the entire length of the approach zones. These transition zones have variable widths, as shown on the zoning map. Such transition zones flare symmetrically with either side of the runway approach zones from the base of such zones and slope upward and outward at the rate of (1) foot vertically for each (7) feet horizontally to the points where they intersect the surfaces of the horizontal and conical zones. Additionally, transition zones are established adjacent to the instrument approach zone where it projects through and beyond the limits of the conical zone, extending a distance of 5,000 feet measured horizontally from the edge of the instrument approach zones at right angles to the continuation of the center line of the runway.

(5) HORIZONTAL ZONE - A horizontal zone is hereby established as the area within a circle with its center at the Airport Reference Point and having a radius of _____* feet. The horizontal zone does not include the instrument and non-instrument approach zones and the transition zones.

(6) CONICAL ZONE - A conical zone is hereby established commencing at the periphery of the horizontal zone and extending to a distance of _____* feet from the airport reference point. The conical zone does not include the instrument and non-instrument approach zones and transition zones.

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* The applicable distance in feet must be based on runway lengths as set forth in Sections 77.27 and 77.25 of Part 77 of the Federal Aviation Regulations.

SECTION IV: HEIGHT LIMITATIONS

Except as otherwise provided in this Resolution, no structure or tree shall be erected, altered, allowed to grow, or maintained in any zone created by this Resolution to a height in excess of the height limit herein established for such zone. Such height limitations are computed from the established airport elevation and are hereby established for each of the zones in question as follows:

(1) INSTRUMENT APPROACH ZONE - One (1) foot in height for each fifty (50) feet in horizontal distance beginning at a point 200 feet from the end of the instrument runway and extending to a distance of 10,200 feet from the end of the runway; thence one (1) foot in height for each forty (40) feet in horizontal distance to a point

(2) NON-INSTRUMENT APPROACH ZONES - One (1) foot in height for each forty (40) feet in horizontal distance beginning at a point 200 feet from the end of the non-instrument runway and extending to a point 10,200 feet from the end of the runway;

(3) VFR AIRPORT APPROACH ZONES - One (1) foot in height for each twenty (20) feet in horizontal distance beginning at a point 200 feet from and at the centerline elevation of the end of the non-instrument runway and extending to a point 10,200 feet from the end of the runway;

(4) TRANSITION ZONES - One (1) foot in height for each seven (7) feet in horizontal distance beginning at a point _____* feet from the center line of non-instrument runways and 500 feet from the center line of the instrument runway, measured at right angles to the longitudinal center line of the runway, extending upward to a maximum height of 150 feet above the established airport elevation which is _____* feet above mean sea level. In addition to the foregoing, there are established height limits of (1) foot vertical height for each (7) feet horizontal distance measured from the edges of all approach zones for the entire length of the approach zones and extending upward and outward to the points where they intersect the horizontal and conical surfaces. Further, where the instrument approach zone projects through and beyond the conical zone, a height limit of one (1) foot for each (7) feet of horizontal distance shall be maintained beginning at the edge of the instrument approach zone and extending a distance of 5,000 feet from the edge of the instrument approach zone measured normal to the centerline of the runway extended.

(5) HORIZONTAL ZONE - One hundred fifty (150) feet above the established airport elevation or a maximum height of _____* feet above mean sea level elevation; and

(6) CONICAL ZONE - One (1) foot in height for each twenty (20) feet of horizontal distance beginning at the periphery of the horizontal zone extending to a height of _____* feet above the airport elevation.

(7) EXCEPTED HEIGHT LIMITATIONS - Nothing in this Ordinance shall be construed as prohibiting the growth, construction or maintenance of any tree or structure to a height up to 45 feet above the surface of the land.

Where an area is covered by more than one (1) height limitation, the more restrictive limitation shall prevail.

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* The applicable distance in feet must be based on runway lengths as set forth in Sections 77.27 and 77.25 of Part 77 of the Federal Aviation Regulations.

SECTION V: USE RESTRICTIONS

Notwithstanding any other provisions of this Ordinance, no use may be made of land within any zone established by this Ordinance in such a manner as to create electrical interference with radio communication between the Airport and aircraft, make it difficult for flyers to distinguish between airport lights and others, result in glare in the eyes of flyers using the Airport, impair visibility in the vicinity of the Airport or otherwise endanger the landing, taking-off, or maneuvering of aircraft.

SECTION VI: NON-CONFORMING USES

(a) Regulations not Retroactive. The regulations prescribed by this Resolution shall not be construed to require the removal, lowering, or other changes or alteration of any structure or tree not conforming to the regulations as of the effective date of this Resolution, or otherwise interfere with the continuance of any non-conforming use. Nothing herein contained shall require any change in the construction, alteration, or intended use of any structure, the construction or alteration of which was begun prior to the effective date of this Resolution, and is diligently prosecuted.

(b) Marking and Lighting. Notwithstanding the preceding provision of this Section, the owner of any non-conforming structure or tree is hereby required to permit the installation, operation, and maintenance thereon of such markers and lights as shall be deemed necessary by the _____ _____# to indicate to the operators of aircraft in the vicinity of the Airport, the presence of such airport hazards. Such markers and lights shall be installed, operated, and maintained at the expense of _____*.

SECTION VII: PERMITS

(a) Future Uses - Except as specifically provided in paragraphs 1, 2 and 3 hereunder, no material change shall be made in the use of land and no structure or tree shall be erected, altered, planted or otherwise established in any zone hereby created unless a permit therefor shall have been applied for and granted. Each application for a permit shall indicate the purpose for which the permit is desired, with sufficient particularity to permit it to be determined whether the resulting use, structure or tree would conform to the regulations herein prescribed. If such determination is in the affirmative, the permit shall be granted.

(1) In the area lying within the limits of the Horizontal zone and the Conical zone, no permit shall be required for any tree or structure less than 75 feet of vertical height above ground, except when because of terrain, land contour or topographic features such tree or structure would extend above the height limits prescribed for such zone.

(2) In the areas lying within the limits of the instrument and non-instrument approach zones but at a horizontal distance of not less than 4,200 feet from each end of the runways, no permit shall be required for any tree or structure less than 75 feet of vertical height above the ground, except when such tree or structure would extend above the height limit prescribed for such instrument or non-instrument approach zone.

Insert here the title of the appropriate official who may be charged with the duty for determining the necessity for lighting and marking.

* Insert here the name of the appropriate political subdivision or body.

(3) In the areas lying within the limits of the transition zones beyond the perimeter of the horizontal zone, no permit shall be required for any tree or structure less than 75 feet of vertical height above the ground except when such tree or structure, because of terrain, land-contour or topographic features would extend above the height limit prescribed for such transition zones.

Nothing contained in any of the foregoing exceptions shall be construed as permitting or intending to permit any construction, alteration or growth of any structure or tree in excess of any of the height limits established by this Resolution except as set forth in Section XV.

(b) Existing Uses. No permit shall be granted that would allow the establishment or creation of an airport hazard or permit a non-conforming use, structure, or tree to be made or become higher, or become a greater hazard to air navigation, than it was on the effective date of this Resolution or any amendments thereto or than it is when the application for a permit is made. Except as indicated, all applications for such a permit shall be granted.

(c) Non-conforming Uses Abandoned or Destroyed. Whenever the Airport Building Inspector determines that a non-conforming structure or tree has been abandoned or more than 80 percent torn down, physically deteriorated, or decayed, no permit shall be granted that would allow such structure or tree to exceed the applicable height limit or otherwise deviate from the zoning regulations.

(d) Variances. Any person desiring to erect or increase the height of any structure, or permit the growth of any tree, or use his property, not in accordance with the regulations prescribed in this Resolution, may apply to the Board of Adjustment for a variance from such regulations. Such variances shall be allowed where it is duly found that a literal application or enforcement of the regulations would result in practical difficulty or unnecessary hardship and the relief granted would not be contrary to the public interest but will do substantial justice and be in accordance with the spirit of this Resolution.

(e) Hazard Marking and Lighting. Any permit or variance granted may, if such action is deemed advisable to effectuate the purpose of this Resolution and be reasonable in the circumstances, be so conditioned as to require the owner of the structure or tree in question to permit the Gallatin Field Airport Board at its own expense, to install, operate, and maintain thereon such markers and lights as may be necessary to indicate to flyers the presence of an airport hazard.

SECTION VIII: ENFORCEMENT

It shall be the duty of the Airport Building Inspector to administer and enforce the regulations prescribed herein. Applications for permits and variances shall be made to the Airport Building Inspector upon a form furnished by him. Applications required by this Resolution to be submitted to the Airport Building Inspector shall be promptly considered and granted or denied by him. Applications for action by the Board of Adjustment shall be forthwith transmitted by the Airport Building Inspector.

SECTION IX: BOARD OF ADJUSTMENT

(a) There is hereby created a Board of Adjustment to have and exercise the following powers: (1) to hear and decide appeals from any order requirement, decision, or determination made by the Airport Building Inspector in the enforcement of this Resolution; (2) to hear and decide special exceptions to ceptions to the terms of this Resolution upon which auch Board of Adjustment under such regulations may be required to pass; (3) to hear and decide specific variances.

(b) The Board of Adjustment shall consist of five members appointed by the County Commission and each shall serve for a term of three (3) years and until his successor is duly appointed and qualified. Of the members first appointed one shall be appointed for a term of one (1) year, two for a term of two (2) years and two for a term of three (3) years. Members shall be removable by the appointing authority for cause, upon written charges, after a public hearing.

(c) The Board of Adjustment shall adopt rules for its governance and procedure in harmony with the provisions of this Resolution. Meetings of the Board of Adjustment shall be held at the call of the Chairman and at such other times as the Board of Adjustment may determine. The Chairman, or in his absence the acting chairman, may administer oaths and compel the attendance of witnesses. All hearings of the Board of Adjustment shall be public. The Board of Adjustment shall keep minutes of its proceedings showing the vote of each member upon each question, or, if absent or failing to vote, indicating such fact, and shall keep records of its examinations and other official actions, all of which shall immediately be filed in the office of the Airport Building Inspector and shall be a public record.

(d) The Board of Adjustment shall make written findings of fact and conclusions of law giving the facts upon which it acted and its legal conclusions from such facts in reversing, affirming, or modifying any order, requirement, decision, or determination which comes before it under the provisions of this Resolution.

(e) The concurring vote of a majority of the members of the Board of Adjustment shall be sufficient to reverse any order, requirement, decision, or determination of the Airport Building Inspector or to decide in favor of the applicant on any matter upon which it is required to pass under this Resolution or to effect any variation in this Resolution.

SECTION X: APPEALS

(a) Any person aggrieved, or any taxpayer affected, by any decision of the Airport Building Inspector made in his administration of this Resolution, if of the opinion that a decision of the Airport Building Inspector is an improper application of these regulations, may appeal to the Board of Adjustment.

(b) All appeals hereunder must be taken within a reasonable time as provided by the rules of the Board of Adjustment, by filing with the Airport Building Inspector a notice of appeal specifying the grounds thereof. The Airport Building Inspector shall forthwith transmit to the Board of Adjustment all the papers constituting the record upon which the action appealed from was taken.

(c) An appeal shall stay all proceedings in furtherance of the action appealed from, unless the Airport Building Inspector certifies to the Board of Adjustment, after the notice of appeal has been filed with it, that by reason of the facts stated in the certificate a stay would, in his opinion,

cause imminent peril to life or property. In such case, proceedings shall not be stayed except by order of the Board of Adjustment on notice to the agency from which the appeal is taken and on due cause shown.

(d) The Board of Adjustment shall fix a reasonable time for hearing appeals, give public notice and due notice to the parties in interest, and decide the same within a reasonable time. Upon the hearing any party may appear in person or by agent or by attorney.

(e) The Board of Adjustment may, in conformity with the provisions of this Resolution, reverse or affirm, in whole or in part, or modify the order, requirement, decision or determination appealed from and may make such order, requirement, decision, or determination, as may be appropriate under the circumstances.

SECTION XI: JUDICIAL REVIEW

Any person aggrieved, or any taxpayer affected, by any decision of the Board of Adjustment, may appeal to the Court of _____ as provided in Section _____ of Chapter _____ of the Public Laws of Montana.

SECTION XII: PENALTIES

Each violation of this Resolution or of any regulation, order, or ruling promulgated hereunder shall constitute a misdemeanor and be punishable by a fine of not more than _____ or imprisonment for not more than _____ days or both such fine and imprisonment, and each day a violation continues to exist shall constitute a separate offense.

SECTION XIII: CONFLICTING REGULATIONS

Where there exists a conflict between any of the regulations or limitations prescribed in this Resolution and any other regulations applicable to the same area, whether the conflict be with respect to the height of structures or trees, the use of land, or any other matter, the more stringent limitation or requirement shall govern and prevail.

SECTION XV: SEVERABILITY

If any of the provisions of this Resolution or the application thereof to any person or circumstances is held invalid, such invalidity shall not affect other provisions or applications of the Resolution which can be given effect without the invalid provision or application, and to this end the provisions of this Resolution are declared to be severable.

SECTION XVI: EFFECTIVE DATE

WHEREAS, the immediate operation of the provisions of this Resolution is necessary for the preservation of the public health, public safety, and general welfare, and EMERGENCY is hereby declared to exist, and this Resolution shall be in full force and effect from and after its passage by the Gallatin County Commission and publication and posting as required by law. Adopted by the Gallatin County Commission, this _____ day of _____, 19____.

Summary of Final Thesis Solution

The terminal for Bozeman will be built in five to ten years. For this reason all calculations are based on the projected 200,000 passenger use of 1995, which means a peak hour passenger capacity of 140 people. (17-43) The building is large so it will not rapidly outgrow its use and become overcrowded. Flexibility has also been an important factor of the design to allow later expansion. The future terminal can be easily enlarged in any area without altering the character of the structure.

The Bozeman airport is a clean cut, functional, aesthetically pleasing building which compliments the air transportation industry. In comparison to the surrounding landscape, the terminal is monumental, making the approaching passenger aware of entering a new era. The roof of the structure slopes upward toward the planes and runways providing a visual transition of the different modes of transportation and emphasizing that this change occurs within the building. Also, the second level is projected out over the lower level giving a more air-like quality.

The future terminal has been placed so as to allow construction and yet not interfere with the operation of the existing structure. Upon completion the older terminal will be phased out and taken down.

A minimum walking distance (300 feet) and bag carrying distance (40 feet) is provided by the new airport terminal. The airline ticket area and two waiting lounges are separated by a centrally located public service area. Practically all public areas are located on the second level, while the first level contains the apron and airport service operations. The offices are on the third level. All of the public spaces are orientated toward the apron and the view of the mountains.

Even though the building is simply layed out, for the convienence of the traveler, graphics will be integrated for directional use. The circulation within the structure is controlled so as not to allow congestion in the corridors and lounges. As a passenger enters the terminal, he is quickly moved to the second level. Also, as a person unloads from the plane, he is directed down to the first level without interfering with the circulation.

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