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A RIMROCK HOTEL FOR BILLINGS, MONTANA

Part 1

Undergraduate Thesis in Architectural Design

by

THOMAS B. O'CONNELL

Submitted to the School of Architecture as partial fulfillment of the requirements for the degree of Bachalor of Architecture

at

Montana State University

Bozeman, Montana
March, 1970

P378
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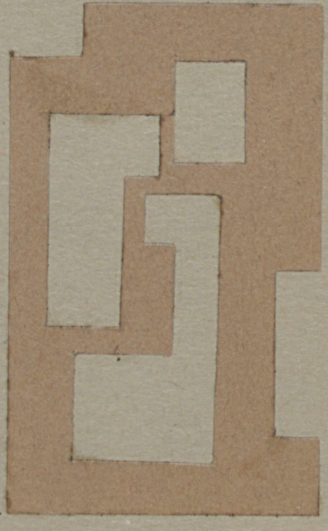
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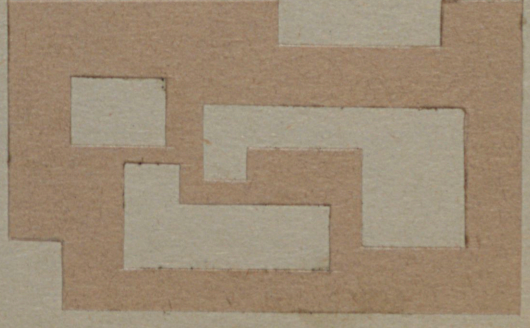
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CONDITIONS CREATING A NEED



1.0 CONDITIONS CREATING A NEED

"Once there was a hunter who spent his days tracking the wide prairies of North Dakota with his gun and dog and sometimes with a small boy who would beg to trot along. On this particular morning, hunter and boy, far out on the prairie, sat watching intently a rise of ground ahead of them. It was pecked with gopher holes. From time to time a small striped gopher would nervously whisk from the mouth of his den to the cover of the matted prairie grass and soon reappear to dive back into his den with cheek food pouches bulging.

'Smart little outfits, the gophers,' the hunter observed. 'I mean the way they have things figured out. Whenever you come upon a gopher village you can be sure it will be near a patch of grain where they can get their food, and close by a creek or flough for water. They'll not build their towns near willow clumps or alders for there's where the owls or hawks will be roosting. And you'll not be finding them near a pile of rocks or stony ledges where their enemies the snakes will be hiding ready to snatch them. When these wise little fellows build their towns they search out the southeast slope of a knoll that will catch the full sweep of the sun each day to keep their dens warm and cozy. The winter blizzards that pound out of the north and west and leave the windward slopes of the rises frozen solid will only drift loose powder snow on top of their homes.

'When they dig their den,' continued the hunter, 'do you know what they do? They slant the runway steeply down for two or three feet and then double back up near the surface again where they level off a nice dry shelf. That's where they lie - on their ledges, close to their food and water, as far as they can get from their enemies, and surrounded by all their gopher friends. Yes sir, they sure have it all planned out!'

'Is our town built on a southeast slope?' the small boy asked thoughtfully.

'No,' said the hunter, 'our town slopes down to the north, in the teeth of the bitter winter winds and cold as a frosty gun barrel.' He frowned. 'Even in summer the breezes work against us. When we built the new flax mill, the only mill for fourty miles, where do you think we put it? We built it right smack on the only spot where every breeze in the summertime can catch the smoke from its chimney and pour it across our houses and into our open window!'

'At least our town is near the river and water,' said the boy defensively.

'Yes,' replied the hunter. 'But where near the river did we build our houses? On the low flat land inside the river bend, that's where. And each spring when the snows melt on the prairies and the river swells, it floods out every cellar in our town.'

'Gophers would plan things better than that,' the small boy decided.

'Yes,' said the hunter, 'a gopher would be smarter.'

'When gophers plan their homes and towns,' the boy philosophized, 'they seem to do it better than men do.'

'Yes,' mused the hunter, and so do most of the animals I know. Somethimes I wonder why.'"

Adequate parks and open spaces are the most important elements in creating or preserving any community's pleasant, attractive, and livable environment. Billings, perhaps more then any other community in the intermountain west or midland empire, is blessed with a natural setting that distinguishes it from other communities as a desirable place to live. Nestled between the magnificent rimrocks and the clear flowing Yellowstone River, almost in the very shadows of the Beartooth and Pryor Mountains, Billings has more than its share of God-given natural beauty. Not unlike other communities, however, Billings for the most part has ignored both the river and the rims, which are the most important of her natural resources and contribute most to the natural environment. (R, 1969: 1)

The comprehensive plan for Billings includes a "belt road" for the area with major emphasis on the rimrock area and an interchange serving the airport as well as the proposed site for the hotel. Nature has bound the city of Billings on the north and east by the rimrocks and on the south by the Yellowstone River. This means that as Billings expands and grows, it must either become more dense or become a city with westward expansion only. If the city becomes more dense the availability of open space will of necessity decrease. Since this is not a desirable situation, development on a more vertical land surface would be ideal. This land, if used for open space and parkland, would be a very unsatisfactory and inconvenient solution because of its steep inclination. But it could be used quite successfully to increase density while limiting expansion.

I feel that since the proposed site has already had the rims cut

quite unattractively by North 27th Street for access to the airport, a hillside hotel could be very successful. It would not interfere with park development on the crest of the rims, and it would enhance the one section of the rims that has been destroyed by highway construction. In this way the park development on the non-sloping part of the rims can be planned and the face of the rims can be preserved.

All of the preceding arguements in favor of hillside hotel are pertinent, I feel, if there is a real need for it such as Billings has demonstrated. The airport growth is the primary source of this need.

Sixty-four flights a day with destinations ranging from New York to Seattle, Canada to Dallas, offer increasing service to all points of the nation. The three airlines provide non-stop jet service to such points as Chicago, Minneapolis and Denver and one-stop service to other major points. Because of the consistently sunny weather Billings' Logan Field is one of the lowest in the United States in the number of hours per year it is closed due to weather. Three airline carriers, Northwest, Western, and Frontier, have provided Billings with air transportation which is excellent when compared to other cities of similar size. Although aircraft movements at Logan Field have shown a slightly downward trend during the period 1961-1964, this was reversed in 1965:

TABLE 1-1

1961	97,961	Movements
1962	92,392	Movements
1963	93,854	Movements
1964	89,242	Movements
1965	97,233	Movements

1966	141,963	Movements
1967	136,002	Movements
1968	152,142	Movements

The boom in general aviation has had a phenomenal impact on the city's airport as shown by the 46% increase in movements for the year 1966. (M, 1969) Passenger emplanements at Logan Field aboard the three authorized carriers have increased 75% within the four-year period of 1965 through 1969 as follows: TABLE 1-2

1961	49,626	1965	86,363
1962	51,843	1966	99,446
1963	68,477	1967	133,088
1964	76,734	1968	152,192 (M, 1969)

The master plan for the airport calls for facilities to adequately handle 345,000 passenger boardings in 1990.

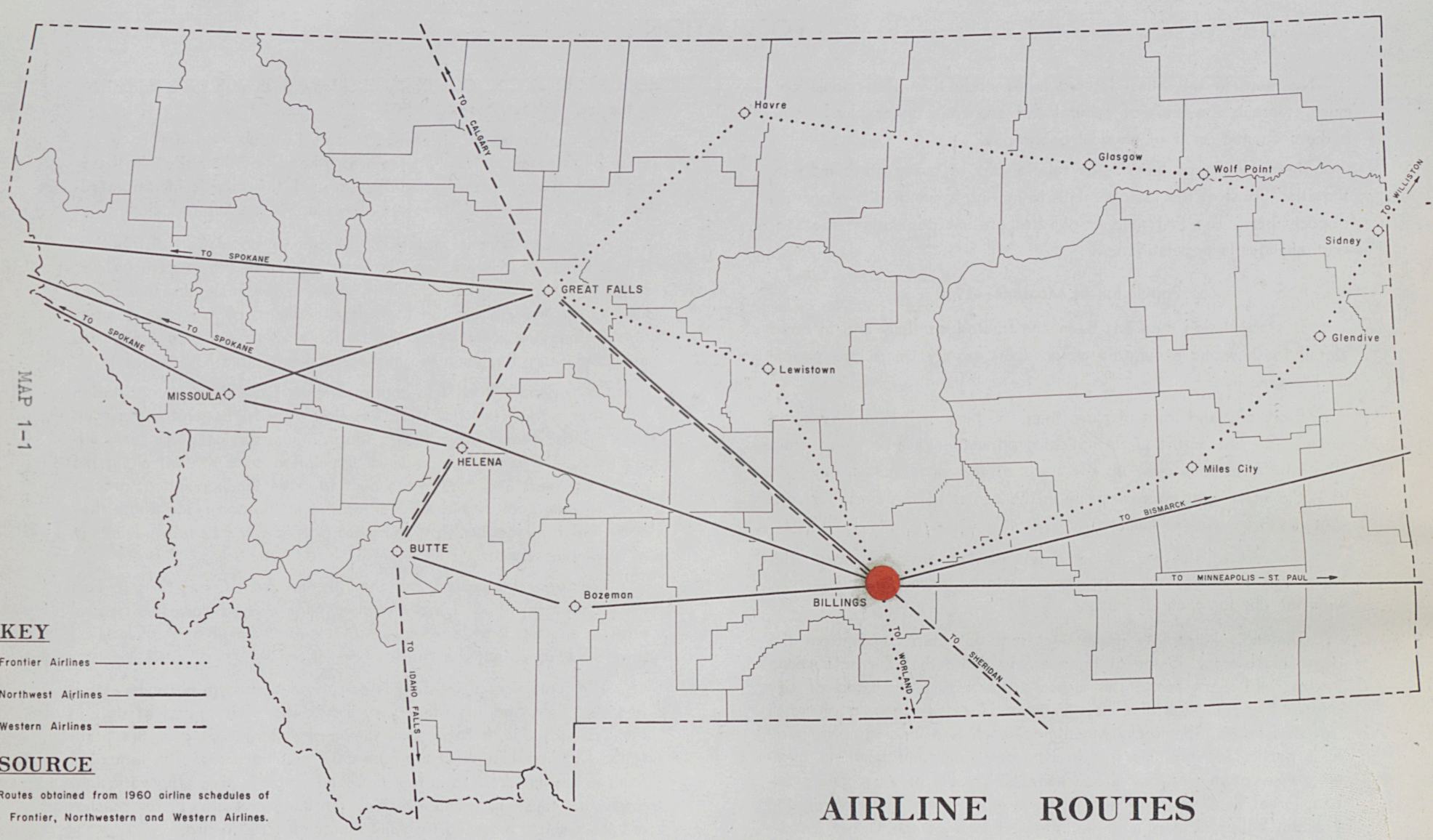
From these few figures it is easy to conclude that the economic impact of an airport is almost impossible to measure. To meet the increased passenger boardings the airport has planned terminal expansion to provide more space for public waiting areas, airline ticketing, air cargo and baggage activities, and parking lot expansion. A private firm has proposed building a motel. "A motel firm has proposed building a motel-restaurant complex on airport land.... The firm proposes to build a high-rise 300-room motel with a dining room and coffee shop complex on property currently leased by Frank Hoffman. A represenative from Treddway Inns said his firm definitely wants to build in the area and would seek other land if the commission turns down the proposal.... Scorborough said, 'If its successful at all and they want to expand,

they're hemmed in.'" (S, 1969: 1)

Because of the existing conditions which have been mentioned, I feel that the proposed site has the best developmental possibilities in the area. Not only will the hotel use land unusable to many other functions, it will improve the area it is in. It is also possible that the complex could be connected to Eastern Montana College with an under-the-road walkway in the future. Thus, the college could benefit from the facilities for banquets and other meetings. It is also possible that Eastern could provide convention facilities with delegates housed in the nearby hotel.

Finally the condition which contributes immensely to a need for a hillside hotel is the fact that in the future when available parkland and even agricultural land deminishes due to building sites, a hillside development could preserve these "flat sites" for developments that cannot function on hillside locations. Perhaps Shakespear foresaw this when he wrote,

> "Moreover he hath left you all his walks,
> His private arbors, and new-planted orchards
> On this side Tiber; he hath left them you,
> And to your heirs forever, common pleasures
> To walk abroad and recreate yourselves."
>
> (Marc Anthony's oration in Julius Ceasar, Act III, Scene 2)
> (R, 1969)



MAP 1-1

KEY

Frontier Airlines ——·····

Northwest Airlines ——

Western Airlines — — — —

SOURCE

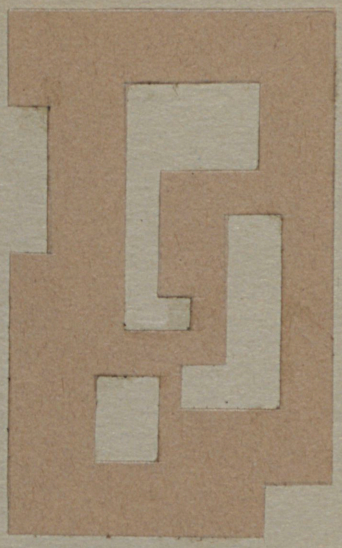
Routes obtained from 1960 airline schedules of Frontier, Northwestern and Western Airlines.

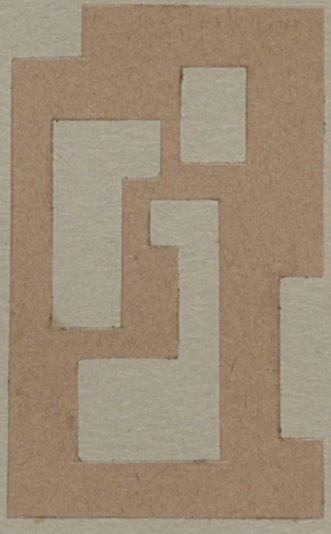
AIRLINE ROUTES

FIGURE 1-1 (M, 1969)

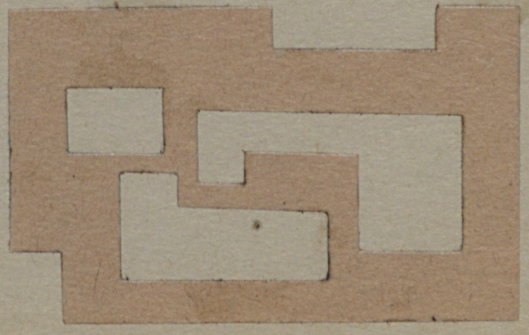
BILLINGS HOTELS AND MOTELS

Billings Travelodge	38 units
Circle-S Motel	6 units
Cherry Tree Inn	40 units
Esquire Motel	49 units
Dude Rancher Lodge	58 units
Hadley Motel	12 units
Hi-Way Motel	14 units
Holiday Inn	105 units
Parkway Motel	19 units
Ponderosa Inn	64 units
Red Gables	23 units
Rimrock Lodge	100 units
Imperial 400 Motel	37 units
Magic City Motel	15 units
Mustang Motel	10 units
Overpass Motel	20 units
Stardust Motel	10 units
Thunderbird Lodge	20 units
Town House Motel	25 units
Uptown Motel	22 units
Westward Ho Lodge	22 units
Custer General Hotel	125 rooms
Lincoln Hotel	50 rooms
Northern Hotel	250 rooms
Picture Court	10 units
Unlisted	360 units





LOCAL CONDITIONS



2.0 LOCAL CONDITIONS

The early pioneer, seeking land and independence, looked uneasily at the rapidly populating and socially ordered Atlantic seaboard where he had first settled. His infant United States had, through discovery and actual purchase, acquired and opened vast lands to the west for settlement, and the pioneer reacted in a predictable manner. Indians, ahead of the pioneer, already inhabited the land that would be Montana when the white man arrived.

2.1 GEOGRAPHICAL

The Billings of today, named after Frederick Billings, Sr., President of the Northern Pacific Railroad from 1879 to 1881, is a city with a land area of slightly over eleven square miles and a population (according to a 1960 census figure) of 58,100. The population of the Billings metropolitan area numbered 66,000 and the county 84,600 as of 1960. (M, 1968) Billings is located in the rich Yellowstone Valley which is in south central Montana. This location is on the western edge of the Great Plains and is midway between St. Paul and Seattle at an elevation of 3100 to 3600 feet. The most distinctive feature of the area, the "Rimrocks," extend nearly five miles from east to west across the north of the highly developed area. They form a pinkish-brown sandstone cliff, varying between 200 and 500 feet in height, and sloping gradually at the eastern end in the vicinity of the Yellowstone River. A similar cliff extends southeastward from the south side of the river, and the Yellowstone River winds through the two converging cliffs.

The land lying to the north of the rimrocks and west of Alkali

Creek is quite rough and rugged. This land configuration is repeated in the southeastern portion of Billings. In both these areas, the topography will limit the expansion and density of any development.

In the northeastern part of Billings, land on either side of the Yellowstone River is generally flat or rolling, as is the land to the west between the rimrocks and the Yellowstone River.

In summary the city is bounded to the south by the Yellowstone River and to the east and the north by the rimrocks. These features can be noted on Figure 2-1.

2.2 HISTORICAL

The first recorded visit by white men to the Yellowstone Valley was in 1743 by French fur traders, Pierre and Francois de la Verendrye. In 1806 Lewis and Clark visited the area, and camped northeast of Billings at Pompey's Pillar, where Captain Clark carved his name and the date, July 25, 1806, into a rock promontory. In 1875 the steamer Josephine sailed up the Yellowstone River and docked at what is now Billings' Josephine Park. (E, 1968: 8)

Caulson, the forerunner of Billings, was established two miles down river from where Billings was to be by P.W. McAdow in 1876. A stage line was established from Miles City to Bozeman, and by 1880 there were 200 men, women, and children living in the valley. In 1882, the Northern Pacific Railroad established Billings as arrangements could not be reached for the desired Coulson land. The town of Coulson, after a brief struggle for existence, moved its citizens and its buildings into Billings. On May 1, 1882, the first structure was built to house the railroad engineers. Billings earned the title of "The

13

BILLINGS

PHYSICAL CHARACTERISTICS

FIGURE 2-1

0 1200 2400 3600 5200

Legend

— Jurisdictional Area
Contour Interval 100'

Land Over 25% Slope

Land Subject to Flooding

Magic City" as it grew almost overnight to a town of 1500-2000 inhabitants. On September 11, 1882, 700 head of cattle were shipped, and the city began to grow steadily as a result of the prosperous cattle and agricultural industries. It soon became an important wholesale and retail trade center. (M, 1968)

On February 26, 1883, Yellowstone County was established with Billings as the county seat. On April 2, 1885, the people accepted a charter of incorporation from the territorial legislature. In June of 1885 the construction of a water plant was begun and Billings was on its way to becoming a city.

With the coming of a dependable water supply, the sugar beet industry flourished and by 1907 Billlings' economy was firmly founded on agriculture, trading, and manufacturing. In the space of two decades, one of the newest Montana cities, Billings, had caught up in growth and development with the oldest. The city's population increase, over 285 percent between 1890 and 1900 and 211 percent in the ensuing decade, was unquestionably the most rapid in the State. From 1910 to 1930 Billings developed as a wholesale and retail trade center. The construction of two oil refineries has boosted non-farm employment opportunities and expanded the economic base since they began operating in 1929. (E, 1968: 8)

2.3 CLIMATE

Billings is situated in the borderline area between the Great Plains and the Rocky Mountains and has a climate which takes on some of the characteristics of both regions. At its elevation of 3100 to 3600 feet above sea level, its climate may be classified as semi-arid,

with an average rainfall just slightly over 13 inches; however, spring and fall rains plus irrigation make it possible to raise a variety of crops in the area. One third of the total precipitation falls during May and June. November through February has the least amount of precipitation, but heavy snows of from six to twelve inches are not uncommon, particularly during November and December. During the spring and fall months when the temperature and moiture conditions are most favorable, the heaviest snows occur. Snows seldom accumulate to great depths on the ground because of frequent thawing periods. (Q, 1968)

Thunderstorms are restricted mainly to the warm season, May through September. These storms are frequently accompanied by strong, gusty winds and occasionally by hail. Destructive hailsorms, however, are rather infrequent. With east and northeast winds during the colder two-thirds of the year, upslope fog and low clouds are common, and occasionally these conditions occur during the warmest months. (Q, 1968)

The average maximum temperature during July is about 88 degrees; the average minimum temperature during January is about 13 degrees. The growing season lasts between 130 and 160 days.

Cold spells of long duration are infrequent in the winter. West to southwest winds, termed "Chinook" move down the Yellowstone Valley, transporting warmer air of the Pacific origin to the area. For additional climate information see figures 2-2 & 2-3. (E, 1968: 12)

2.4 ECONOMICS

The Billings Metropolitan Area has historically derived its income from agriculture, manufacturing, and retail trade and services.

FIGURE 2-2

BILLINGS, MONTANA
LOGAN FIELD

AVERAGE TEMPERATURE

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1935	24.0	36.1	33.1	41.7	52.3	64.2	75.7	71.6	63.4	48.3	32.7	32.3	48.0
1936	24.1	2.6	36.0	45.0	64.6	70.2	81.0	72.6	62.0	50.6	37.3	28.2	47.8
1937	6.0	21.2	34.6	47.4	60.4	64.5	76.0	73.8	64.3	52.1	35.8	26.7	46.9
1938	31.6	24.8	37.4	47.7	54.1	66.6	71.8	71.0	67.2	51.6	33.6	31.0	49.0
1939	33.1	18.2	36.4	48.0	58.9	59.6	73.6	69.4	60.4	49.2	42.6	37.6	48.9
1940	14.3	26.8	38.8	42.4	59.9	66.6	74.6	73.2	66.2	53.2	29.0	32.6	48.1
1941	29.8	30.0	35.4	45.2	59.3	64.5	72.9	70.8	54.0	46.0	39.8	28.3	48.0
1942	25.8	22.2	35.7	48.8	51.7	60.4	72.2	68.4	58.8	50.8	34.9	30.2	46.7
1943	13.6	32.6	25.4	51.8	51.2	60.4	72.4	71.3	60.2	53.2	39.6	32.0	47.0
1944	30.8	25.4	29.2	48.6	59.2	59.3	69.4	67.8	59.3	54.2	35.2	26.8	47.1
1945	27.3	26.7	37.6	41.2	51.8	58.1	72.7	70.9	57.1	51.9	34.8	23.6	46.1
1946	30.8	31.2	42.0	52.8	52.2	63.5	73.7	68.8	58.9	42.6	31.8	29.4	48.1
1947	26.5	24.3	29.2	45.5	56.0	59.4	74.8	71.8	59.3	52.9	30.9	28.1	46.6
1948	28.9	22.9	29.7	48.0	57.1	64.0	70.4	72.0	63.8	50.8	36.2	20.4	47.0
1949	9.2	17.4	32.0	52.8	59.1	63.4	71.4	73.4	58.6	41.9	47.4	22.6	45.8
1950	5.1	33.8	30.2	42.6	49.9	60.9	67.6	67.8	57.4	51.6	31.9	31.4	44.2
1951	20.5	27.6	22.5	42.0	57.0	56.9	71.8	67.3	54.5	44.7	35.2	19.2	43.3
1952	17.7	28.9	31.9	51.3	56.2	65.8	70.2	70.4	64.2	51.1	33.2	32.4	47.9
1953	36.2	32.3	38.4	40.4	51.2	63.0	74.3	71.6	63.2	54.7	43.5	32.9	50.2
1954	17.5	40.3	27.4	42.8	53.8	60.9	75.4	69.7	59.9	48.1	43.9	34.3	47.8
1955	27.3	20.5	26.2	44.6	54.4	62.6	71.7	73.9	59.6	53.4	24.1	22.6	45.1
1956	21.9	25.0	35.5	41.3	56.9	69.3	72.1	68.4	61.3	51.1	37.5	30.9	47.6
1957	11.2	27.2	34.6	42.3	56.2	62.7	74.5	70.4	59.3	44.7	34.3	37.3	46.2
1958	35.3	26.5	33.7	44.6	63.4	60.1	66.5	73.7	61.4	52.0	36.5	28.8	48.6
1959	23.0	22.0	40.4	44.2	50.7	66.5	72.8	71.5	59.0	47.2	30.8	34.1	46.9
1960	23.2	25.3	35.0	44.8	56.4	66.2	77.9	69.8	62.2	51.5	36.9	30.3	48.3
1961	32.2	38.6	41.0	42.8	56.6	72.7	75.0	76.2	52.5	47.3	31.2	24.5	49.2
1962	19.6	23.9	29.5	50.7	55.0	65.0	69.6	69.4	59.0	53.7	41.4	32.7	47.5
1963	13.9	36.8	40.8	44.4	53.9	62.1	71.4	71.0	65.2	54.8	38.0	22.4	47.9
1964	29.1	31.4	31.8	45.2	56.7	62.7	75.6	68.1	56.4	51.5	31.2	17.9	46.5
1965	28.1	25.2	21.4	45.8	52.6	61.4	71.5	69.5	47.1	54.4	38.0	28.5	45.3
1966	15.1	25.7	37.1	40.1	55.4	61.6	76.2	68.3	65.5	50.4	34.5	29.2	46.6
1967	30.2	34.3	31.3	39.7	50.1	60.8	72.7	71.0	61.9	49.9	37.2	24.7	47.0
1968	23.4	34.5	43.5	45.3	54.0	62.6	72.1	67.6	61.6	52.1	38.3	19.9	47.9
RECORD MEAN	23.2	27.1	33.7	45.4	55.5	63.2	73.0	70.7	60.1	50.4	35.9	28.3	47.2
MAX	32.8	37.1	44.0	57.0	67.5	75.2	87.3	84.9	73.0	62.2	45.4	37.4	58.7
MIN	13.6	17.1	23.3	33.7	43.5	51.2	58.6	56.4	47.2	38.5	26.3	19.2	35.7

TOTAL DEGREE DAYS

Season	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Total
1934-35							1274	809	989	698	391	85	
1935-36	0	18	107	521	968	1013	1269	1808	895	597	124	66	7386
1936-37	0	7	136	449	835	1143	1825	1231	945	530	168	143	7412
1937-38	0	3	119	400	879	1187	1025	1125	856	513	354	39	6500
1938-39	7	23	17	420	940	1050	986	1308	890	521	218	195	6575
1939-40	3	61	177	485	670	852	1567	1110	812	675	178	84	6674
1940-41	4	2	73	363	1079	1003	1088	980	913	594	203	122	6424
1941-42	3	27	336	589	760	1137	1218	1197	908	484	419	146	7224
1942-43	4	30	236	468	892	1082	1593	909	1220	398	436	178	7446
1943-44	7	5	169	377	761	1021	1062	1147	1112	492	220	204	6577
1944-45	20	30	192	336	893	1189	1169	1072	848	715	408	242	7114
1945-46	8	23	299	407	908	1278	1063	944	711	367	396	91	6495
1946-47	8	42	211	695	996	1107	1195	1140	1112	586	276	179	7547
1947-48	0	14	214	379	1025	1146	1119	1223	1093	511	284	94	7102
1948-49	10	1	124	445	863	1385	1729	1333	1028	362	216	106	7602
1949-50	10	2	203	717	525	1315	1857	865	1072	665	463	159	7853
1950-51	32	20	286	409	984	1035	1376	1041	1313	685	249	246	7676
1951-52	54	45	312	620	889	1413	1398	1043	1021	412	266	49	7522
1952-53	25	31	75	427	947	1001	886	906	819	734	424	125	6400
1953-54	0	7	112	320	639	990	1469	684	1162	661	356	168	6568
1954-55	3	11	174	518	626	944	1160	1243	1199	605	320	115	6918
1955-56	22	0	240	368	1223	1305	1331	1155	908	704	286	16	7558
1956-57	7	50	140	425	820	1050	1663	1050	936	673	275	109	7198
1957-58	3	25	188	623	916	851	913	1073	960	601	105	158	6416
1958-59	44	11	162	403	848	1116	1297	1200	755	616	436	68	6956
1959-60	23	3	251	543	1023	950	1291	1145	925	600	287	53	7094
1960-61	1	37	150	416	836	1067	1010	733	738	660	285	6	5939
1961-62	2	3	379	543	1008	1249	1402	1148	1094	428	304	89	7649
1962-63	4	46	187	342	701	990	1586	783	750	612	343	124	6468
1963-64	10	9	61	333	802	1316	1107	972	1025	587	275	111	6608
1964-65	0	67	253	415	1009	1454	1135	1110	1347	570	381	120	7861
1965-66	3	33	533	327	806	1125	1545	1094	860	742	319	155	7542
1966-67	0	54	83	446	910	1104	1069	852	1039	755	461	152	6925
1967-68	1	17	149	463	827	1240	1285	880	658	589	334	125	6568
1968-69	16	42	147	394	793	1394							

TOTAL PRECIPITATION

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1935	0.16	0.23	1.73	0.97	2.78	0.80	1.90	0.47	0.29	0.59	0.51	0.71	11.14
1936	0.40	1.04	0.13	0.78	1.07	1.80	0.96	0.47	1.32	0.41	0.56	0.26	9.20
1937	0.40	0.56	0.76	0.72	0.53	4.93	0.67	0.18	1.83	2.45	0.75	0.59	14.37
1938	0.06	0.20	1.95	0.50	4.09	5.23	2.07	1.07	0.56	1.74	1.15	0.07	18.69
1939	0.39	0.35	0.91	0.83	1.75	5.31	0.11	0.76	0.22	0.92	0.05	0.12	11.72
1940	0.68	0.74	0.60	3.16	0.84	2.49	0.53	0.13	1.09	2.47	0.71	0.06	13.50
1941	0.04	0.20	0.63	2.00	2.00	3.09	1.17	1.11	4.99	1.24	1.20	1.13	18.80
1942	0.40	0.75	0.98	1.28	4.93	2.30	0.56	1.07	1.66	1.20	1.09	0.12	16.34
1943	1.54	0.99	1.80	0.49	1.24	3.28	0.48	0.68	0.55	0.29	0.51	0.07	11.92
1944	0.31	0.57	0.33	0.10	0.73	7.64	1.29	0.97	2.01	0.03	0.29	1.17	15.44
1945	0.26	0.32	0.65	0.64	1.86	2.21	0.68	1.18	1.33	0.50	0.57	0.66	10.86
1946	0.14	0.19	1.35	0.28	1.09	1.49	0.91	0.95	1.68	2.14	0.65	0.93	11.80
1947	0.15	0.66	1.08	1.24	1.09	3.84	0.27	1.04	1.39	0.52	0.63	0.81	12.72
1948	0.46	0.35	0.79	0.74	1.25	1.66	0.95	0.48	0.40	0.02	0.09	0.71	7.90
1949	1.55	0.62	0.92	0.74	1.53	2.12	1.72	0.22	2.26	2.72	0.03	0.83	15.26
1950	0.65	0.41	1.26	1.17	2.07	1.98	1.85	0.68	1.46	0.83	0.71	0.69	13.76
1951	0.64	0.64	1.01	0.88	1.46	1.70	0.64	1.95	1.01	0.86	0.16	1.04	11.99
1952	0.36	0.93	0.41	0.87	3.40	1.11	0.80	0.83	1.07	0.47	0.39	0.15	10.79
1953	0.62	0.81	0.96	1.32	2.28	1.77	0.40	1.02	0.88	1.15	0.28	0.21	11.70
1954	1.24	0.13	2.70	1.19	1.90	1.25	0.23	0.76	1.06	1.15	T	0.14	11.75
1955	0.07	1.57	1.60	4.42	4.27	1.72	1.41	0.05	0.82	1.26	0.81	1.89	19.89
1956	0.56	0.43	0.30	1.59	2.47	0.66	1.07	0.87	0.55	0.60	0.97	0.51	10.58
1957	0.82	0.55	1.52	3.55	3.39	4.49	0.25	1.47	1.24	2.58	1.31	0.05	21.22
1958	0.48	1.66	1.35	2.07	0.65	3.28	3.12	0.42	0.50	0.55	1.16	1.50	16.74
1959	1.02	1.13	0.23	2.36	1.07	0.97	0.31	0.19	1.38	0.69	1.92	0.33	11.60
1960	0.66	0.53	0.53	1.00	1.31	1.11	0.17	1.95	0.16	0.81	0.55	0.61	9.39
1961	0.15	0.20	0.72	2.33	1.57	0.24	0.85	0.23	3.99	1.47	1.55	0.22	13.52
1962	1.90	1.26	1.23	0.06	3.67	1.72	0.86	1.19	0.95	0.29	0.86	0.23	14.22
1963	2.23	0.31	0.39	2.38	2.49	3.16	0.49	0.39	1.29	0.31	0.05	1.43	14.92
1964	0.11	0.35	1.38	4.11	3.91	5.13	0.10	2.08	0.06	0.22	0.72	0.59	18.76
1965	0.66	1.16	0.90	1.18	1.89	2.30	1.28	3.50	2.17	0.09	0.66	0.74	16.55
1966	0.43	0.32	1.58	1.10	0.84	1.56	1.45	1.09	2.46	0.50	1.07	0.95	13.35
1967	0.36	0.39	1.55	1.63	1.84	5.18	0.37	0.54	0.66	1.04	0.50	0.79	14.85
1968	1.22	0.58	0.66	1.50	1.79	3.86	0.25	2.35	1.38	0.51	1.71	0.81	16.62
RECORD MEAN	0.62	0.62	1.03	1.45	2.03	2.69	0.89	0.95	1.31	0.96	0.71	0.62	13.88

TOTAL SNOWFALL

Season	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Total
1934-35							4.0	3.2	27.6	12.3	T	0.0	
1935-36	0.0	0.0	T	1.9	6.7	5.7	7.4	20.8	2.5	6.2	0.0	0.0	51.2
1936-37	0.0	0.0	0.0	0.8	14.9	6.9	8.1	9.5	6.9	0.6	0.0	T	47.7
1937-38	0.0	0.0	0.0	0.6	7.6	8.5	0.9	2.3	12.5	1.4	T	0.0	33.8
1938-39	0.0	0.0	0.0	2.2	9.2	T	7.9	9.2	12.3	1.0	0.0	0.0	41.8
1939-40	0.0	0.0	0.5	1.4	0.0	2.1	12.5	13.2	1.1	10.6	0.0	0.0	41.4
1940-41	0.0	0.0	0.0	0.1	9.6	1.1	1.2	5.2	6.2	18.0	0.0	0.0	41.4
1941-42	0.0	0.0	6.0	1.0	7.4	11.3	3.2	9.8	5.2	0.1	T	0.0	44.0
1942-43	0.0	0.0	0.3	0.6	7.5	1.7	13.4	11.7	17.7	0.0	5.5	T	58.4
1943-44	0.0	0.0	0.0	T	1.0	T	3.3	15.4	6.5	T	0.0	0.0	26.2
1944-45	0.0	0.0	T	T	2.7	18.2	4.9	6.7	2.6	3.9	T	0.0	39.0
1945-46	0.0	0.0	T	1.5	6.0	9.5	1.5	3.2	8.0	T	T	0.0	29.7
1946-47	0.0	0.0	0.0	7.3	5.4	15.2	5.6	14.2	11.7	3.9	0.0	0.0	63.3
1947-48	0.0	0.0	T	0.4	9.3	8.3	3.3	2.3	12.0	0.4	T	0.0	36.0
1948-49	0.0	0.0	0.0	T	0.5	14.0	23.1	10.1	7.6	0.0	T	0.0	55.3
1949-50	0.0	0.0	T	23.1	T	11.1	8.1	5.0	15.4	10.2	5.4	2.0	80.3
1950-51	0.0	0.0	4.4	1.9	8.9	11.3	9.6	13.1	14.5	6.1	5.4	T	75.2
1951-52	0.0	0.0	T	8.7	2.8	15.8	6.5	9.9	3.9	4.0	0.0	0.0	51.6
1952-53	0.0	0.0	0.0	1.0	2.6	2.1	3.5	9.2	8.1	5.6	3.7	0.0	35.8
1953-54	0.0	0.0	0.0	T	T	2.9	20.2	0.6	27.1	10.9	3.4	0.0	65.1
1954-55	0.0	0.0	T	8.6	T	1.0	1.1	22.3	18.5	42.3	0.0	0.0	93.8
1955-56	0.0	0.0	T	5.0	8.9	28.8	8.2	7.4	4.9	12.8	6.7	0.0	82.7
1956-57	0.0	0.0	0.0	3.6	8.7	5.8	9.0	6.8	16.7	6.5	0.0	0.0	57.1
1957-58	0.0	0.0	5.6	9.2	8.2	0.3	4.4	19.2	8.3	13.1	0.0	0.0	68.3
1958-59	0.0	0.0	0.0	T	8.2	14.5	10.1	13.2	3.1	11.3	0.0	0.0	60.4
1959-60	0.0	0.0	T	1.8	21.9	3.9	10.1	7.8	5.1	4.8	T	0.0	55.4
1960-61	0.0	0.0	0.0	T	3.6	7.5	1.6	2.1	2.4	14.0	0.0	0.0	31.2
1961-62	0.0	0.0	2.3	11.3	15.3	2.7	23.2	11.7	11.5	T	0.0	0.0	78.0
1962-63	0.0	0.0	6.3	0.0	8.2	1.3	27.7	2.3	2.7	15.4	0.0	0.0	63.9
1963-64	0.0	0.0	0.0	1.0	T	21.6	1.8	5.1	15.9	16.3	2.2	0.0	63.9
1964-65	0.0	0.0	0.0	T	7.2	7.8	8.0	13.9	11.4	3.4	3.5	0.0	55.2
1965-66	0.0	0.0	5.6	0.0	6.3	10.0	6.3	3.6	17.3	2.5	T	0.0	51.6
1966-67	0.0	0.0	0.0	T	12.0	10.3	6.1	3.7	16.2	11.4	7.7	0.0	67.4
1967-68	0.0	0.0	0.0	T	5.1	9.0	13.2	1.6	6.8	12.3	T	0.0	48.0
1968-69	0.0	0.0	T	T	4.6	8.6							

Record mean values above (not adjusted for instrument location changes listed in the Station Location table) are means for the period beginning in 1935.

A horizontal line drawn on the above tables indicates a break in the data sequence due to a change in instrument exposure or a station move (see Station Location table). Data are from Airport locations.

LATITUDE 45° 48' N
LONGITUDE 108° 32' W
ELEVATION (ground) 3567 Feet

METEOROLOGICAL DATA FOR THE CURRENT YEAR

BILLINGS, MONTANA
LOGAN FIELD
1968

Month	Temperature: Averages: Daily maximum	Daily minimum	Monthly	Extremes: Highest	Date	Lowest	Date	Degree days	Precipitation: Total	Greatest in 24 hrs.	Date	Snow, Sleet: Total	Greatest in 24 hrs.	Date	Relative humidity: 5 AM	11 AM	5 PM	11 PM (Standard time used: MOUNTAIN)	Wind: Resultant Direction	Resultant Speed	Average speed	Fastest mile: Speed	Direction #	Date	Percent of possible sunshine	Average sky cover sunrise to sunset	Number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, Sleet 1.0 inch or more	Thunderstorms	Heavy fog	Temperatures: Maximum: 90° and above	32° and below	Minimum: 32° and below	0° and below
JAN	32.4	14.4	23.4	58	24	-16	2	1285	1.22	0.35	27-28	13.2	4.1	27-28	62	58	54	58	25	9.3	14.6	36	SW	2	40	7.3	5	8	18	9	6	0	2	0	14	25	10
FEB	43.0	25.9	34.5	63	29	8	17+	880	0.58	0.40	21-22	1.6	0.8	12	65	60	51	60	26	4.9	11.1	32	NW	24	49	7.0	5	7	17	6	0	0	5	0	7	22	0
MAR	53.5	33.4	43.5	74	29	21	21	658	0.66	0.46	17-18	6.8	5.0	17-18	55	44	34	50	27	4.2	10.4	34	W	27	70	7.5	3	12	16	6	2	0	0	0	1	14	0
APR	56.2	34.3	45.3	84	30	20	3	589	1.50	0.39	15	12.3	4.1	2-3	47	35	31	43	28	5.4	12.2	33	W	11	57	7.1	4	9	17	10	4	0	4	0	1	10	0
MAY	63.8	44.2	54.0	77	29+	30	11	334	1.79	0.75	14	T	T	10 +	55	39	35	48	34	3.5	10.4	34	NW	7	66	6.6	4	14	13	14	0	7	3	0	0	1	0
JUN	72.2	53.0	62.6	93	2	43	14	125	3.86	1.73	8-9	0.0	0.0		73	55	51	66	31	2.3	9.7	79	NW	13	46	7.1	3	11	16	14	0	5	5	1	0	0	0
JUL	85.4	58.8	72.1	99	29	47	31	16	0.25	0.11	28	0.0	0.0		67	42	31	50	03	1.8	9.7	35	NE	25	85	3.4	17	11	3	6	0	7	0	11	0	0	0
AUG	78.9	56.3	67.6	96	5	50	17+	42	2.35	0.71	14-15	0.0	0.0		70	50	38	56	27	2.5	10.0	50	W	14	59	6.1	8	8	15	12	0	6	1	5	0	0	0
SEP †	72.8	50.4	61.6	90	11	38	22	147	1.38	0.50	12	T	T	21	68	52	40	57	26	5.9	11.2	54	W	12	67	5.3	11	7	12	10	0	1	†1	1	0	0	0
OCT	62.7	41.5	52.1	80	29	30	27	394	0.51	0.19	14-15	T	T	16 +	52	43	31	45	26	6.5	11.4	56	NW	20	54	6.2	8	8	15	6	0	0	1	0	0	2	0
NOV †	47.0	29.6	38.3	63	21	16	17	793	1.71	1.17	4-5	4.6	3.2	4-5	62	54	50	60	26	7.5	12.1	48	NW	22	35	7.0	6	6	18	7	2	0	†4	0	1	21	0
DEC	28.8	10.9	19.9	54	11	-25	29	1394	0.81	0.27	4	8.6	2.9	4	66	64	62	63	25	4.5	10.8	30	SW	3	18	7.7	4	6	21	11	4	0	5	0	16	29	7
YEAR	58.1	37.7	47.9	99	JUL. 29	-25	DEC. 29	6657	16.62	1.73	JUN. 8-9	47.1	5.0	MAR. 17-18	62	50	42	55	27	4.3	11.1	79	NW	JUN. 13	56	6.5	78	107	181	111	18	26	31	18	40	124	17

† DATA CORRECTED AFTER PUBLICATION OF THE MONTHLY ISSUE.

NORMALS, MEANS, AND EXTREMES

FIGURE 12-3

Month	Temperature: Normal: Daily maximum	Daily minimum	Monthly	Extremes ø: Record highest	Year	Record lowest	Year	Normal degree days	Precipitation: Normal total	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs.	Year	Snow, Sleet: Mean total	Maximum monthly	Year	Maximum in 24 hrs.	Year	Relative humidity: 5 AM	11 AM	5 PM	11 PM (Standard time used: MOUNTAIN)	Wind: Mean hourly speed	Prevailing direction	Fastest mile: Speed	Direction #	Year	Pct. of possible sunshine	Mean sky cover sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, Sleet 1.0 inch or more	Thunderstorms	Heavy fog	Temperatures: Max.: 90° and above	32° and below	Min.: 32° and below	0° and below
(a)	(b)	(b)	(b)	10		10		(b)	(b)	34		34		34		34	34		30		9	9	9	9	29	15	25	25		29	29	29	29	29	34	26	29	21	9	9	9	9
J	33.2	13.1	23.2	63	1967	-26	1963	1296	0.54	2.23	1963	0.04	1941	0.84	1962	8.2	27.7	1963	9.7	1962	65	61	56	64	13.0	SW	66	W	1953	51	7.0	5	9	17	7	3	0	1	0	13	27	7
F	36.0	15.3	25.7	72	1961	-20	1965	1100	0.60	1.66	1958	0.13	1954	0.61	1952	8.7	22.3	1955	9.0	1944	66	59	52	63	12.4	SW	72	W	1963	54	7.1	4	8	16	7	3	*	2	0	7	23	2
M	43.4	24.0	33.7	77	1960	-17	1960	970	1.05	2.70	1954	0.13	1936	0.97	1946	10.3	27.6	1935	10.5	1964	66	51	44	60	11.6	SW	61	NW	1956	60	7.1	4	9	18	9	4	*	2	0	6	23	3
A	57.4	34.6	46.0	87	1962	13	1966	570	1.31	4.42	1955	0.06	1962	2.48	1955	7.7	42.3	1955	23.7	1955	70	51	42	60	11.8	SW	72	NW	1947	58	7.1	4	9	17	9	2	1	3	0	1	15	0
M	68.1	45.4	56.8	94	1960	21	1967	285	1.88	4.93	1942	0.53	1937	2.83	1952	1.3	7.7	1967	5.7	1967	71	49	43	61	11.1	NE	68		1939	61	6.5	6	11	14	11	1	4	1	*	0	2	0
J	76.0	54.1	65.1	102	1966	38	1965	102	2.55	7.64	1944	0.24	1961	2.78	1937	0.1	2.0	1950	2.0	1950	74	50	44	63	10.4	SW	79	NW	1968	64	6.0	7	12	11	12	*	8	1	3	0	0	0
J	88.5	60.8	74.7	105	1960	47	1968	6	0.90	3.12	1958	0.10	1964	1.87	1958	0.0	0.0		0.0		63	39	30	48	9.8	SW	73	N	1947	79	3.9	15	12	4	7	0	8	*	13	0	0	0
A	85.2	58.6	71.9	105	1961	41	1966	15	0.90	3.50	1965	0.05	1955	2.47	1965	0.0	0.0		0.0		60	40	30	47	9.6	SW	66	N	1947	76	4.2	14	11	6	6	0	6	*	10	0	0	0
S	73.5	47.3	60.4	96	1960	26	1965	186	1.19	4.99	1941	0.06	1964	2.19	1966	0.9	6.3	1962	6.3	1962	68	51	41	57	10.4	SW	61	NW	1949	67	5.2	10	10	10	7	*	2	1	2	0	2	0
O	61.6	37.3	49.5	90	1963	20	1961	487	1.09	2.72	1949	0.02	1948	1.98	1937	2.7	23.1	1949	10.0	1949	59	45	37	51	11.1	SW	68	NW	1949	63	5.5	10	10	11	6	1	*	2	*	*	4	0
N	45.0	25.2	35.1	72	1965	-22	1959	897	0.63	1.92	1959	T	1954	1.37	1959	6.5	21.9	1959	15.3	1959	65	57	53	61	12.2	SW	63	NW	1948	48	6.8	6	8	16	6	2	0	2	0	4	22	*
D	38.6	18.2	28.4	62	1959	-26	1964	1135	0.59	1.89	1955	0.05	1957	0.71	1955	8.2	28.8	1955	13.0	1955	65	61	57	63	13.0	WSW	66	NW	1953	48	6.7	6	9	16	6	3	*	2	0	12	28	5
YR	58.9	36.2	47.5	105	AUG. 1961+	-26	DEC. 1964+	7049	13.23	7.64	JUN. 1944	T	NOV. 1954	2.83	MAY 1952	54.6	42.3	APR. 1955	23.7	APR. 1955	66	51	44	58	11.4	SW	79	NW	JUN. 1968	62	6.1	91	118	156	93	19	30	18	29	43	146	17

ø For period September 1959 through the current year.
Means and extremes in the above table are from the existing and comparable locations. Annual extremes have been exceeded at other locations as follows:
Highest temperature 112 in July 1901; lowest temperature -49 in February 1899; minimum monthly precipitation 0.00 in October 1896.

(a) Length of record, years.
(b) Climatological standard normals (1931-1960).
* Less than one half.
\+ Also on earlier dates, months or years.
T Trace, an amount too small to measure.
Below-zero temperatures are preceded by a minus sign.
The prevailing direction for wind in the Normals, Means, and Extremes table is from records through 1963.

Unless otherwise indicated, dimensional units used in this bulletin are: temperature in degrees F.; precipitation, including snowfall, in inches; wind movement in miles per hour; and relative humidity in percent. Degree day totals are the sums of the negative departures of average daily temperatures from 65° F. Sleet was included in snowfall totals beginning with July 1948. Heavy fog reduces visibility to 1/4 mile or less.

Sky cover is expressed in a range of 0 for no clouds or obscuring phenomena to 10 for complete sky cover. The number of clear days is based on average cloudiness 0-3; partly cloudy days 4-7; and cloudy days 8-10 tenths.

& Figures instead of letters in a direction column indicate direction in tens of degrees from true North; i.e., 09 - East, 18 - South, 27 - West, 36 - North, and 00 - Calm. Resultant wind is the vector sum of wind directions and speeds divided by the number of observations. If figures appear in the direction column under "Fastest mile" the corresponding speeds are fastest observed 1-minute values.

To 8 compass points only.

In more recent years the oil industry has become a chief contributor to this income. The economic base can be defined as the sum total of the income opportunities located in the area which balance outgoing revenue to other ares.

Billings has an advantageous inland location in an area richly endowed with natural resources. This has established the city as the economic center of the state. Some of the basic factors that account for this are:

1. A central location well served by interstate and local transportation facilities.
2. A natural location for processing and distributing the mineral fuels provided in surrounding areas.
3. A productive and stable agricultural hinterland.
4. A city with an economic base such that it can be responsive to a much larger population base than its own.

2.4.1 WHOLESALE TRADE

In 1963 Yellowstone County contained 12 percent of the state's population. Yet, one-fourth of the state-wide total merchant wholesale establishment and nearly one-third of the state's wholesale sales receipts were generated by that 12 percent. The wholesale trade area of Billings encompasses nineteen counties with a total population of 207,100 people in 1963, the year of the last census of wholesale trade. The sale and distribution of all types of merchandise throughout the state of Montana, the northern half of Wyoming, and into North and South Dakota ranks a close second to agriculture in dollar volume. Yellowstone County had a total wholesale sales of $266,673,000.00 in 1967. This is $46,000,000.00 more than the second ranked Montana

county, Cascade, which had total wholesale sales of $220,600,000.00. (E, 1968: 33)

2.4.2 RETAIL TRADE

The retail trade area is composed of the seven counties that form the geographic core of the wholesale trade area. The seven counties had a combined population of 116,900 in 1963 and an estimated population of 117,800 in 1966. Yellowstone County conducted 13.8 percent of the State's retail sales in 1963. Billings, with nearly 75 percent of the County's retail establishments, accounted for over 82 percent of total County sales. The overall increase in retail trade in Billings and Yellowstone County did not,however, equal that of the state between 1958 and 1963. Among those items generally associated with larger metropolitan areas, such as department stores and other smaller specialty shops, the City's increase was much larger than that of the State. The general slowing of past growth rates thus would seem to indicate a general tapering of economic growth rather than any decrease in the popularity of Billings as a regional trade center.

2.5 AGRICULTURE

Agriculture is one of the foundations of Billings' economy. The products from agriculture are responsible for much of the employment in the manufacturing and transportation industries of the city. Furthermore, much of the consumer funds for the retail and wholesale industires are derived from these products. As a result of technology the average size of farms is increasing both in the irrigated and dryland areas. The agricultural operations are becoming highly mechanized and, therefore, more efficient which is resulting in decreasing labor

requirements and increased production. This has resulted in a population decline in rural areas and the growth of the City of Billings.

The primary agricultural income is derived from cattle since 70 percent of the value of all agricultural commodities if from the sale of livestock. Another important agricultural income is derived from irrigated crops. (E, 1968: 83)

2.6 SOCIAL

Billings has a total of 77 churches with every major denomination represented. There is also a total of 38 schools in Billings which are distributed as such:

27 Public schools
8 Parochial schools
2 Four year colleges
1 Business college

Billings also has a total of 16 developed parks with a total area of 195 acres. Outdoor recreation facilities include three swimming pools, five wading pools, playgrounds, tennis and badminton courts, a lighted baseball park, picnic grounds, water skiing and motor boating on Lake Elmo, a public and two private golf courses, and a new YMCA. (R, 1968: 4)

2.7 TRANSPORTATION

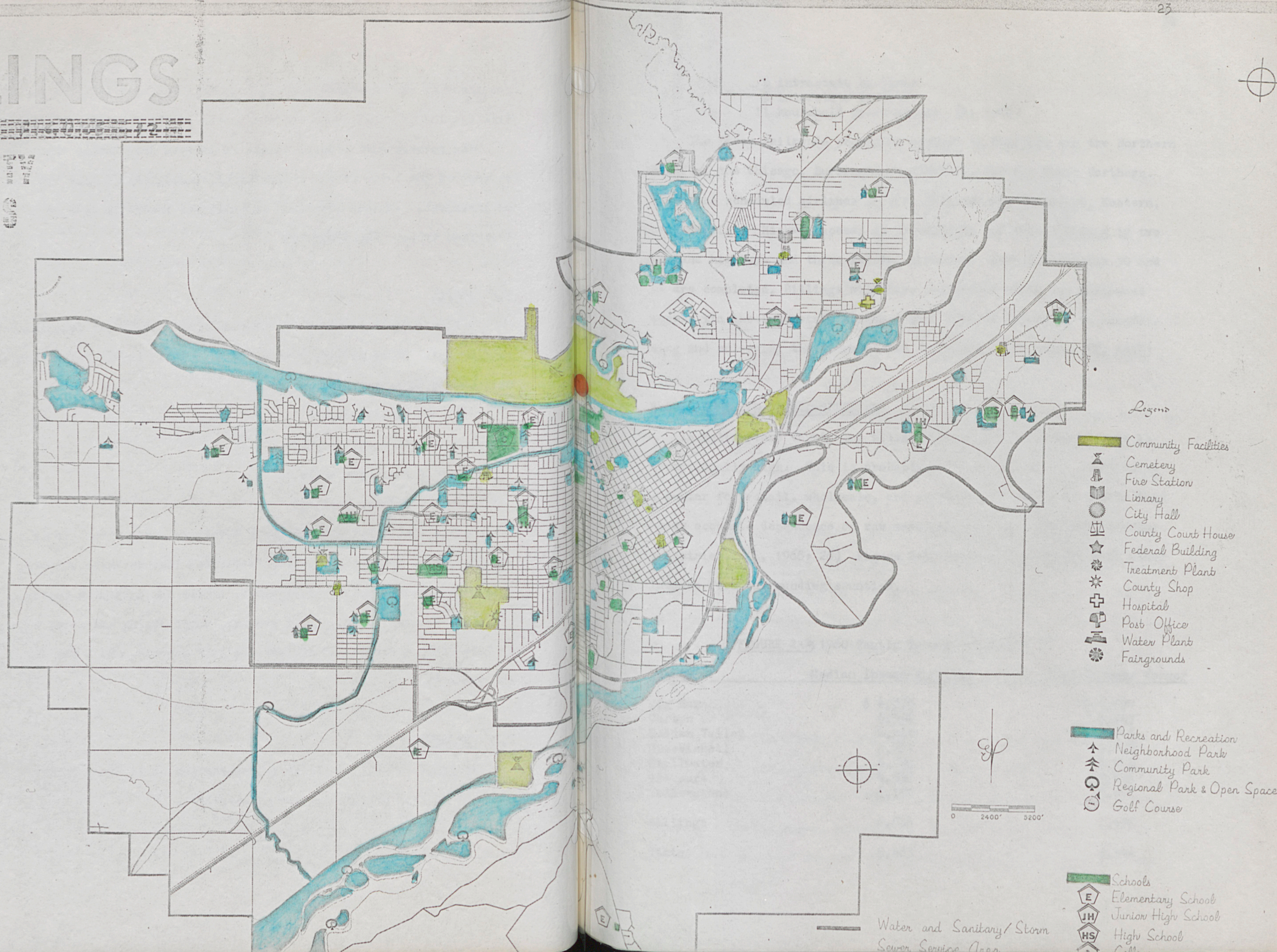
Billings is well served by transportation as is shown below.

139 private and exempt carriers
39 regulated motor carriers
3 large railroads
3 scheduled airlines
8 charter air services

BILLINGS

COMMUNITY FACILITIES PLAN

FIGURE 2-4



5 intrastate buslines
3 interstate buslines
11 household goods movers (M, 1968)

The three railroads providing service to Billings are the Northern Pacific, the Chicago, Burlington and Quincy, and the Great Northern. The trhee scheduled airlines serving Billings are Northwest, Western, and Frontier. Highway access is provided to and from Billings by two Montana highways and three federal highways. When Interstates 90 and 94 are completed, Billings will have both north-south and east-west access via the interstate system. This will be important to reinforcing and enlarging the truck-served wholesale trade area. (M, 1968)

2.8 INCOME AND RETAIL SPENDING

In Yellowstone County and Billings itself, the average income is exceptionally high. This is probably a reflection of its function as a center for retail, wholesale, and professional services, rather than heavy economic dependence on raw material production or manufacturing industries. (E, 1968: 26) Figure 2-4 compares this income with other incomes from surrounding counties.

FIGURE 2-5 1960 Family Income (E, 1968: 27)

County	Median Income-Families	Mean Income/ Worker
Big Horn	$ 4,375	$ 2,670
Carbon	4,336	2,747
Golden Valley	4,044	3,313
Musselshell	4,927	3,122
Stillwater	4,790	2,983
Treasure	4,538	3,006
Yellowstone	6,150	3,910
Billings	6,638	4,176
State	5,403	3,544

Higher per capita retail expenditures in Yellowstone County reflects two things: higher incomes per capita and Billings' role as a retail center for various items, particularly heavy durable goods. Even though this is true on a state-wide scale, the increase in retail trade in Billings and Yellowstone County, as mentioned before, has slowed since 1958. This has been attributed to the decline of the oil boom. (E, 1968: 28)

2.9 MANUFACTURING

From 1958 to 1963 the increase in manufacturing establishments in Yellowstone County was 6.3 percent as against 5.2 for the state. The value these establishments added to the county was $45,751,000.00 or an increase of 36.6 percent since 1958. Yellowstone County accounted for 24 percent of the value added by manufacturing in the state from 1958 to 1963. (E, 1968: 76)

As expected Yellowstone County dominates the petroleum refining industry of the state. In 1958, of the 1,065 people employed in petroleum refining in the state, 710 were employed in Billings. Billings industry also accounted for over 16 million out of the $24,081,000.00 added in value within the state. (E, 1968: 76)

2.10 POPULATION

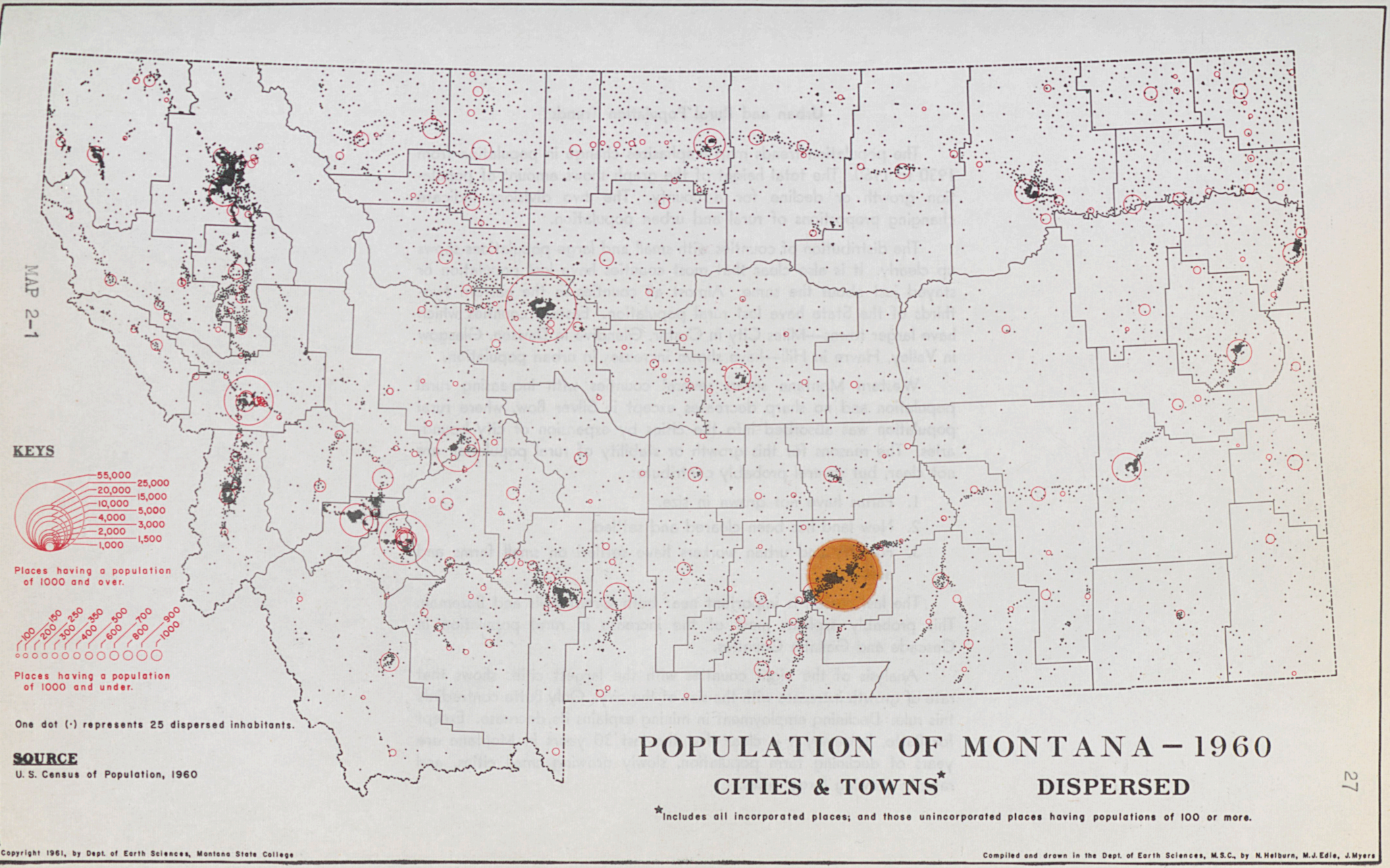
In the early census counts for the City of Billings astounding growth rates were recorded, with the population doubling and tripling over ten year time periods. These increases, much above those of the state as a whole, slowed somewhat in the 1930's, but continued to be higher than those of any any other major city in Montana. The County's

growth, while creditable, has been at a more even pace. (E, 1968: 19) These growth rates can be seen in Table 2-1.

TABLE 2-1 POPULATION TRENDS (E, 1968: 20)

	City of Billings	Yellowstone County	Montana
1930	16,380	30,785	537,606
1940	23,261	41,182	559,456
Percent Increase	42.0	33.8	4.1
1950	31,834	55,875	591,024
Percent Increase	36.9	35.7	5.6
1960	52,851	79,016	674,767
Percent Increase	66.0	41.4	14.2

The reasons for this growth can be attributed to Billings' position as a regional center, to the petroleum industry, and to agriculture. It is expected that the Billings Metropolitan Area will continue to increase its proportion of the county's population. The metropolitan area has a population of 152,000 projected by 1990. This represents approximately 90 percent of Yellowstone County's estimated population for the same time. (E, 1968: 21)



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

Urban and Rural Population Trends

The population trends map emphasizes change in population from 1930 to 1960. The total height of the graph shows amount of population growth or decline for a county. The two divisions indicate changing proportions of rural and urban population.

The distribution of counties with small and large populations shows up clearly. It is also clear that most counties have lost population or stayed just about the same. Almost all counties in the eastern two-thirds of the State have lost rural population. Eastern counties which have larger towns—Miles City in Custer, Glendive in Dawson, Glasgow in Valley, Havre in Hill—have shown increases in urban population.

Western Montana shows several counties with increasing rural population and no sharp decreases except in Silver Bow, where rural population was absorbed into the cities by expansion of city boundaries. The reasons for this growth or stability of rural population are not clear, but several probably contribute:

1. Farms have not grown in size.
2. New land has been cleared and settled.
3. Forestry and urban workers have settled on small farms and acreages.

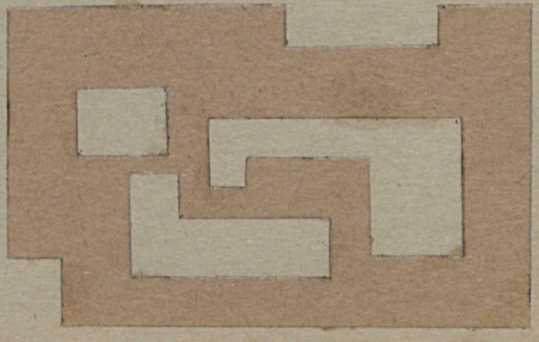
The last reason is important near both Great Falls and Bozeman. This probably explains most of the increase in rural population in Cascade and Gallatin Counties.

Analysis of the eight counties with the largest cities shows that rate of growth increases with the size of the city. Only Butte contradicts this rule. Declining employment in mining explains its decrease. Except for Butte, however, it is clear that the last 30 years in Montana are years of declining farm population, slowly growing small cities, and rapidly growing large cities.





SITE CONDITIONS



3.0 SITE CONDITIONS

"The best site for housing is not flat, even though it may be the cheapest to develop. Our thinking is handicapped by our heritage of easy walk on the valley floor. The valley floor is for forming, industry, and commerce. The opportunity for light, air, and outlook lies in the hills or along water courses. Regardless of the building type chosen, the architect is constrained to design the immediate open space surrounding the shelter as part of it, and to relate his room shapes, sizes, fenestration and circulation to the larger environment. We must have as well, a variety of space we can see and sense outside our "caves." (B, 1958: 19)

Surely one of the reasons that this area is mostly undeveloped is due to the steep slope and clif-like effect of the proposed site as well as the surrounding land. Although the proposed site is not as steep as the rest of the rims because of the cut made for the airport road, it will still tend to be more expensive to develop and improve than a site with flat terrain. In fact, there is a direct proportion between the inclination of the slope and the expense of developing it. More important than this fact, however, are the many advantages provided by a hillside hotel. The unobstructed view it provides cannot be equaled in flat developments, although a development on a hillside would have a view from only one side since the opposite side would be facing into the hill itself, to me this one view is much more desirable than the two views of a development located on a flat site. The two "views" usually are little more than the buildings across the street or the alleys and service entrances of the adjoining buildings.

In addition to the advantageous view of a hillside development, the

property is normally less expensive than flat site lots. For example some land on North 27th Street has sold for as much as $9.00 per sq.ft. Although the value usually decreases to about $ .75-$1.00 per sq. ft. closer to the rims. The land on top of the rims, although somewhat cheaper, still sells for about $ .50 per sq.ft. This compares with a land price of approximately $ .25 per sq.ft. on the face of the rims. I will admit that under normal conditions construction costs will averave higher for hillside construction as compared to non-hill-side construction, but reduced site costs and the possibility of stacked mechanical elements such as plumbing, electrical units, heating and air conditioning ducts, and common vertical circulation will help to compensate for the higher construction costs.

Obviously the site which is selected for a hillside hotel is quite important. In my case the advantages and disadvantages of an inclined site were weighed against those of a flat site and in the final analysis the hillside site was more desirable.

3.1 ORIENTATION

The proposed site for this building is located north of 27th Street North, south of State Secondary 318, east of the airport interchange, and west of Block Otter Trail. This would place the development across 27th Street North and just north and above Eastern Montana College. The described boundaries have a vertical contour rise of approximately 115 feet. This section of the site is proposed for the hotel. The remaining area, which is the crest of the rims and with a vertical contour of only about 20 feet in the described 115 feet, is proposed for parking and recreation. As mentioned before the site is just east of the proposed air-

port interchange in the proposed traffic plan of the Bullings comprehensive plan.

3.2 ADJACENT ENVIRONMENT

To the north of the site is Eastern Montana College, with its growing campus. The high-rise buildings at Eastern give future customers as well as the development itself a sense of scale. The buildings interwoven with open space on the campus can accomplish this while single-family residences could not. Since the adjacent environment on the west, east and south is on the rimrocks and not primary for viewing, the north was most emphasized in site selection. The views in the other direction do indicate that the site is mostly underdevolped and consists mainly of open space, with the exception of the airport.

3.3 TOPOGRAPHY AND VEGETATION

The site has a moderately steep slope which varies up to an approximately 95 foot vertical drop. The slope is quire uniform because of the grooming it received when North 27th Street was widened from Eastern to the airport. The area which is between the face of the rims and State Secondary 318 is approximately 400 feet wide and is relatively flat. The site area is spotted with various types of trees ranging in height from 15 to 60 feet. However, these trees are primarily in the Block & Otter Trail vicinity. Brush cover is spotted throughout the location and is of medium to light density. The shrubs on the site are of two types: sagebrush and skunkbrush sumac. Grass cover is of medium density and is cut through in numerous places by haphazard trails, which make dirt a problem on windy days. It is green for only a short period dur-

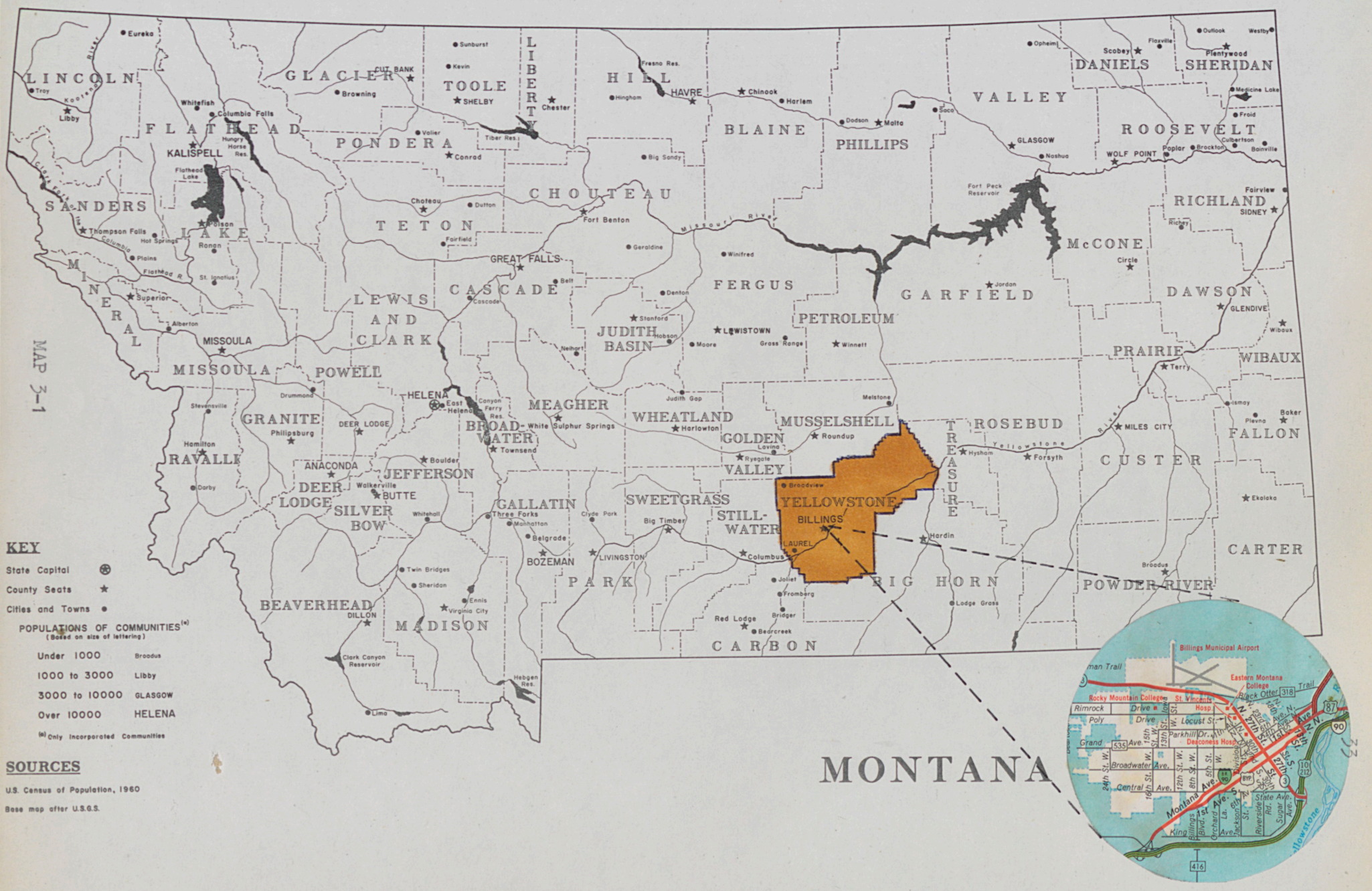
ing spring.

3.4 SOIL ANALYSIS

The surface soil of the site consists mostly of sand loams with a few pockets of sandy-clay loams. Although the soil pockets are usually two to four feet thick, wind erosion has stripped the surface soil at some points. The soil near U.S. Secondary 3 is the deepest on the site being about 12 feet thick at some locations. The surface soil is only slightly alkaine and would not affect building materials. Below the surface soil and exposed by weathering in some spots is a layer of Eagle sandstone. This is a very durable and stuble layer suitable for building construction needs. If construction takes place where there is sandstone rubble, it will be necessary to anchor the building in a stable layer of sandstone. No fractures in the sandstone layer are evident at the site.

3.5 VIEWS

In the distance, mountains, although not dominating, are in view. They form the Yellowstone River Valley which is probably the most dominate aspect of this distant view. Within the Yellowstone River Valley is another rimrock area on the south side of the river. This formation is primarily in the south east when viewed from the site. They help to define what has become the immediate view, which is Billings itself. Although the eastern part of Billings is quite unattractive during daylight hours because of its oil refineries. At night the lights in this part have a majical sparkle. The other views of Billings are pleasant with dense tree coverage most noticable in the area. The very immediate views offer Eastern Montana College and the view of the rims to the west and



MAP 3-1

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

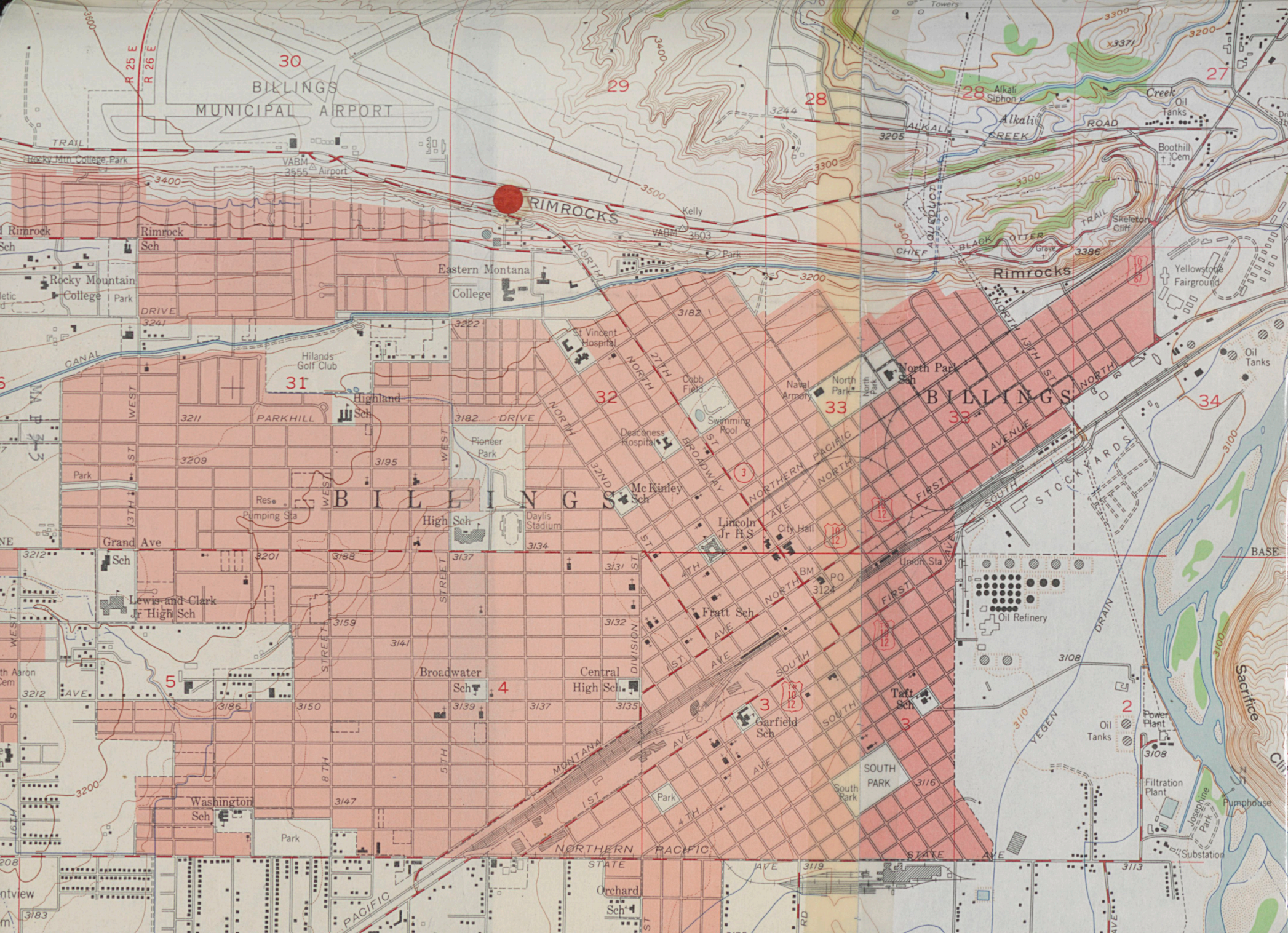
[a] Only Incorporated Communities

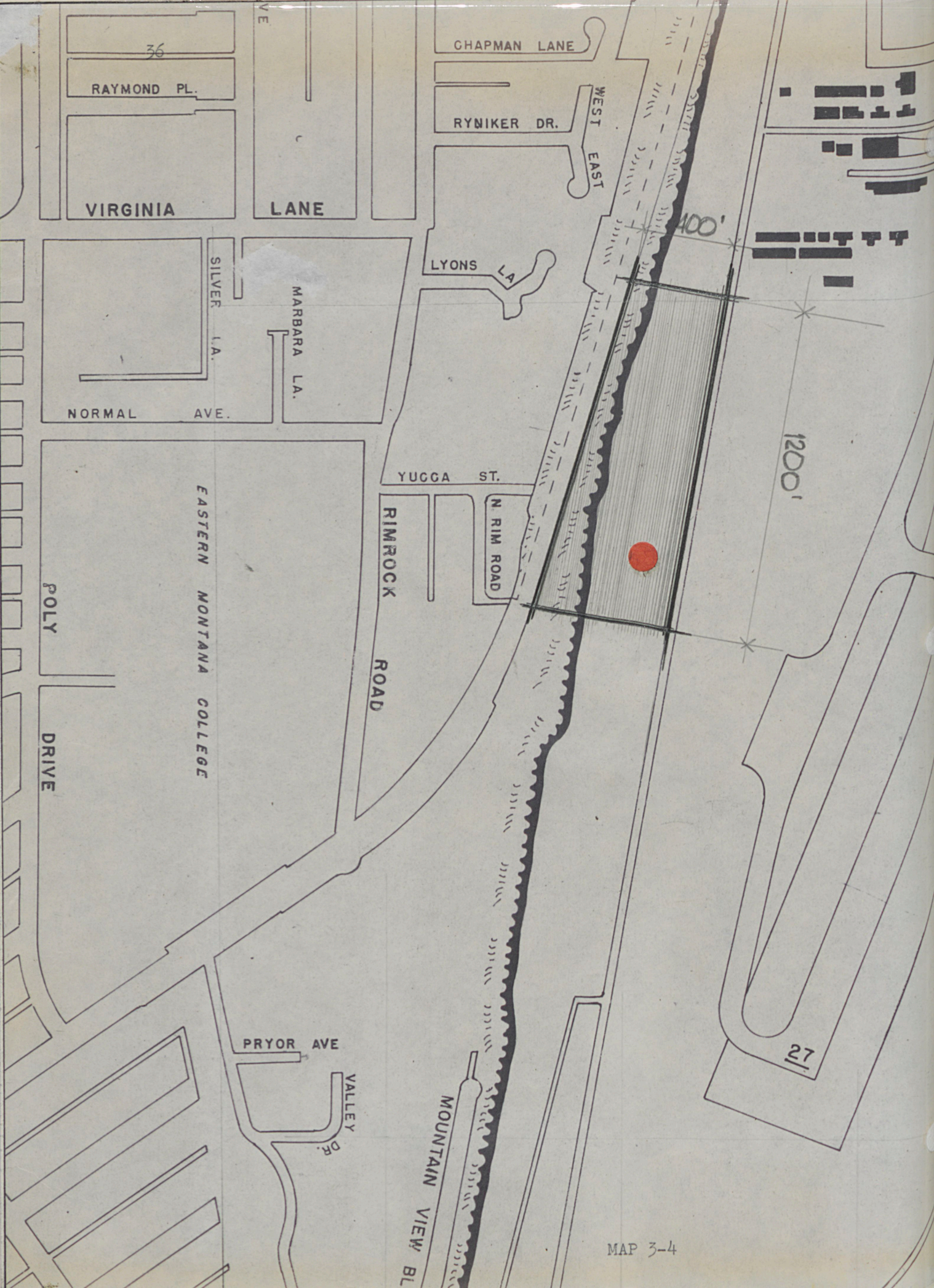
SOURCES

U.S. Census of Population, 1960

Base map after U.S.G.S.


BILLINGS LOGAN FIELD
BILLINGS
MAP 3-2
To Yellowstone Park


BILLINGS
MUNICIPAL AIRPORT
RIMROCKS
Rocky Mountain College
Eastern Montana College
Hilands Golf Club
Highland Sch
Pioneer Park
BILLINGS
High Sch
Daylis Stadium
McKinley Sch
Lincoln Jr H S
City Hall
Fratt Sch
Lewis and Clark Jr High Sch
Broadwater Sch
Central High Sch
Garfield Sch
Washington Sch
Orchard Sch
St Vincent Hospital
Deaconess Hospital
Cobb Field
Swimming Pool
Naval Armory
North Park
North Park Sch
Union Sta
Oil Refinery
Taft Sch
South Park
Power Plant
Filtration Plant
Pumphouse
Josephine Park
Substation
Yellowstone Fairgrounds
Boothill Cem
Skeleton Cliff
Alkali Creek
Alkali Siphon
Oil Tanks
Stockyards
Sacrifice Cliff
Parkhill
Grand Ave
Park
Rimrock
Rimrocks
Canal
Drain
Yegen
Aqueduct
Chief Black Otter Trail
Rocky Mtn. College Park
Airport
Kelly Park
Rese Pumping Sta
Northern Pacific
Montana
Division
Broadway
Avenue
Street
Drive
Road
Trail
Creek
Base
Tower
Gravel Pit
Cem
Sch
Park
Oil Tanks
Oil Refinery
Power Plant
Filtration Plant
Pumphouse
Substation
Stockyards
Sacrifice Cliff
Yellowstone Fairgrounds
Boothill Cem
Skeleton Cliff
Alkali Creek
Alkali Siphon
Rocky Mtn. College Park
Airport
Kelly Park
Rese Pumping Sta
Northern Pacific
Montana
Division
Broadway
Avenue
Street
Drive
Road
Trail
Creek
Base
Tower
Gravel Pit
Cem
Sch
Park
R 25 E
R 26 E
30
29
28
27
31
32
33
34
5
4
3
2
3600
3400
3500
3300
3200
3100
3244
3205
3371
3386
3241
3222
3182
3211
3209
3195
3212
3201
3188
3137
3134
3131
3159
3141
3132
3186
3150
3139
3137
3135
3147
3116
3108
3110
3119
3113
3183
3124
VABM 3555
VABM 3503
PARKHILL
DRIVE
CANAL
WEST
NORTH
SOUTH
1ST AVE
2ND AVE
3RD AVE
4TH AVE
5TH AVE
6TH AVE
7TH AVE
8TH AVE
13TH ST
27TH ST
32ND ST
BROADWAY
STREET
DIVISION ST
NORTHERN PACIFIC
MONTANA
FIRST AVENUE
NORTH 13TH ST
STATE AVE
SOUTH PARK
DRAIN
YEGEN
AQUEDUCT
CHIEF BLACK OTTER TRAIL
ROAD
TRAIL
CREEK
BASE
TOWER
GRAVEL PIT
CEM
SCH
PARK


36
RAYMOND PL.
VIRGINIA
LANE
CHAPMAN LANE
RYNIKER DR.
WEST
EAST
LYONS LA
400'
1200'
SILVER LA.
MARBARA LA.
NORMAL AVE.
YUCCA ST.
N RIM ROAD
RIMROCK ROAD
EASTERN MONTANA COLLEGE
POLY
DRIVE
PRYOR AVE
VALLEY DR.
MOUNTAIN VIEW BL
27

MAP 3-4

east. On the crest of the rims, parkland will be visible both east and west if the city follows its comprehensive plan. The east view should be especially pleasing because of the proposed plans for Block Otter Trail and Swords Park.

3.6 WIND

The usual direction for prevailing winds is from the southwest, but there are many variations on this. Upslope fog and low clouds are common with east and north east winds during the colder two-thirds of the year with an occasional occurance of these conditions during the warmest months. Cold waves "break"abruptly with the onset of moderate to strong west to southwest winds. This "chinook" wind moves down the Yellowstone Valley transporting warmer air of the pacific to the area. Thunderstorms, which are restricted mainly to the warm season, May through September, are frequently accompanied by strong, gustly winds and occasionally, by hail. (Q, 1968)

3.7 SUN ORIENTATION

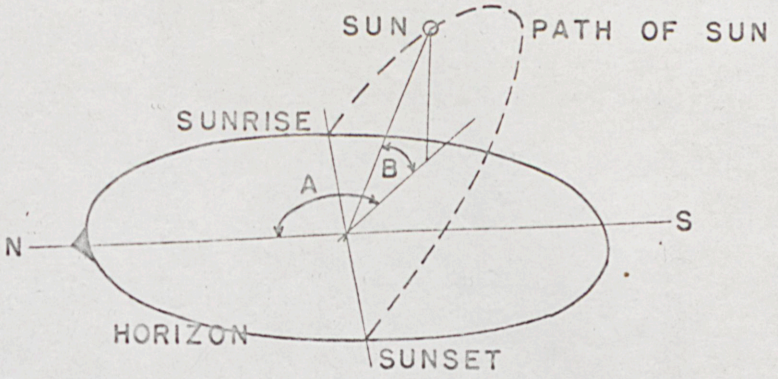
Billings is located at 45° 48' north latitude and 108° 32' west longitude with an altitude of 3567 feet above sea level, at the sirport terminal. The sun's rays make an angle of approzimately 68° with the earth's surface on June 22, at 12:00 noon. The angle is 22°. The equinox, equal day and night, has an angle of 45°.

3.8 AVAILABLE UTILITIES

The greater Billings area is served by three water systems, the city's own utility and the county water sidtricts of Billings Heights and Lock-

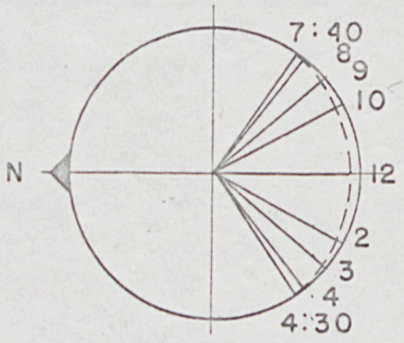
TABLE 3-1

S O L A R A N G L E S



ANGLE A – AZIMUTH
ANGLE B – ALTITUDE

EXPLANATION



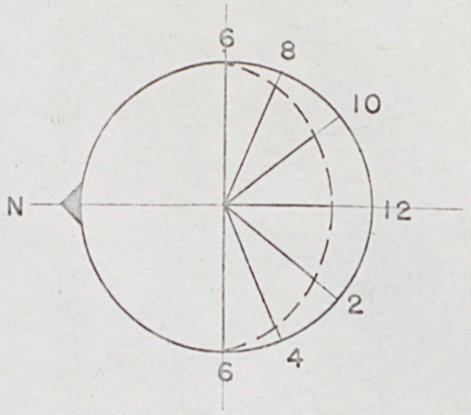
A.M.	P.M.	AZIMUTH	ALTITUDE
noon		180°-0'	21°-30'
10:00	2:00	151°-30'	16°-0'
9:00	3:00	139°-0'	10°-0'
8:00	4:00	127°-30'	2°-30'
7:40	4:20	124°-30'	0°-0'

WINTER - DEC. 22

[redacted]

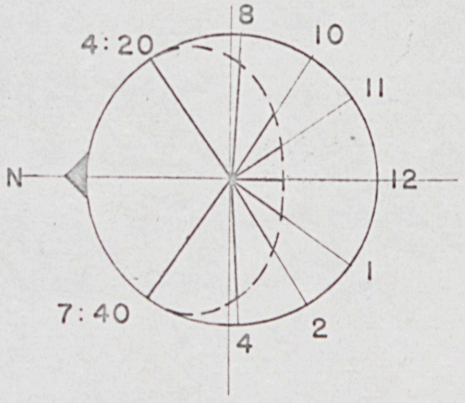
[redacted]

TABLE 3-2 S O L A R A N G L E S



A.M.	P.M.	AZIMUTH	ALTITUDE
noon		180°-0'	45°-0'
10:00	2:00	141°-0'	38°-0'
8:00	4:00	112°-0'	20°-30'
6:00	6:00	90°-0'	0°-0'

SPRING - MAR. 21
FALL - SEPT. 23



A.M.	P.M.	AZIMUTH	ALTITUDE
noon		180°-0'	68°-30'
11:00	1:00	145°-30'	65°-30'
10:00	2:00	121°-30'	57°-30'
8:00	4:00	93°-0'	37°-30'
4:20	7:40	55°-30'	0°-0'

SUMMER - JUNE 22

wood. The city system serves the incorporated area and extends a ten-inch main along Rimrock Road west to the Yellowstone Golf Club. The total storage capcity of the city system which would serve the site, is 12.9 million gallons, and the total capacity of the treatment plant is 22 million gallons per day, a minimum operating pressure of sixty pounds per square inch is provided at every point in the system.

The sanitary sewer system in the planning area covers only the area within the corporate units of Billings. The area served can be seen in figure 3.1. The sanitary system is about 18 years old, with major additions in 1954, 1957, and 1963, and it has a capacity of 14 million gallons per day. (E, 1968)

From figure 3.1 it can be seen that at the present the site does not have these services. Probably the biggest reason for this is the absence of any development near or at the site. The boundary for the storm sewer service area, the sanitary sewer service area, and the Billings water service area, is North 27th Street, which is also the south boundary of the site. Both of the sewer systems and the water service, therefore, are within the width of a street to the site and could quite easily be provided for the development. The water system, if desired, could also come from the airport service system.

Electricity and telephone access is available in the area, but both are overhead services. In order to adequately meet the increase in demand caused by the development, additional lines will probably need to be provided. Therefore, in the planning stages of my project underground electrical service will be considered, along with any gas lines.

3.9 ZONING

The site is currently zoned for commercial business under the agri-

BILLINGS

WATER AND SANITARY/STORM SEWER SERVICE AREAS

FIGURE 3-1

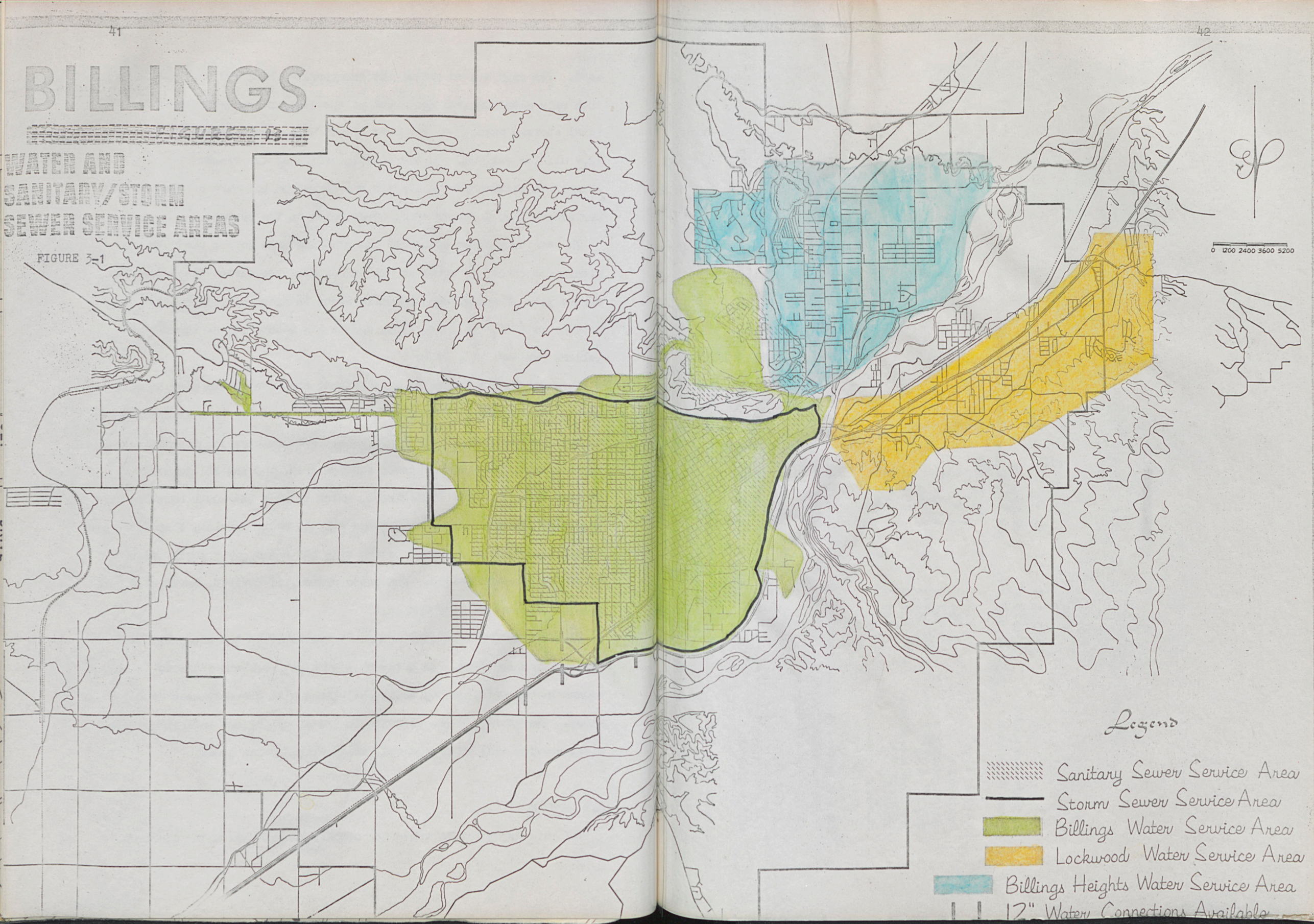


TABLE 3-3

SUMMARY OF PLANNING AREA LAND USE BY JURISDICTION, ZONED AND UNZONED

	Planning Area	Not Zoned	Zoned by City	Zoned by County	Total Zoned
Total Area (acres)	80,602.0	71,737.5	5,490.1	3,374.4	8,864.5
Vacant/Agriculture	61,929.0	58,819.2	793.8	2,316.0	3,109.8
Total Developed	18,673.0	12,918.3	4,696.3	1,058.4	5,754.7
Total Net Area[a]	14,222.5	8,467.8	4,696.3	1,058.4	5,754.7
Residential	6,754.1	2,602.7	3,421.9	729.5	4,151.4
Manufacturing	1,288.4	1,156.5	79.2	52.7	131.9
T., C. & U.[b]	2,672.3	2,589.8	70.7	11.8	82.5
Wholesale & Retail	417.8	203.8	205.3	8.7	214.0
Services	260.3	89.4	161.1	9.8	170.9
Public	2,829.6	1,825.6	758.1	245.9	1,004.0

[a] Land in highways, streets and alleys, 4,402.0 acres, was subtracted from the total developed land figure to obtain total net area. Also omitted were 48.5 acres reported in vacant floor area by the land use data.

[b] The large amount of unzoned land in this category includes the airport and all rail and utility rights-of-way.

Source: Compiled by Clark, Coleman & Rupeiks, Inc.

TABLE 5-4

USE OF LAND IN ZONING DISTRICTS - CITY OF BILLINGS
(In Acres)

	Total Area Acres	Residential	Manufacturing	Transp., Utilities & Comm.	Whsle., & Retail Trade	Service	Public	Agric. & Vacant
Suburban Residential	324.0	102.7			1.3		150.9	69.1
One-family Restricted	1,232.2	868.9	.8	17.5	1.1		140.5	203.4
One family	1,901.9	1,124.9	46.4	3.7	14.0	72.7	351.9	288.3
Two family	850.4	706.9	3.8	.9	2.5	4.2	87.2	44.9
Multi-family	414.0	349.7		.1	4.9	16.8	4.6	37.9
Residential-Professional	14.0	9.2			.1	1.2	.2	3.3
Limited Commercial	211.5	68.0	.4	1.0	64.2	16.6	5.1	56.2
General Commercial	357.4	147.3	9.2	33.6	68.1	31.8	11.2	56.2
Central Commercial	28.3	1.8	.5	3.6	10.3	4.9	5.3	1.9
Highway Commercial	1.9	.6						1.3
Light Industry	145.6	39.0	15.6	9.9	38.8	10.4	1.2	30.7
Heavy Industry	8.9	2.9	2.5	.4		2.5		.6
TOTAL	5,490.1	3,421.9	79.2	70.7	205.3	161.1	758.1	793.8

Source: Data compiled by Clark, Coleman & Rupeiks, Inc.

GENERALIZED LAND USE IN SEVEN YELLOWSTONE COUNTY ZONING DISTRICTS
(In Acres)

Zoning Districts	Total Area Acres	Residential	Manufacturing	Transp., Utilities & Comm.	Whsle., & Retail Trade	Service	Public	Agric. & Vacant
21	123.4	33.0			.7			89.7
22	997.3	388.3	52.2			7.0	37.5	512.3
23	82.2	54.9	.2		5.9		4.0	17.2
24	80.1	55.2	.3		1.9	.9		21.8
25	794.2	109.4					53.2	631.6
26	1,258.3	62.5		11.8	.2	1.9	151.2	1,030.7
27	38.9	26.2						12.7
TOTAL	3,374.4	729.5	52.7	11.8	8.7	9.8	245.9	2,316.0

Source: Compiled by Clark, Coleman & Rupeiks, Inc.

cultural/vacant land classification, however, a zoning district to protect the rim tops jas been proposed to the Yellowstone County Commissioners. The proposed zoning district as recommended by the comprehensive plan for the Billings area through 1990, would include all the property between the rimrocks and State Highway 3 where there are no existing or proposed zoning districts. It is common knowledge among Billings' residents that there is really no zoning classification for the rims at present and that the proposed public and quasi public zoning for the rims by the comprehensive plan is still an unsettled issue. Therefore, the zoning for the rims is being further considered by the planning board's committee.

3.10 TRAFFIC

The two road systems serving the proposed site, North 27th Street and State Highway 3, are probably two of the most traveled in Billings and their importance will increase even more in the future. North 27th Street now provides the connection between the C.B.D. and two of the most important transaction systems, the interstate highway and Logan Field. A key feature of the planning board's plan is the beltline system. This system coupled with the interstate will completely encircle the exisiting city of Billings. One of the major roads in this system is State Highway 3. Current traffic on this roadway ranges from about 1,500 to 2,500 vehicles per day, but by 1990, due to the proposed belt system, this volume will increase tenfold. The volumes forecasted for this date will necessitate the construction of an interchange of the intersection with North 27th Street. This interchange will serve the airport, the C.B.D., and the proposed site.

BILLINGS

EXISTING STREETS AND HIGHWAYS

FIGURE 3-2

0 1200 2400 3600 5200

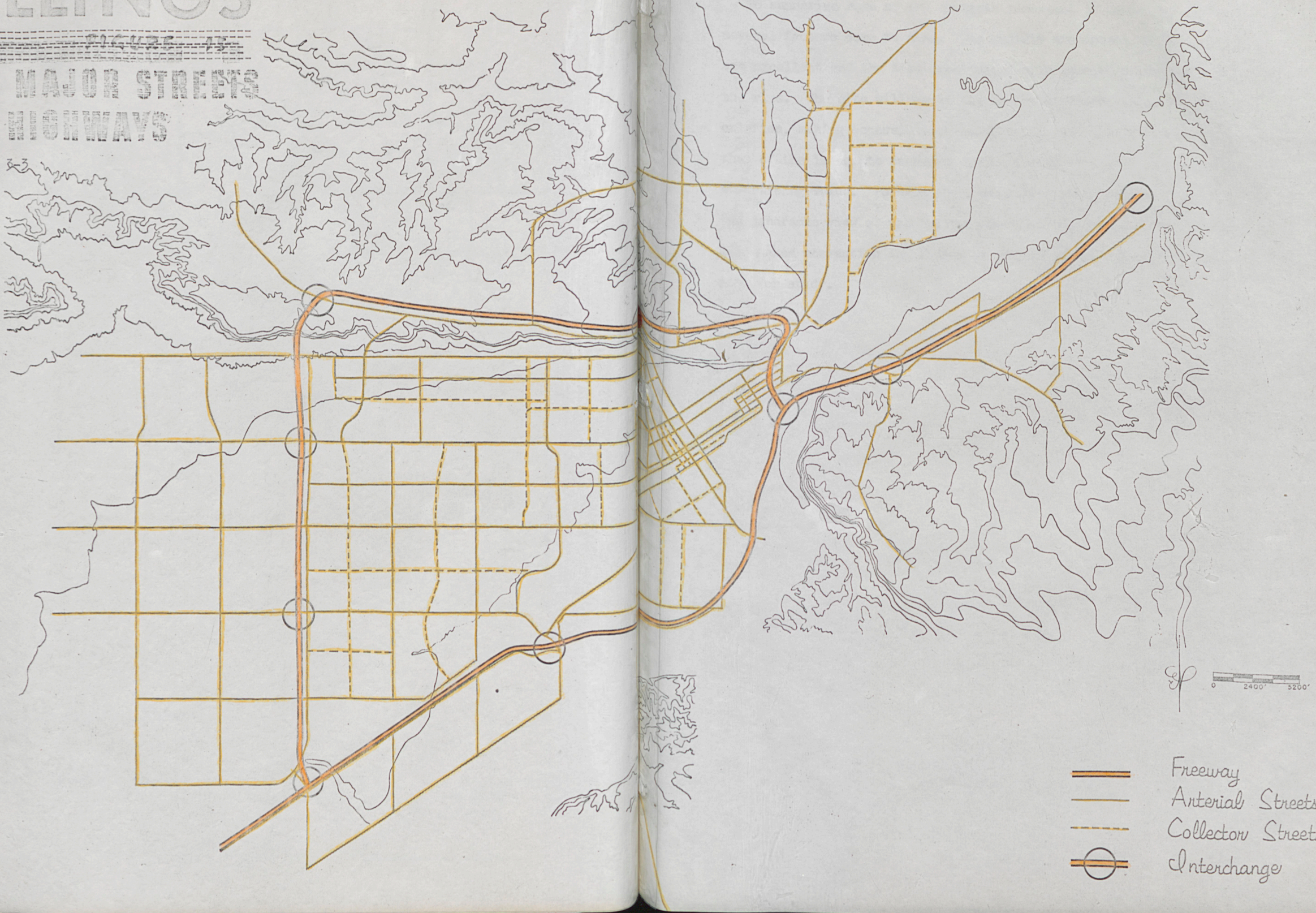
Legend

Interstate Highways
Arterial Streets
Collector Streets

BILLINGS

1990 MAJOR STREETS AND HIGHWAYS

FIGURE 3-3



3.11 CONCLUSION

To summarize some of the criteria important to selecting the site several factors come to mind. The quality and nature of surroundings are excellent and the site development will improve a scarred section of the rims. The site will be at the vertex of future major roadway circulation, making accessibility quite easy. The site elevation is above that of the immediate downtown area and therefore adds in recognition of advertising value. Perhaps the most advantageous aspect of the site is the panoramic view of the Yellowstone River Valley it affords. The site also makes convention facilities at Eastern Montana College a feasible idea for study.

View from the site looking west.





View from the rim crest on the site looking southeast.



View of the site looking east from the rims south of the airport road.



View from the site looking south.



View from the site looking southwest.



View from the site looking southeast.



View of the top of the rims from the site looking east.



View of the top of the rims from the site looking west.



View from the site looking west.

View from the site looking southeast.





View from the crest of the rims on the site looking south-east

View from the site looking southwest.



View of the rim crest on the site looking west.





View of the site while traveling east on the airport road.

View of the site from North 27th Street looking northwest.





View of the rims looking east from the site.



View of the rims looking west from the site.

ECONOMIC CONSIDERATIONS

4.0 ECONOMIC CONSIDERATIONS

To the owner of a new building, such as a hotel, there are several areas which appear to stand out with respect to initial and total investment in the building. Some of these areas which deserve consideration are: the purchase of land upon which the building will stand, the cost of the construction of the building, and the continual cost involved in the operation of the business. Although there are many other economic factors to consider, it is essential that these three areas are understood so that a preliminary budget can be established.

4.1 LAND COSTS

A "rule of thumb" for hotel planning advises that the building structure should not have a total cost that is more than ten times the amount of toal land cost. Since the land of the face of the rims is valued at about $.25 per square foot ($10,000.00 per acre), a thirty acre site, for example, would cost $300,000.00 and by using the rule of thumb a $3,000,000.00 hotel would be feasible. Since this land cost may seem excessive, it is worth-while to compare it with other land values of nearby sites. The land value on the top of the rims is not much higher at $.50 per square foot ($20,000.00 per acre), but the land below the rims and on North 27th Street has been valued at as much as $4.00 per square foot ($160,000.00 per acre). When these figures are considered, the proposed site seems to be the best investment. Not only is the land cheaper on the site, but it affords better views and better advertising value than other sites as well as being workable in the comprehensive plan and proposed transportation plan for Billings.

4.2 CONSTRUCTION COSTS

Although the cost of a building is an important criterion in the design process, it cannot be known, except for a budget amount, until the preliminary drawings are completed. It is too early at this time to give exact figures for the total building costs. However, for current hotel building costs per square foot, the Marshall-Stevens Cost Index offers several figures, per type of construction, which give an indication of cost.

The types of construction and costs are categorized as follows:

Class A: Buildings having structural steel framing, with reinforced concrete or masonry floors and roofs. Excellent quality construction -- $24.05/s.f.

Class B: Buildings having concrete frames and concrete or masonry floors and roofs. Excellent quality construction -- $22.17/s.f.

Class C: Buildings having masonry exterior walls, and wood or steel roof and floor construction. Good quality construction -- $17.62/s.f.

Class D: Buildings having wood or light steel frame and roof structures. Good quality construction -- $15.70/s.f.

Since these costs are only rough estimates at this time, they would vary as the design drawings became more detailed. The cost of construction will also vary as different or new types of construction systems are used, which may be necessary because of the slope of my site. Changes in labor costs, material availability, and the building layout itself will also influence the cost of construction. As the building is further designed, these and more considerations must be taken into account.

Since I intend for my building to be of above average quality, it is essential that these costs are closely structured to rate returns anticipated in hotel operations.

4.3 RATE STRUCTURES OF HOTEL ROOMS

"Under prevailing economic conditions, it is imperative for successful operation that rates be adequate to cover operating costs and to provide a reasonable return on the fair value of the property. While it is recognized that room rates are primarily the result of competitive conditions, good business principles demand that room rate structures be established on a sound basis." (A, 1965: 16)

An operating formula has been derived by the firms of Horwath & Horwath and Harris, Kerr, Forster and Company to help establish the proper rate structures of hotel rooms. It is suggested that computations be made regularly with this formula to continually evaluate the room rate position and chart its trends. An illustration of Schedule 1 and Schedule 2, which make up the formula is shown in Table 4-1. (A, 1965: 18)

Table 4-1 (A, 1965: 18)

Room Rate Formula for Transient and Residential Hotels

SCHEDULE 1. To Determine the Amount Needed from Room Sales to Cover Costs and a Reasonable Return on the Present Fair Value of Property.

Operating Expenses	Your Hotel		Example	
Rooms department	$_____	$44,273.00		
Telephone department-- net loss		1,499.00		
Administrative & general		27,162.00		
Payroll taxes & employee relations		3,685.00		
Advertising & Business promotion		4,625.00		
Heat, light & power		16,757.00		
Repairs & maintenance		15,803.00		
Total operating expenses	$_____		$113,804.00	
Taxes, Insurance, etc.				
Real estate & personal property taxes		$ 9,624.00		
Franchise taxes		300.00		
Insurance on building & contents		922.00		
Total taxes, insurance, etc.			$ 10,846.00	
Depreciation (standard rates on present fair value)				
	Value Rate			
Building	$_____ at _____%$	$ 9,240.00		
Furniture, fixtures and equipment	$_____ at _____%$	6,160.00		
			$ 15,400.00	sub
Total depreciation--	$		$ 15,400.00	
Reasonable Return on Present Fair Value of Property				
	Value	Rate		
Land	$			
Building	$			
Furniture, fixtures and equipment	$	$		
Total fair return	$_____	at %$_____	$ 45,000.00	
			$185,050.00	
Total		$_____		

Deduct (credits from sources other than rooms)			
Income from store rentals	$_____	$ 5,259.00	
Credit from food and beverage operations (if loss subtract from this group)		$24,864.00	
Net income from other operated departments & miscellaneous income		$ 7,524.00	
Total credits from sources other than rooms			$ 37,647.00
Amount to be Realized from Guest Room Sales to Cover Costs and a Reasonable Return of Present Fair Value of Property	$_____		$147,403.00

Table 4-1 (A, 1965: 18)

SCHEDULE 2. Computation to Determine Average Daily Rate Required per Occupied Room.

			Your Hotel	Example
1.	Amount to be realized from guest room sales to cover costs and a reasonable return on present fair value of property (from Schedule 1)		$_____	$147,403.00
2.	Number of guest rooms available for rental			100
3.	Number of available rooms on annual basis (Item 2 multiplied by 365)	100%	100%	36,500
4.	Less: allowance for average vacancies	____%	25%	9,125
5.	Number of rooms to be occupied at estimated average occupancy	____%	75%	27,375
6.	Average daily rate per occupied room required to cover costs and a reasonable return on present fair value (Item 1 divided by Item 5)		$	$5.38
7.	Actual average rate per occupied room at prevailing occupancy		$ 79%	$4.95

Schedule 1 is to be used to determine the total room sales volume needed to cover costs and a reasonable return on the present fair value of the property. The figures used in the example, which is given for illustration purposes only, are on the basis of averages applicable to 100 rooms. Although the figures will vary with each hotel, the same principles will be applicable to hotels of different types and sizes.

The operating expenses as listed in Schedule 1 are in the groups which conform with the Uniform System of Accounts for Hotels. The items listed under the taxes and insurance classification are self-explanatory. Under the depreciation heading a computation should be made of the depreciation applicable to the present fair value of the property at standard depreciation rates. In evaluating a rate structure, the hotel operator is entitled to a reasonable return on the present fair value of the property. The rate of return should be determined by each operator in the light of his own circumstances. The section on credits from sources other than rooms is designed to include income from all sources other than room operation, which can be considered as an offsetting reduction to determine the net amount needed from room sales. (A, 1965: 18)

Schedule 2 is a simple computation to determine the average daily rate per occupied room required to produce the amount to cover costs and a reasonable return on the present fair value of the property. (A, 1965: 19)

4.4 PROFIT

Profit is the eventual end of all rate structuring. As a rule of thumb, the return rate of 10% has been used generally in the hotel

industry, although operators of resort hotels may wish to use a higher rate than this due to the dependency on good economic conditions. Table 4-2 shows a cost-profit relationship of areas in hotel operation which have been computed from standard practice. This table shows by percentage the breakdown of operating expenses and the reasonable profit percentage to expect. (A, 1965: 20)

Table 4-2 (A, 1965: 20)

Total Sales and Income

	Your Hotel	All Resorts
Rooms		49.4%
Food (including sundry income)		35.3
Beverages (including sundry income)		10.9
Telephone		1.4
Other departmental profits		1.5
Other income		1.5
Total		100.0%

Cost of Goods Sold and Departmental Wages and Expenses

	Your Hotel	All Resorts
Rooms		14.9%
Food and beverages		38.8
Telephone		2.4
Total		56.1%
Gross Operating Income		
Deductions From Income		
Administrative and general expenses		10.6%
Advertising and business promotion		5.4
Heat, light and power		4.2
Repairs and maintenance		7.0
Total		27.2%
House Profit		16.7%
Store Rentals		1.3
Gross Operating Profit		18.0%
Fire Insurance and Franchise Taxes		.7
Profit Before Real Estate Taxes and Other Capital Expenses*		17.3%
Real Estate Taxes		3.0
Profit After Real Estate Taxes but Before Other Capital Expenses		14.3%
Percentage of Occupancy		56.5%
Average Rate per Room per Day		$16.57

*Profit before deducting depreciation, rent, interest, amortization, and income taxes.

Average Daily Room Rate per Guest	$ 9.87
Number of Guests per Occupied Room	1.68
Times Real Estate Taxes Earned	5.80
Average Size	w 252

NOTE: Payroll taxes and employee relations distributed to each department.

Rooms	
Net sales	
Guests' rooms	99.9%
Public rooms	.1
Total sales	100.0%
Departmental Expenses	
Salaries and wages including vacation	15.8%
Employees' meals	1.4
Payroll taxes and employee relations	1.8
Laundry	2.6
Linen, china and glass	1.0
Other expenses	7.5
Total expenses	30.1%
Departmental profit	69.9%
Food and Beverages	
Food Sales	100.0%
Cost of food consumed	45.6%
Less: employees' meals	9.3
Cost of food sold	36.3%
Food gross profit	63.7%
Beverage sales	100.0%
Cost of beverages sold	32.4
Beverage gross profit	67.6%
Total food and beverage sales	100.0%
Cost of food and beverages sold	35.4
Food and beverage gross profit	64.6%
Cover charges and sundry income	.5
Total revenue	65.1%
Departmental Expenses	
Salaries and wages including vacation	30.2%
Employees' meals	4.1
Payroll taxes and employee relations	3.4
Music and entertainment	2.9
Laundry	1.5
Kitchen fuel	.5
Linen	.4
China and glass	1.2
Silver	.3
Menus and drink lists	.4
Licenses and taxes	.2
Other expenses	4.0
Total expenses	49.1%

Department profit	16.0%
Average receipt per food cover	$2.70
Average Size (rooms)	262
Percentage of Occupancy	56.5%
Average Rate per Room per Day	$16.57
Times Real Estate Taxes Earned	5.8
Variation - 1960 Based on 1959	
Room sales	-.4%
Food sales (including sundry income)	+.2
Beverage sales (including sundry income)	-.1
Total sales and income, plus store rentals	-
Total cash payrolls including vacations	+3.4
Profit after real estate taxes	-12.5
Percentage of occupancy	-3.7
Rate per room per day	+3.1
Ratios to Room Sales	
Food sales (including sundry income)	71.5%
Beverage sales (including sundry income)	21.9
Combined food and beverage sales	93.4%
Ratios to Total Sales and Income (except store rentals)	
House profit	16.7%
Gross operating profit	18.0
Profit after real estate taxes	14.3
Rooms department wages amd expenses	14.9
Telephone - net cost	1.0
Administrative and general expenses	10.6
Advertising and business promotion	5.4
Heat, light and power	4.2
Repairs and maintenance	7.0
Fire insurance and franchise taxes	.7
Real estate taxes	3.0
Total cash payrolls including vacations	35.9
Ratios to Rooms Sales	
Rooms Department wages and expenses	30.1%
Telephone - net cost	1.9
Administrative and general expenses	21.5
Advertising and business promotion	10.9
Heat,light and power	8.4
Repairs and maintenance	14.3
Fire insurance and franchise taxes	1.5
Real estate taxes	6.0
Sub-total	94.6%
Deduct	
Food and beverage profit	14.8%
Store rentals	2.7
Other profits and income	6.1
Sub-total of deductions	23.6%
Net operating cost	71.0%

Profit after real estate taxes but before capital expenses 29.0%

Cost per Occupied Room per Year

	your Hotel	all Resorts
Rooms Department expenses		$1,830
Telephone - net cost		116
Administrative and general expenses		1,303
Advertising and business promotion		661
Heat, light and power		513
Repairs and maintenance		867
Fire insurance and franchise		90
Real estate taxes		367
Sub-total		$5,747
Deduct		
Food and beverage profit		900
Store rentals		162
Other profits and income		373
Sub-total of Deductions		$1,435
Net Operating Cost Per Occupied Room		$4,312

Average Rental per Occupied Room (including public room rentals)

Profit per occuoied room per year after real estate taxes but before other capital expenses	$1,759
Cost per Available Room per Year	
Rooms Department expenses	$1,035
Telephone - net cost	65
Administrative and general expenses	737
Advertising and business promotion	374
Heat, light and power	290
Repairs and maintenance	490
Fire insurance and franchise taxes	51
Real estate taxes	207
Sub-total	$3,249
Deduct	
Food and beverage profit	$509
Store rentals	92
Other profits and income	211
Sub-total of Deductions	$812
Net operating cost per available room	$2,437
Average Rental per Available Room (including public room rentals)	3,431
Profit per Available Room per Year After Real Estate Taxes but Before Other Capital Expenses	$ 994

Note: Payroll taxes and employee relations distributed to each department.

4.5 OPERATION COSTS

The operation costs of a business determine its eventual success or failure, especially when the business must pay for a new building.

Complete knowledge of the departments of the hotel and the functions they are to perform is the chief concern of management. The most important single criterion in developing a sound internal operation is communication between all the departments. This type of communication requires management to know what is happening, where it is happening, and why it is happening. Only then can management calculate the cost of performing such duties. For example, maintenance alone can incur losses up to 5% of gross revenue due to the lack of proper coordination between management and maintenance. (A, 1965: 8)

4.6 FOOD AND BEVERAGES

Many hotel operators will stress that a great deal of hotel success depends on the operation of the food and beverage department. The margin for success or failure in the food area is quite slim, usually breaking even at best. On the other hand, the beverage trade provides a large profit for the operation. To achieve a successful food and beverage operation within the hotel, the kitchen, from the purchasing department to the service department, must make use of standards, portion controls, and a general uniformity. Management must set the standards. (A, 1965: 9) Restaurant operating percentages are shown in Table 4-3.

Table 4-3 (A, 1965: 9)

Restaurant Operating Percentages

Sales	
Food	77.00
Beverages	23.00
Total	100.00%

Cost of sales	
Food	42.00
Beverages	33.00
Total	75.00%
Gross profit	60.07
Other income	.59
TOTAL GROSS PROFIT AND OTHER INCOME	60.66%
Expenses	
Payroll	28.63
Payroll taxes and employee benefits	3.87
Sub-total	32.50%
Departmental expenses	7.00
Administrative and general	5.00
Advertising	1.50
Repairs and maintenance	1.50
Total	47.50%
Profit before rent, interest, depreciation, and taxes	13.16%
Deduct	
Rent	5.51
Interest	.41
Depreciation	1.24
Total Deductions	7.16
Profit before Federal and State taxes	6.00%

Departmental Expenses

Laundry and linen	2.00
Utilities	1.90
China, glassware, and silver	.97
Miscellaneous	.57
Licenses	.32
Cleaning supplies	.30
Menus	.30
Utensils	.17
Guest supplies	.15
Decorations	.15
Printing and stationary	.12
Paper supplies	.05
Total	7.00%
Payroll	2.75
Insurance-general	.60
Legal and accounting	.50
Miscellaneous	.32
Telephone	.25
Promotion	.25
Printing	.10
Travel	.10
Postage	.08
Association dues	.05
Total	5.00%

4.7 STAFF PLANNING

The first element in a staff planning program is a thorough review of each job classification, including an analysis of the job duties. The analyst should keep in mind "who," "what," "when," and "how" the work can be simplified, and this implies inquiries as to how often each function is performed. The ultimate goal in this analysis of the payroll control system is to find yard-sticks relative to staffing anticipated work loads.

The second step in the installation of a staff planning program is the installation of a forecast procedure. Since forecasting is important both in regard to the planning and scheduling of personnel and to convention requirements, it is often advisable to hold a forecast meeting with the department heads. At these meetings the management and staff should discuss the forecast with emphasis on the requirements of arriving groups, special events, and hours of arrival and departure. They should also exchange ideas and ascertain anticipated weekly volumes. (A, 1965: 15) An example of a weekly forecast expressed in terms of the daily work load is shown in Table 4-4.

Table 4-4. Resort Hotel X
Forecast for week beginning May 25 (A, 1965: 15)

	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Total
Occupied rooms	120	130	130	130	150	150	150	960
Guest count	200	205	205	205	230	230	230	1505
Anticipated arrivals	150	15	5	5	10	10	10	-
Anticipated departures	80	10	5	5	25	10	10	-
Breakfast	130	180	200	200	200	230	230	1370
Luncheon	210	220	220	220	230	250	230	1580
Dinner	160	220	220	220	240	250	250	1560
Special events						L 20		20

To be effective the staff planning program must coordinate closely with an effective payroll control system. This coordination will develop trends and aid in forecasting if daily reports of personnel used are compared to the predictions. (A, 1965: 16) A sample of a weekly control report is shown in Table 4-5.

TABLE 4-5 - WEEKLY PAYROLL CONTROL REPORT (A, 1965: 17)

Department	No. of Units		No. of Employee Days		
	Forecasted	Actual	Std. Per Forecast	Std. Per Actual	Actual
Front Office	1085	1344	60	60	61
Uniformed Service	1085	1344	120	120	110
Housekeeping	1085	1344	247	268	250
Steward	4595	4846	138	138	129
Kitchen	2250	2832	180	180	205
La Reserve	1395	1682	139.5	142.5	155
La Loire	540	585			
Men's Bar					
Room Service	615	565	74	76	82
Banquet			72	76	82
Bartenders			36	36	34
Checkers-Cashiers	2550	2832	55	55	51
Repairs and Maint.			115	115	115
Laundry			60	60	63
Protection			36	36	36
Telephone			30	30	30
Printing			10	10	10
Comptroller			75	75	75
Admin. & General			35	35	35

TABLE 4-5 - WEEKLY PAYROLL CONTROL REPORT (A, 1965: 17)

_____ Hotel

Payroll Control Summary for Week Ending _____

Department	Emp. Days Over or Under		No. Units Per Employee	
	Std. Per Forecast	Std. Per Actual	Std. Per Actual	Per Actual
Front Office		1	22.2	22
Uniformed Service	10	10	11.2	12.2
Housekeeping	3	18	5	6
Steward	9	9	35.1	38
Kitchen	25	25	15.1	13.1
La Reserve	15.5	12.5	11.1	10.1
La Loire				
Men's Bar				
Room Service	8	6	7.3	7
Banquet				
Bartenders		2		
Checkers-Cashiers		4	51.2	55.2
Repairs and Maint.				
Laundry			3	
Protection				
Telephone				
Printing				
Comptroller				
Admin. & General				

Prepared by_____ Date:_____

This forecast enables the department heads to prepare a schedule of personnel to meet the predicted work load. For example, the number of employees in the rooms department, such as maids and housemen, are related to occupied rooms or guest count. In the foods department the required persons are related to meal counts. In this process a manpower table may be involved. (A, 1965: 12) A sample of this sliding scale of manpower requirements is shown in Table 4-6.

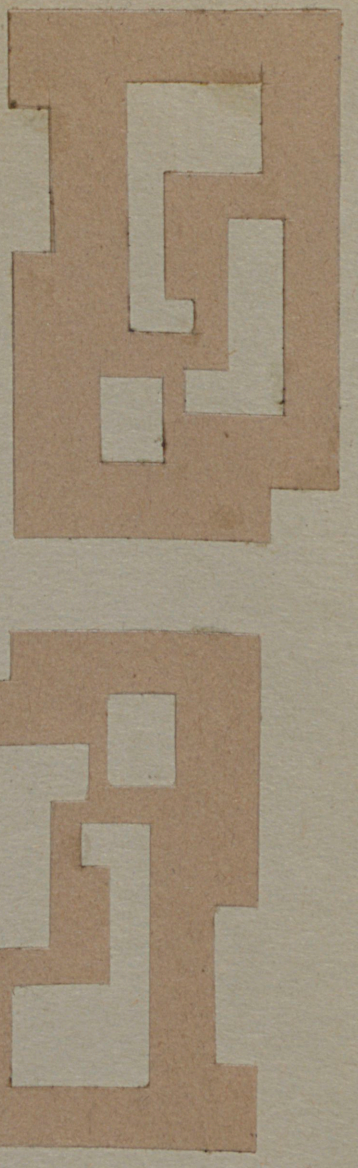
TABLE 4-6 SLIDING SCALE OF MANPOWER REQUIREMENTS (A, 1965: 14)

Weekly Range of Covers	Housemen and Maids	Total Number of Empl. Days	% Number of Employees Per Week	% Number of Employees Per Day	Number of Meals Empl. Day	Number of Meals Waiter Day
500-999	15	138.5	27.7	19.8	5.4	27.2
	12	115.5	23.1	23.1	6.5	
1000-1499	15	116.5	33.3	23.8	7.5	26.4
	12	144.5	28.9	28.9	8.7	
1500-1749	12	187	37.4	26.7	8.6	27.1
	12	162	32.4	32.4	10.1	
1750-1999	15	205	41.0	29.3	9.2	26.8
	-	-	-	-	-	
2000-2249	15	226	43.2	32.3	9.4	27.4
	-	-	-	-	-	
2250-2499	15	236	47.2	33.8	10.0	27.2
	-	-	-	-	-	
2500-2749	15	248.5	49.7	35.5	10.5	27.2
	-	-	-	-	-	
2750-2999	15	258.5	51.7	37.0	11.1	27.4
	-	-	-	-	-	
3000-3249	15	274	54.8	39.2	11.4	27.2
	-	-	-	-	-	
3250-3499	15	281.5	56.3	40.2	12.0	27.6
	-	-	-	-	-	
3500-3749	15	291.5	59.8	41.7	12.4	27.4
	-	-	-	-	-	
3750-3999	15	299	59.8	42.8	13.0	27.6
	-	-	-	-	-	

TABLE 4-6 SLIDING SCALE OF MANPOWER REQUIREMENTS (A, 1965: 14)

Weekly Range of Covers	Manager and Supervisors	Hostess	Chefs and Cooks	Bakers	Pantry	Kitchen Helpers	Waiters
500-999	15	7	16	8	8	35	27.5
	15	5	16	5	5	25	27.5
1000-1499	15	7	20	8	12	35	47.5
	15	5	20	5	10	25	47.5
1500-1749	21	7	20	10	12	35	60.0
	15	5	20	10	10	25	60.0
1750-1999	21	7	21	15	12	37	70
	-	-	-	-	-	-	-
2000-2249	21	9.5	21	15	18.5	39	77.5
	-	-	-	-	-	-	-
2250-2499	21	9.5	21	15	18.5	39	87.5
	-	-	-	-	-	-	-
2500-2749	21	9.5	21	15	18.5	44	95.0
	-	-	-	-	-	-	-
2750-2999	21	9.5	21	15	18.5	44	105.0
	-	-	-	-	-	-	-
3000-3249	21	12	24	15	18.5	44	115.0
	-	-	-	-	-	-	-
3250-3499	21	12	24	15	18.5	44	122.5
	-	-	-	-	-	-	-
3500-3749	21	12	24	15	18.5	44	132.5
	-	-	-	-	-	-	-
3750-3999	21	12	24	15	18.5	44	140.5
	-	-	-	-	-	-	-

As with any venture involving the construction of a building, there are many inherent economic considerations. In the case of a hotel such as the one I have proposed, money making is the prime economic consideration. However, it is not my intent to determine a method of financing this project, but only to present some of the factors that must be examined if the hotel is to be successfully operated in an economic sense. For the purposes of this design solution, economics will be considered as secondary to developing of space to serve the necessary functions of the hotel. Since economics is not of primary importance, it is hoped that the experiments with space planing and arrangement will be less limited in their solution and will justify any deficit in economy.



AESTHETICS

5.0 AESTHETICS

In the vernacular of architecture the word aesthetic seems to be one of those most often used and most often confused. Aesthetics is a very hard subject to define. Webster's New World Dictionary lists two meanings for aesthetics.

The first meaning illustrates what is wrong with much contemporary feeling about the subject. Webster explains that aesthetics is "relating to the beautiful as distinguished from merely pleasing the moral and especially the utilitarian."

In the second definition Webster explains that aesthetics is "involving pure or sensation, especially in contrast to ratiocination or reasoning."

When we think of something as being beautiful, we "feel" its beauty as a sensuous experience. The reaction to beauty is first of all an emotion, and only later can we examine the situation hoping to discover why it impressed us in such a manner. This applies to buildings when we hear them described as "aesthetically pleasing," or when we read about a building with good "aesthetics." The problem with these classifications is that too often the everyday citizen, as well as the professional architect considers great artistic value and true aesthetic beauty as one in the same. In most of these cases no value system has been used to determine the building "aesthetics."

Essentially, the aesthetics of a building is a value judgement arrived at individually, depending on background experience. Unless the laymen has some background or experience in the process of functional building design, he probably doesn't have much stable evidence available,

other than judgement. To the architect the building process reveals numerous elements of judgement which when evaluated, show a building as aesthetically good or bad.

To most travelers by surface or by air, the rims are Billings' "trade-mark," and they are certainly the city's outstanding scenic attraction. Since my project includes a site that is so closely associated with a natural feature that is distinctive in the Billings area, I have a particular problem. Since the building design should either blend with this natural setting or be in direct contrast to it, there is no possible way the designer can duplicate any of nature's wonders. Therefore in attempting to harmonize with the environment and blend with the natural setting, the designer must be sensitive to the surroundings. On the other hand, if the building design contrasts to the natural setting, the designer has to be even more aware of the possible results. Since my site has been scarred by highway improvements it will be necessary that the building improves the visual aspects of the site itself and that it either contrasts or harmonizes with the over-all picture of the rimrocks. The materials used to suit the environment, the structure and other related problems will express the character of the hotel. Influencing this character will be an atmosphere which is warm, informal, inviting, and friendly needed to attract clientele to the hotel.

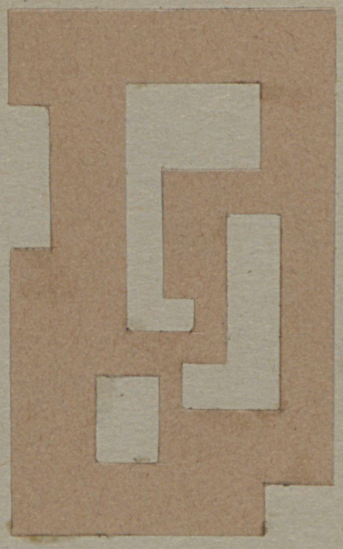
The total of aesthetics involves the function of the spaces, the masses of the building, the breakup of spaces, and the relationship of the building to the site. Beside these physical goals there are intangible goals as to what the spaces within the building are supposed to do. They are often the most difficult to achieve, but both aspects are necessary to achieve the whole in a building.

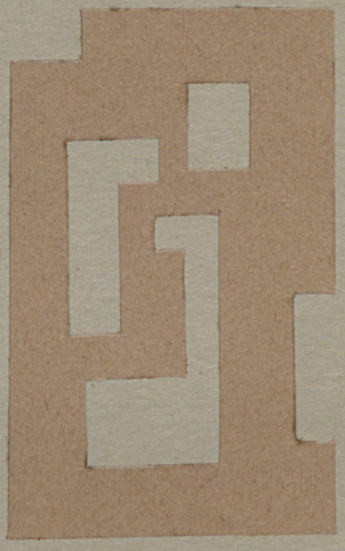
It is essential that I have a fair idea of the people who are going to use the building, as anyone who is going to use it is going to do so for some specific reason. These reasons could be endless, but for some reason or another he has needs that have brought him to the building.

This applies not only to clientele, but to employees as well. The relationship of the building's functional areas and how well they work together is an important criterion in this area. Only in this way can the building give these people the sense that their needs have been met and that they have become a part of the total aesthetic surrounding. For a plane of public emtertainment, such as a hotel, a building should express invitation, interest, warmth, and excitement. The special public facilities should each retain a flavor reflecting their essential function while providing an atmosphere for good business.

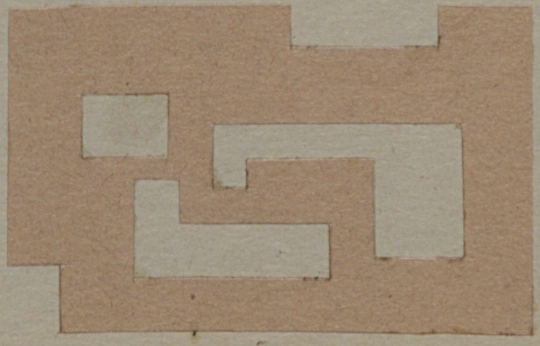
A structure is compatible with its surroundings, if it fulfills the requirements it was designed for, it becomes an asset rather than a liability to its location on the rims. The distinctive natural feature of the rims will be echoed throughout the building because of its compatibility and distinct unity with the rimrocks and nature.

From this we can see that the architect has certain basic elements at his disposal to use as he sees fit to arrive at a completed composition. Out of these elements and their relationship to one another, an understanding of why the people are using it, what the building is supposed to do, and what it can do, the building forms will emerge and the aesthetic beauty of the building hopefully will show.





FUNCTIONS OF THE COMPLEX



6.0 FUNCTIONS OF THE COMPLEX

Essentially the design of a hotel complex must provide space for the hotel functions and all related services catering to transient and public guests, the space allowed for leasing to various stores or specialty shops, and parking garage. Designing a complex of this type requires that the planner take into account the many types of people, their varied interests, and the limitations involved in fulfilling all of their needs. A complex such as this requires facilities such as those mentioned above integrated with relaxation in all respects.

The convenience of the persons using the facilities is probably the most important consideration in designing the building. If the persons using the building are not happy, or at least satisfied, the whole operation is a loss. Convenience not only for guests, but also for employees and personnel is essential. It is easily understood that the operation will be much more successful if the employees can do their work with little inconvenience. This will also help to lower operating expenses from which both the hotel and the guest can profit.

6.1 ACTIVITIES

Since a hotel is a building which houses many activities, it is necessary for the designer to recognize these activities, their relationship to one another, and the means of traveling among them in the building. I feel that it is better to refer to these activities in terms of descriptive adjectives such as "food preparation" rather than nouns such as "kitchen." By giving references to activities in this manner, I feel the meanings are less restrictive and less apt to cause trouble in

TABLE 6-1

Activities

Dining

- restaurant
- guide service
- private
- coffee shop

Drinking

Lounging

Conventions

- banquets
- displays
- lectures
- movies

Business meetings

Recreation & entertainment

- movies
- dances
- guest entertainers
- young people's activities

Administration offices

Parking

- guest room
- temporary

Registration

Guest room activities

Housekeeping

- maintenance
- repairing
- waste collecting
- storing
- administering

Food service

- preparation
- table waiting
- room service

Employee service

- eating
- lounging
- washing

Maintenance and service

- repair work
- heating and air conditioning
- sending and receiving goods
- distributing goods

Impulse shopping

the design process. A list of activities can be seen in table

6.1.1 ORGANIZATION OF ACTIVITIES

It isn't enough for the designer merely to recognize these activities, since unless they are organized within the building they have very little value. The designer should be aware of the need for order among these functions and plan for it. Many different organizations will prove to be workable, but the planner must decide which one will best suit his needs.

Often the guest staying at a hotel desires to go directly from his room to his car without the necessity of passing through public areas. However, when elevators are used, it is important to have them centrally located so that one elevator bank can serve many areas. The designer must organize these areas of function to avoid conflict; if separate circulation systems are used. It is uneconomical, but if the hotel guest must use public circulation, he could be unhappy.

Since the public prefers to dine at a private restaurant rather than eating at a hotel, it is important that the hotel restaurant has a distinctive atmosphere. Public spaces should generally be kept separate from any private convention activities. Although areas such as the coffee shop, restaurant, bar, and service shops should be exposed to the general loby area to facilitate the public's patronage, they should not destroy the informal character of the space.

A well-designed compact food service system is especially important in a hotel. Although it is typical for paths of circulation to and from the food service to become widespread and complicated, such a condition loses money because of wasted time and space. As least as important as

the food service is the accessibility to the housekeeping department. Like the food service, it should be cenralized for efficient operation.

The emphasis is on three organization principles:

1) the centralization of all services
2) the elimination of conflicting types of circulation: service with public, public with convention, and public with hotel guests
3) the exposure of concessions to the public

These facilities are important and their relationships are essential because of the control that most exist in a money making operation.

6.1.2 SPACE AND EQUIPMENT NEEDED FOR ACTIVITIES

The layout of the activity areas used by the guest will, hopefully, be free flowing spaces integrated together to give the guest a welcome feeling with smooth and unoffending circulation from one area to the next.

Since approximately 80% of the guests will arrive after dark, the approaches to the hotel should be clearly defined.(This percentage will vary with changes in the flight schedules at the airport.)As the guest arrives from the airport or other areas, the main entrance provides him with his first, close at hand impression of the hotel's character. This character should convey a feeling of informality and personal attention and, at the same time, serve as a transition from the outside to the inside; protection from the elements should be provided. The hotel lobby, which must further emphasize this warm and informal atmosphere, should have clearly defined functions in order to eliminate congestion between transients, conventioneers and the public.

The banquet room is the largest single space in the hotel, and it

should be a multipurpose room adaptable with respect to use, function, and mood. Since the different functions in a multi-purpose area require varying amounts of furnishings and equipment, sufficient storage space is essential. Electrical outlets with a variable power supply are necessary for displays, movie projectors, supplementary sound and lighting systems and other special needs. The general lighting system and service pattern should also recognize this area as multi-purpose.

Conversion of a conference area to a banquet area will probably occur quite frequently. Therefore, the area must fulfill the needs of both functions. The smaller dining areas and possibly the public restaurant should be considered as adaptable spaces and designed as such. This adaptability of spaces stresses the centralization of these activities as well as the necessary elimination of conflicting types of circulation. These elements must be stressed, however, to make the operation economically feasible.

Since a hotel must cater to varied types of guests it must provide varied types of accommidations. The guest room will involve many design considerations such as size, facilities and furnishings, but for economic efficiency, the rooms must contain many elements which are common to all. Although small rooms are not annoying to the guest if they are well designed, any size room will be annoying if it does not have a domestic character, no matter how well designed it may be. Many techniques are used to minimize the usefulness of a room while minimizing the area of the room; these are economic considerations. Often movable partitions and screens are used to separate areas. By providing access from one room to another for use as a double room, flexibility is greatly increased. Other techniques are: eliminating or reducing in size desks and dressers;

using durable materials; using several adaptable color schemes throughout the complex of rooms. Many amenities, such as enlarged bathrooms, air conditioning, television, and radio, are initally expensive for the owner, but prove worth-while over an extended period of the hotel operation.

6.2 SERVICES

Studies of hotels and their operations over the years have led to the formulation of several "rules of thumb" which provide a starting point for design considerations. These basic "rules of thumb" are:

1. Construction cost should not exceed $1,000 for every $1.00 of average room rate.
2. The total area of bedroom floors should be at least as much as the total public space and service areas.
3. The total allowance for all facilities should not exceed 6,000 w.ft. per guest room.
4. Not over one employee per room.
5. Land cost should not exceed 10% of the cost of the building.
6. Profit ratios to consider within individual departments average 70% on rooms, 50% on beverages, 15% on rentals, and nothing on food.
7. A break-even point of 65% occupancy.
8. Miscellaneous guest-room "rules".
   a. Net bedroom area should be at least 50% of the gross area of the typical guest floor.
   b. If a variety of guest room sizes are required, increments of 20 sq.ft. of floor area are

advisable.

c. Minimum feasible net bedroom areas are 90-110 sq.ft. for a room with a single bed, and 160-180 sq.ft. for a room with twin beds. (D, 1966: 1045)

According to graphs from Time Saver Standards, which are the result of the examining of more than 40 hotel plans, space-allotment figures that would be reasonably reliable can be determined that give an estimate for planning essential areas. The hotels studied were predominately of the transient, commercial type and were believed to be representative. The number of guest rooms for a hotel is the building from which these areas were derived.

A typical hotel has six main space or service divisions which are classified in the following functions: (1) public space, (2) concession space, (3) subrental srace, (4) food and beverage service space, (5) guest space, and (6) general-service space. (D, 1966: 1055)

There must be a constant manipulation between the services and the cost-profit operation. This manipulation will govern the services provided by the hotel, the personnel available, and the quality of this personnel, all of which are important in establishing a character and stability which is essential in the hotel's operation. The percentage of the total area that is productive space is of special significance, since at least 50% of the total area should be productive space.

6.3 PUBLIC SPACE

Public space comprises those areas that are open to the public as necessary auxiliaries, but that generally do not yield a direct profit.

Typical inclusions in these areas, which promote guest convenience, are the lobby, lounge, public toilets, and entertainment space.

The lobby, which includes the front office is usually adsigned approximately 11 sq.ft. per guest room, although the tendency in recent years has been to reduce the size of this non productive area.

The front office is the nerve center or focal point for many of the activities of the hotel and provides cashier general informantion, guest-contact, mail, and telephone service. The average allotment is 1 sq.ft. per guest room.

Lounges have lost their importance as a separate area lately, and the trend has been to a "lobby-lounge" area with no demarcation between them. This provides a more free traffic flow between the lounge and lobby and allows guests waiting in the lobby to overflow into the lounge.

Often public corridors adjoining the lobby connect it to the main entrance, and by doing so set the lobby back from the entrance and by doing so set the lobby back from the entrance. This nonproductive area is justified if its corridors are flanked by shops which provide some financial return from an otherwise dormant area.

A layout combining the lounge, lobby, and corridor areas has the advantage of reducing the amount of alloted space as well as being more flexible in the allotment of space, providing free circulation to all areas, and providing more profit from these areas.

Although the toilets for guests should be adequate in number, they should not be excessive so as to further enlarge the nonprofit area. In planning the location of these areas, the convenience of guests and of restaurant and bar patrons should be the chief consideration. The areas should have entrances which are rather inconspicuous. (D, 1966: 1056)

6.4 CONCESSION SPACE

"Concession space is for guest-paid hotel services that might be run by the management or subject on a percentage basis." (D, 1966: 1056) This area would usually provide a barber shop, beauty parlor, cigar and news stand, and valet shop. Services not usually provided under hotel operations such as store, permanent exhibits, travel agencies, offices, and club quarters are obtained by subrental of the area.

Both barber shops and beauty parlors are in considerably less demand than formerly. The beauty parlor usually has about half as many chairs as the barber. However, each chair in the beauty parlor require about twice as much area as a chair in the barber shop since it must include adequate space for manicure tables, lockers and employees' toilet.

The cigar and news stand is often in the front desk area so that it can be operated by a separate clerk during busy hours and by the front office personnel during slack periods. In some hotels this area is operated by the drugstore concession.

The valet shop provides cleaning and pressing of clothing items for the guest of the hotel. Although this service might be included as part of the hotel laundry and of regular hotel service, often the area is merely the pick-up and delivery station for a local concern in the business. Arrangements are made through the bellman.

If the hotel is large enough, a telegraph office may be desirable. This is done to relieve the front desk of the work of processing guest telegrams. (D, 1966: 1057)

6.5 SUBRENTAL

The extremely high cost of most land and heavy tax assessments make

it necessary in many hotels to include a number of store rentals to help carry the premium cost of the land. The number of rented stores depends mostly upon the individual financial situation of a hotel, but the total area of rented stores depends mostly upon the size of the hotel. The rental value of these stores increases if they have an entrance from the street as well as an entrance from the lobby.

The rental value of these stores is also enhanced by providing storage space, which is frequently about one-fifth of the store area. This area is usually located in the far less valuable basement areas and serves as a storage space, receiving room, and as a place to unpack boxes.

Travel agencies, offices club quarters, and other subrental areas are provided as the demands of the hotel and its location dictate. (D, 1966: 1057)

6.6 FOOD AND BEVERAGE SERVICE

The food and beverage areas provide all space required for the receiving, storage, preparation, and service of these items for guests, the general public, and the employees. Related to these areas are all the kitchens, dining and banquet halls, pantries, strorage and receiving rooms, bar and cocktail lounges, eating utensil storage and garbage disposal facilities. (D, 1966: 1058)

The main dining area is determined as to size by the specific clientele to be served, the personnel, the size of the hotel, and the hours of operation. Specific care in this area is necessary for a successful operation because this facility many times only breaks even in the over-

all profit percentage.

In addition to the main dining area, the main kitchen may also have to service the coffee shop, the banquet hall, private dining rooms, and employee's meals. The main kitchen should be sized for the work load. A bake shop is usually provided in the area of the main kitchen, and it might make up 20 percent of the total kitchen area.

The coffee shop provides quick food service at moderate prices to the hotel guests and the general public. In some operations the coffee shop is expanded into the cafeteria to provide self-service meals.

The bar and cocktail lounge may be separated, adjoining, or combined. It is essential to estimate the amount of business that the bar and cocktail lounge will handle in view of the characteristics of the community and the type of patronage likely to be attracted since these facilities attract a wide margin of profit.

The use of private dining rooms depends on the needs of the community and the possibility of dividing banquet halls into smaller eating areas. The dining-banquet depends a great deal on the main dining and kitchen location, as well as public entrances. The flexibility of these rooms exerts demands on storage requirements and serving facilities. Dining facilities should be provided in the building for the employees, and the food service should be cafeteria style.

The stewards storeroom allows the necessary space for dry foodstuffs, canned foods, vegetables, dairy products, and meat. All the necessary equipment for the storage of these items should be provided. The beverage storage should be provided separately from the food storage for control reasons. The general storage area should be broken down into areas for specific types of beverage.

The receiving room is provided for food, beverages, linen, and other supplies which, upon arrival, are checked against delivery slips, weighed, counted, and inspected. Since these supplies must usually wait for a time until storage in appropriate stock rooms, ample space should be provided for temporary storage of the materials.

The garbage room receives the accumulated used bottles, cans, and cartons from the hotel and should be planned for clutter-free storage and good health practices. The area should be placed outside the kitchen and the receiving room. (D, 1966: 1059)

6.7 GUEST ROOM SPACE

The guest room space is essentially the area which includes bathrooms, closets, entrance vestibules, sleeping areas, and auxiliary areas such as corridors, stair wells, elevators, and maids' closets. The breakdown of single, double, and twin beds is the initial consideration for preparing the approximate total number of guest rooms. From this point the proportion of the rooms, bed lengths, closet facilities, bathroom accessories, room orientation, and communication or service facilities are studied by the designer since they are areas that are important to the success of a hotel. Since the guest rooms are the source of the greatest profit in a hotel, extremely careful planning should be employed to eliminate any mistakes or omissions in them. (D, 1966: 1060)

Although there is no set standard for the guest room dispersal per floor, in many cases the number of rooms assigned per floor depends on the maid service planned. A maid usually handles about 16 rooms, and consequently the number of guest rooms per floor is often a

multiple of 16.

Guest floor stairways tend to increase in number with the number of guest rooms per floor, and they are regulated by local and national codes. The number of elevators provided is influenced by the number of guest rooms, building height, speed of the elevators, and the desired frequency of service. (D, 1966: 1055)

6.8 GENERAL SERVICE SPACE

General service space, classed as nonproductive space, includes those areas for general administration, operation, maintenance, and storage that are not otherwise classified.

The administration offices would include space for the manager, assistant manager, accountant, secretary, convention registration, coatrooms, toilets, and lounge area. A linen room is necessary to accommodate the housekeeper's office and to store the hotel linen. The decision to include a laundry room in the hotel depends on the individual situation of each hotel. The costs of commercial laundering, availability and costs of space, and local wage rates must all be kept in mind when determining whether the hotel should operate its own laundry.

Men's and women's toilet and locker room facilities are a necessary requirement to provide area for employees to change clothes, clean up, and store personal belongings while at work. In general about 35 percent of the area is allotted for the toilet facilities and 65 percent for the locker room. The approximate proportion of space for men as opposed to women depends on the proportion of men to women employees.

Maintenance shops are necessary to keep the hotel running. There should be a minimum of three separate rooms: a plumbing and electric shop, a carpentry and upholstering shop, and a paint and varnish room. The work in each shop is such that it does not mix well with the others. Storage space is essential for these areas.

The mechanical room houses the necessary heating and cooling equipment for air and water, and its location depends on the systems and equipment to be used. Accessibility to all facilities for service is a keynote in planning as well as selection of a system or systems which provide as little maintenance as possible. Space requirements for this area may run as high as 10 percent of the total building area. The consideration of thermal environment control for each guest room will govern the choice of the most economical system. The refrigeration and boiler plants are usually located in the basement with some of the air handling equipment and cooling tower located on the roof. (D, 1966: 1061)

6.9 LIGHTING

Although lighting considerations such as efficiency and integration with other design elements are important, the major importance of the lighting system is the character and mood which prevails throughout the hotel because of its effect. Adaptability of the lighting system and the illumination which it provides is an excellent way to change the character of a multi-purpose area to fit the particular occasion.

Entrance foyers should have a high level of illumination in order

TABLE 6-2

SPACE	FT. CANDLES	SPACE	FT. CANDLES
Auditorium		Lobby	
assembly only	15	general	10
exhibitions	30	reading	30
dancing	5	working areas	30
Bathrooms		Offices	
general	10	general	100
mirror	30	accounting	150
Bedrooms		Dining - intimate	
general	10	light environment	10
make-up, shaving	50	subdued	3
reading	30	for cleaning	20
Corridors and stairs	20	Dining - leisure	
Entrance foyer	30	light environment	30
Registration	70	subdued	15
Laundry		Dining - quick service	
washing	30	bright conditions	100
flat work ironing	70	normal conditions	50
Linen work		cashier	50
sewing	100	Kitchen	70
general	20	Garage	5

to provide a smooth transition between the interior space of the hotel and both the day and night lighting outside the hotel. This lighting scheme should carry trough to the lobby where the atmosphere is retained, but yet provides ample illumination for functions of the hotel administration. This theme should be continuous throughout the corridors and guest rooms so as to provide adequate, yet pleasing light for walking, reading, writing, grooming, and sleeping. (D, 1966: 906)

6.10 PARKING GARAGE

As with the hotel and its auxiliary facilities, the parking garage depends upon planning and design to insure a profitable return from the investment. The type of location usually determines the type of operation of the garage, as well as the type of structure to be built on the particular site. Opportunities to use the shape of the terrain as part of the garage structure and circulation should not be overlooked. Many garages have been built with entrances on all levels directly from the street.

In connection with the hotel, a parking garage will specifically be for the service of the guests of the hotel and customers in the specialty shops. The garage will also serve banquet guests and conventioneers who may be using the dining facilities.

Traffic characteristics will help determine the practical size of the structure, as will the typical customer that the operation anticipates. The final selection of which method is to be used is based on the evaluation of the site and the individual requirements of the hotel operator. (D, 1966: 1242)

6.11 AREA ANALYSIS

FOYER:

FUNCTION: Entrance space leading to all public spaves in building.

RELATED AREAS: Lobby, Cocktail Lounge, Dining Area, Lounge, Registration Desk, Office, Rest Rooms, Shops.

REGISTRATION DESK AND OFFICE:

FUNCTION: Guest registration.

EQUIPMENT: Counter, files, desk and chair, switchboard, mail, telephone.

RELATED AREAS: Foyer, Lounge, Lobby, Elevator Bank.

LOUNGE:

FUNCTION: Meeting and relaxation.

EQUIPMENT: Comfortable seating, writing tables, storage, fireplace.

ALLOTMENT: Area/seat=28 sq. ft.

RELATED AREAS: Foyer, Cocktail Lounge, Lobby, Dining Room, Rest Rooms, Registration Desk.

COCKTAIL LOUNGE:

FUNCTION: Serve variety of hard liquor and beer to guest and patrons.

EQUIPMENT: Bar, back-bar, stools, tables and chairs.

ALLOTMENT: Area/seat=15 sq. ft. (1250 sq. ft.)

RELATED AREAS: Dining area, Rest Rooms, Foyer, Banquet Area.

LIQUOR STORAGE ROOM:

FUNCTION: Storage of beer and hard liquors.

EQUIPMENT: Shelves, sink.

RELATED AREAS: Cocktail Lounge, Banquet Area, Receiving Area.

DINING AREA:

FUNCTION: Table service of meals.

EQUIPMENT: Tables, chairs, service centers, cashier stand.

ALLOTMENT: Area/seat=12 sq. ft. (2500 sq. ft. & Banquet-2500)

RELATED AREAS: Cocktail Lounge, Food Preparation, Rest Rooms, Foyer, Banquet Area, Lobby.

PUBLIC RESTROOMS:

EQUIPMENT: Men: waterclosets, lavs, urinal.
Women: water closets, lavs, powder table and chair.

RELATED AREAS: Foyer, Lounge, Dining Area, Lobby, Cocktail Lounge.

MAIN COOKING AREA:

FUNCTION: Cooking of meats, fish and vegetables.

EQUIPMENT: Walk-in refrigerator and counters for equipment.

RELATED AREAS: Dining, Preparation Areas, Food Storage Area, Dishwashing Area.

VEGETABLE PREPARATION AREA:

FUNCTION: Storage and preparation of vegetables

EQUIPMENT: Walik-in refrigerator and counters for other equipment.

RELATED AREAS: Main Cooking Area, Food Storage Area.

PASTRY AREA:

FUNCTION: Preparation and baking of pastry items.

EQUIPMENT: Walik-in sooler and counters for other equipment.

RELATED AREAS: Main Cooking Area, Food Storage Area, Dishwashing Area.

DISHWASHING AREA:

FUNCTION: Washing of dishes, utensils and pans.

EQUIPMENT: Dishwashers, sinks and counters for equipment.

RELATED AREAS: Dining Area, Cocktail Lounge, Main Cooking Area, Preparation Areas.

GENERAL KITCHEN STORAGE AREA:

FUNCTION: Storage of dry, frozen and refrigerated goods.

EQUIPMENT: Walk-in freezer, walk-in refrigerator, shelves.

RELATED AREAS: Main Cooking Area, Preparation Areas, Receiving Areas.

RECEIVING AREA:

FUNCTION: Receiving and checking of supply, delivery.

RELATED AREAS: All areas of building.

GARBAGE AND TRASH ROOM:

FUNCTION: Storage and burning of garbage.

EQUIPMENT: Incinerator

RELATED AREAS: All areas of building.

MECHANICAL ROOM:

FUNCTION: All heating, plumbing, electrical and air conditioning equipment

RELATED AREAS: Outside entrance, garbage and trash burning area.

GUEST ROOMS:

FUNCTION: Living, sleeping, bathing and relaxing, (approx. 150 rooms with variety of sizes and rates).

EQUIPMENT: Beds, watercloset, lav, bath, shower, closet or clothes rack, chairs, desk-dresser, night stands, heating and air conditioning.

RELATED AREAS: Parking, Lobby, Recreation(swimming), Dining.

SUMMARY

As I approach the end in my thesis project, I can understand more and more that my presentation is only an approach to a solution in itself. With my limited knowledge it is not, and cannot be, a finished, refined solution. However, I feel that my presentation has been worked to a satisfactory degree where it is a plausible, working design, which could be finished by more experienced persons.

Since I selected my thesis project there has developed considerable controversy over the utilization of the rimrocks as building sites. This publicity has made my project much more interesting as well as more difficult. I also think that the solution was more realistic because of much of this publicity since I had to interpret and weigh the arguments for-and-against their utilization and then make my own decisions for my project. The site selection itself was based on my decisions regarding the controversy. It was selected not only because the soil is the most stable in the area, but because the hillside has already been scarred by the construction of the airport road. This is also the reason that I have kept the building, at least as much as possible, from breaking the plane at the top of the rimrocks. I think it is essential that the building is a warm, friendly, and natural experience, but I don't feel that this is possible in this site location unless the building blends with the site.

Although the publicity helped me make many decisions, it was not the only factor involved. The Billings Comprehensive Plan was probably even more useful for the long range planning aspects. By studying the proposed highway system and growth trends, the site selection became an

easy job. The publicity and master plan had been the basis for many of my early decisions and therefore they continued to have great influence throughout my design process.

Since my site dictates corridors loaded only on one side and since I feel strongly against breaking the plane more than is necessary, it is evident that the building mass will be mostly linear. Two circulation cores were provided to break up this long linear aspect as well as to provide better service.

I felt that the selection of materials was very important. They had to be handsome, yet bold and blending with the site. This is why I have used concrete and wood throughout the building. The concrete is basic for the structure and finish of exterior walls. Its finish is a rough form board texture with some surfaces receiving special treatment such as hammered ribs to expose the aggregate and produce textures different than those of the exposed concrete waffle slabs and lintees in the ceiling system. The wood used is nonstructural and is important mostly for details and accents for the concrete. It helps to create the desired warm and friendliness of the building. I feel that both materials blend well with the site and its requirements.

Since I am near the completion of my thesis, I can look back now and see that I am at the end of part of my life. In a way this makes me sad, but it also makes me quite happy since although I am less sure of myself now than at any other time in my life, I also know that I am closer to the real discovery of architecture.

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2. Mr. Robert Scorborough, Airport Manager. Billings, (July).

3. Mr. Richard Nesbitt, City Engineer. Billings, (July and January).

4. Mr. Edward Waldo, Public Works Director. Billings, (July).

5. Mr. Orien Gossock, Director, Billings City County Planning Board. (July and January).

6. Mr. Evan Nielson, U.S. Soil Conservation Service. Bozeman, (March).

7. Mr. Fletch Hardy, Chamber of Commerce. Billings, (July and January).

APPENDIX I

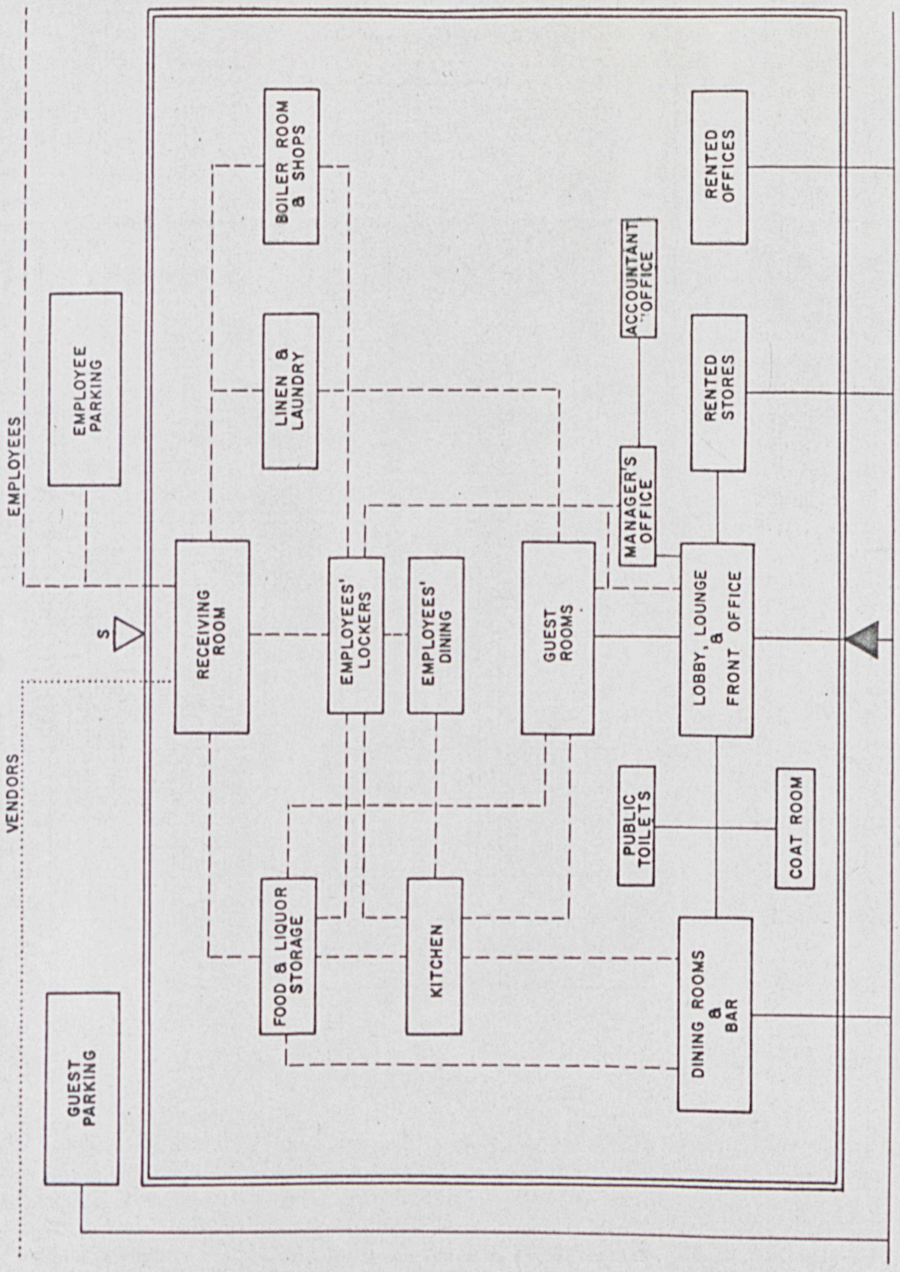


Fig. 8. Functional plan of typical commercial hotel, showing main traffic routes

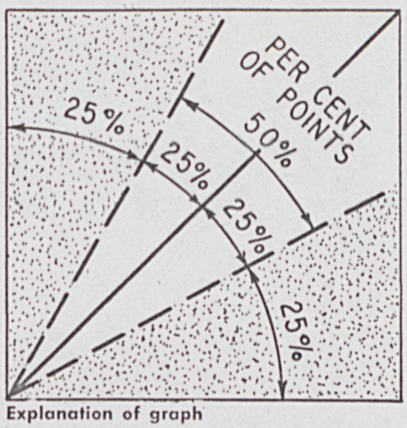
Space allotments—general

By FRANK HARRISON RANDOLPH, *P.E.*
Hotel Planning Consultant and Professor of Hotel Engineering, Cornell University

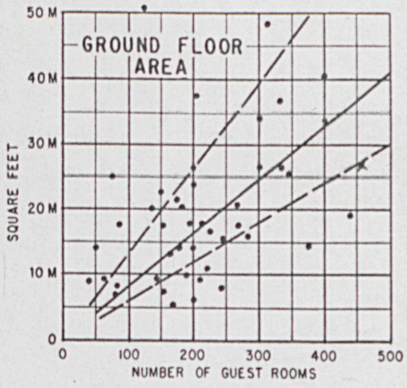
In designing hotels, architects are frequently handicapped by the lack of factual data on space requirements. Too much space results in excessive investment and building-maintenance costs. Too little space makes it difficult for the hotel owners to realize satisfactory profits and, in service areas, causes crowding, reduces speed, and increases payroll.

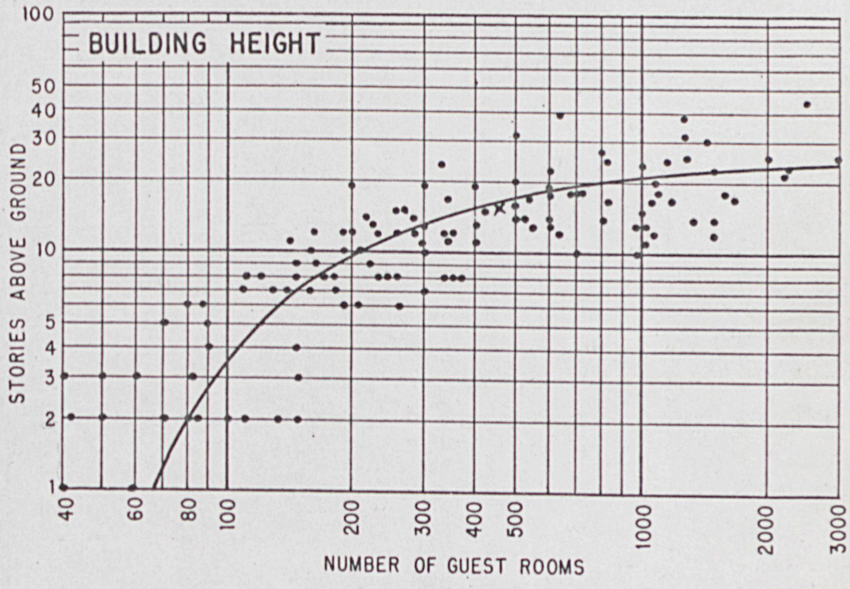
Information on a few hotels can probably be obtained by the architect. However, the data may apply to hotels of the wrong size, possibly of a different type, or designed to meet unusual requirements. Even with a set of complete plans, there is no assurance that the areas shown are the right size or that the building will be well suited to the complex business of hotel operation. Generally, the data collected from the sources usually available are incomplete, unrepresentative, or otherwise inadequate.

In order to obtain space-allotment figures that would be reasonably reliable, the plans of more than 40 hotels were examined. These ranged up to 500 guest rooms in size, were of wide geographic distribution, and all were built within the last 25 years. They were predominantly of the transient, commercial type and were believed to be representative. Although several were in resort communities, this had little influence on the space allotments for the working areas. Residential hotels and apartment houses were not included.



Explanation of graph





ORGANIZATION AND USE OF GRAPHS

In general, each space allotment is plotted on a separate graph, with the total number of guest rooms in the hotel as the base line, for this appears to be the most feasible common denominator. The plotted points (each representing one hotel) often pepper the graph in a widely scattered manner without suggesting a good location for a trend line running through the field of points. The plotted points for the lobby, main kitchen, and boiler room, however, indicate that the size of these areas varies directly with the number of guest rooms. This is a reasonable expectation for other areas.

To arrange the information in a clear and usable form, a solid diagonal line is started at "zero-zero" in the lower left corner of the graph and located by trial to show the median trend running up through the field of the points so that half the points are above the line and half below it. On most of the graphs, two broken diagonal lines are drawn in addition. The upper diagonal line is located by trial so that one-fourth of the total plotted points are above it, and the lower diagonal so that one-fourth of the points are below it. As a result, the fan-shaped area between the two broken diagonal lines contains 50 per cent of the points plotted and may be considered as the usual range of practice.

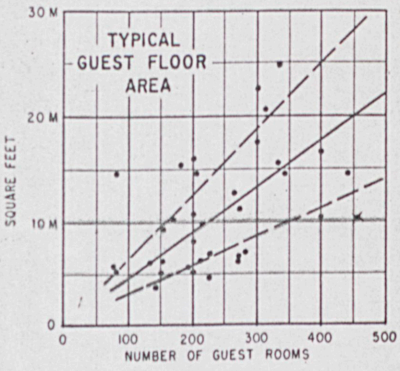
This method of presentation enables the designer to grasp at a glance the relative number of data points, their location, distribution, and trend. He may then determine what deviations from the median value are required for his hotel. The occasional points plotted above the range of the grid are not located to vertical scale.

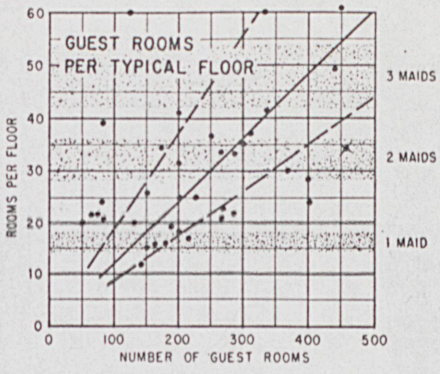
The generalization that the usual space allotment for the front office is 1 sq ft per guest room is true. By glancing at the graph, however, the designer can estimate the reasonable tolerance above and below this value.

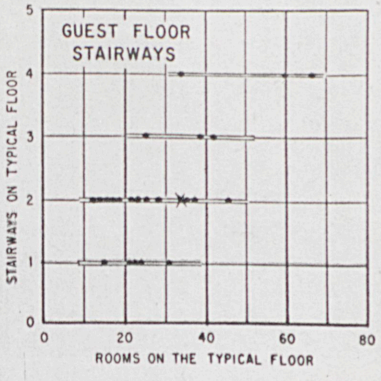
The space allotments for the 455-room Hartford Statler-Hilton Hotel are worthy of special designation and are indicated, where shown, by an X on the data point. The designers, already thoroughly versed in hotel planning and accustomed to attaining high standards of guest comfort and operating efficiency, spent several years of research in planning this structure. The data points that vary appreciably from the median values were for the most part the results of a reevaluation of hotel space requirements, and not due to circumstances peculiar to this hotel.

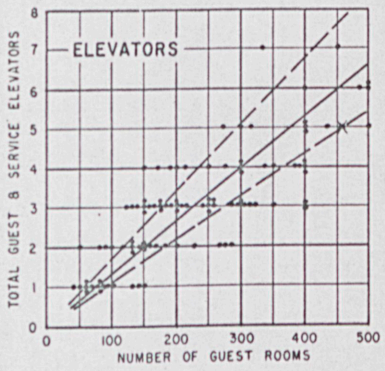
The method of presentation is such that one or two unusual instances have little influence on the trend line. In contrast, taking an average value might be influenced considerably by one or two abnormally high or low values.

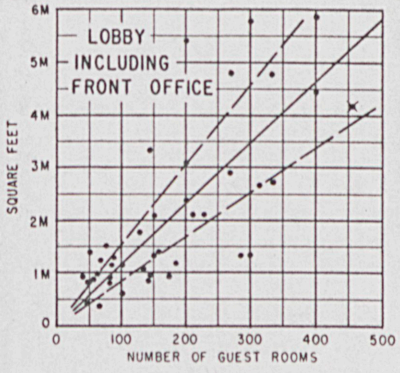
This information is not presented as the final word on space allotments. But it should serve as a reliable guide in

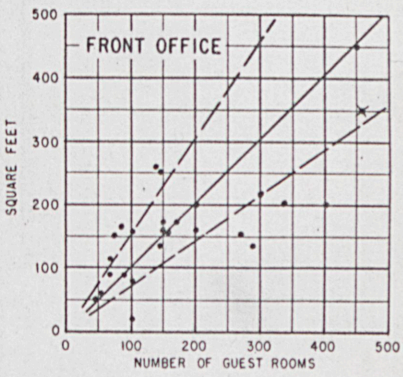












future planning, subject to modifications to meet individual requirements.

GENERAL DATA

Certain general data warrant consideration to give an approximate over-all idea of the typical hotel with any given number of guest rooms.

Building height is indicated by the number of stories above ground. The results of a survey of 125 hotels are shown on the graph, plotted with logarithmic coordinates. The curve rises rapidly, showing the typical 200-room hotel to be 10 stories high, and then tends to level off, showing the typical hotel of 2,000 to 3,000 rooms to be about 25 stories high.

Ground-floor area is shown with the plotted points widely scattered on the graph. The available ground area and the number of guest rooms to be placed on it account for the wide dispersion. In general, the more guest rooms, the greater the ground-floor area. ("M" is the abbreviation for 1,000.)

Typical guest-floor area usually covers about 55 per cent of the ground-floor area, according to the data presented. The guest-floor area may vary greatly, however, depending upon individual circumstances.

Guest rooms per typical floor are shown with a wide dispersion of the plotted points. If there were a standard average-size guest room and a standard percentage addition for corridors, stairways, and the like, then the points on this graph would follow a pattern similar to the graph for the typical guest-floor area, because the area for each data point would be divided by a constant value representing each guest room plus allowances. No such standards exist, however, and therefore the two patterns show no marked resemblance.

Usually each maid is assigned to about 16 rooms, which should all be on the same floor. If feasible, the number of guest rooms on the typical floor should be a multiple of 16 or quite close to it. On the graph, the horizontal bands indicate that one maid would handle from 14 to 18 rooms, two maids twice this number or from 28 to 36 rooms, and three maids three times the number or from 42 to 54 rooms. In more than half the hotels studied, the housekeeper apparently has some difficulty in arranging maid assignments.

Guest-floor stairways tend to increase in number with the number of guest rooms on the typical floor. Regulations limiting the distance from the guest-room door to the nearest stairway entrance usually require a minimum of two stairways on the typical floor. The graph shows that two stairways are usually enough if there are no more than 40 guest rooms per floor. In general, there are about 15 to 20 rooms per stairway.

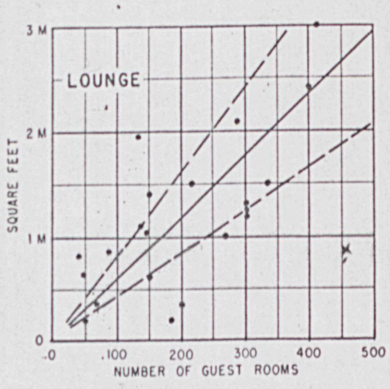
Elevators are provided according to the number of guest rooms. The number of elevators is of course also influenced by other factors such as the height of the building, the speed of the elevators, and the desired average frequency of service. The total number of guest and service elevators is presented on the graph.

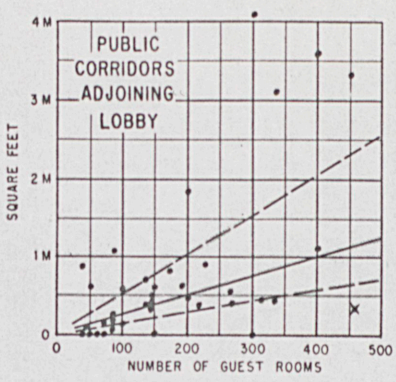
A special study of elevators in 100 hotels showed the distribution between guest elevators and service cars (including short-lift cars) to be as follows:

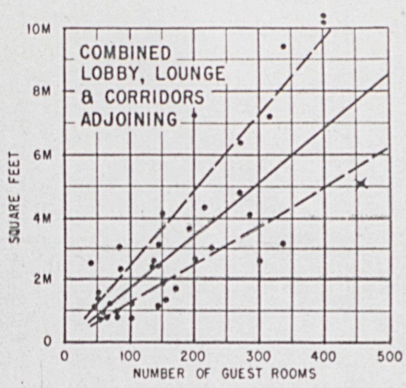
Number of rooms in hotel	*Guest cars per 100 rooms*	*Service cars per 100 rooms*
50–150	1.3	1.0
150–550	0.7	0.5

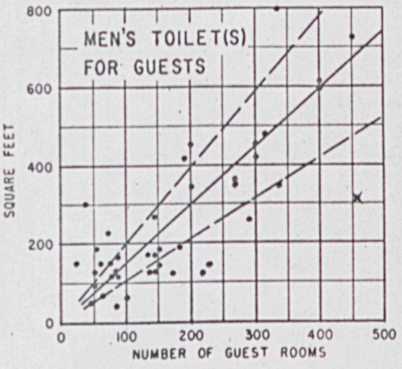
Expressed another way, about 60 per cent of the elevators are guest cars and about 40 per cent are service cars.

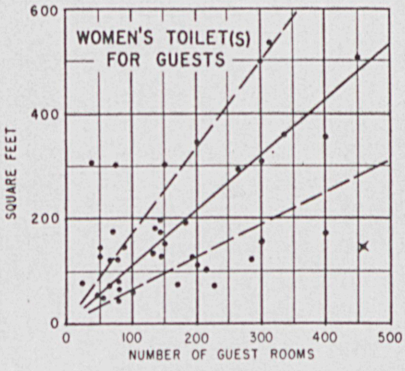
The typical hotel has six main space divisions, classified according to function: (1) Public space, (2) Concession space, (3) Subrental space, (4) Food and beverage service space, (5) Guest-room space, and (6) General-service space. Each division will be considered separately. The percentage of the total area that is productive (revenue producing) space is of special significance. Preferably, at least 50 per cent of the total area should be productive space.

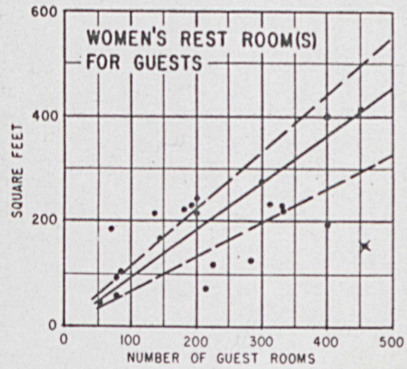












PUBLIC SPACE

Public space comprises those areas that are open to the public as necessary auxiliaries but that generally do not yield a direct profit. Typical inclusions in these areas promoting guest convenience are the lobby, lounge, public toilets, and entertainment rooms.

The lobby including front office is usually assigned about 11 sq ft per guest room. The tendency in recent years has been to reduce the size of this nonproductive area. Formerly, 14 sq ft was not uncommon, but now 9 sq ft is often considered ample. About 40 per cent of the points on the graph do not exceed 9 sq ft per guest room.

The front office is the nerve center or control point for many of the activities of the hotel. The front office, or front desk, has guest-contact stations for the registry, cashier, information, and mail. The average allotment is 1 sq ft per guest room. The specialist in front-office operation and equipment may recommend the dimensions desired for best results. A straight-line counter is generally preferred, with a length of 10 ft for a 50-room hotel, 15 ft for 100 rooms, 20 ft for 200 rooms, and 26 ft for 400 rooms.

The lounge is usually allotted about 6 sq ft per guest room. The graph shows, however, that half the hotels studied use only 4 sq ft and a few even cut this area to 2 sq ft per guest room.

The lounge usually adjoins the lobby so that guests waiting in the lobby can overflow into the lounge. Some designers simply designate the area "Lobby-Lounge" with no demarcation between them.

Public corridors adjoining the lobby are often designed so that the lobby is set back from the street entrance and is reached by one or more corridors flanked by stores, restaurants, or other areas. This nonproductive area is justified if it permits a high return from street-frontage areas. Some layouts require no such corridors. The space allotment is dependent more on design than on the number of guest rooms.

The combined lobby, lounge, and adjoining corridors are quite flexible in the allotment of space. To bring these three nonproductive areas into proper perspective, the sum of the areas is given on the graph. The combined areas show a close correlation with the size of the hotel, with an average allotment of about 16 sq ft per guest room. Some hotels, however, have reduced this nonproductive area to 12 sq ft per guest room.

The men's toilet(s) for guests should be adequate in number, but not excessive. The required space may be divided into two widely separated rooms or simply provided in one location. The convenience of guests and of restaurant and bar patrons should be the chief consideration in planning the location. This facility should not be too accessible to the man on the street.

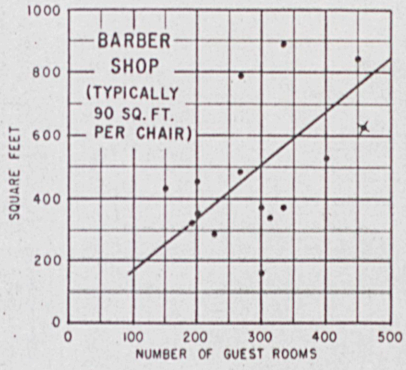
The women's toilet(s) for guests should be provided on the same basis as the men's toilet facilities. In addition, the entrance should be inconspicuous.

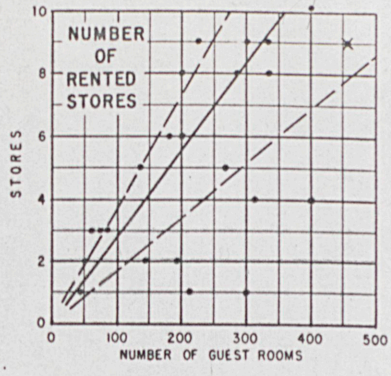
The women's restroom(s) for guests frequently precedes the women's toilet. It is an appreciated convenience. The restroom is generally of about the same area as the adjoining women's toilet. The combined allotment for the women's toilet and restroom is typically 1 sq ft per guest room. Some recently planned hotels have cut this figure in half to reduce the nonprofit area.

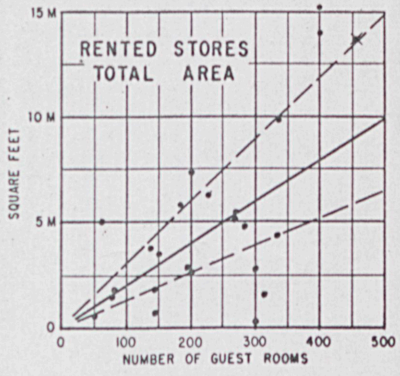
Entertainment quarters and game rooms are properly classified as public space because they seldom yield an annual profit. Thus, if a ballroom were used only for dances and other entertainment, it would be included under public space. However, since a ballroom is also used for banquets, it is more suitably included under food and beverage service space and will therefore be considered later.

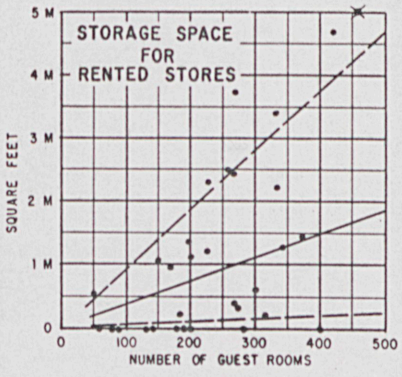
CONCESSION AND SUBRENTAL SPACES

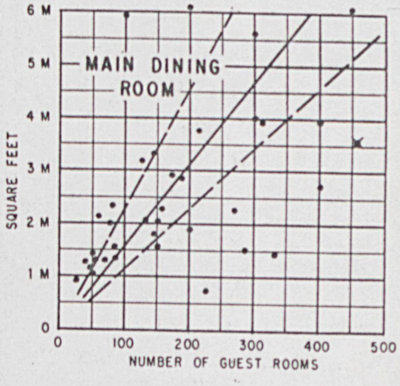
Concession space is for guest-paid hotel services that might be run by the management or sublet on a percentage basis. It may well include a barber shop, beauty











parlor, cigar and news stand, and valet shop.

Subrental space is for services that are not normally provided under hotel operation, such as stores, permanent exhibits, travel agencies, offices, and club quarters. The rental is usually a fixed monthly amount.

These two income-producing divisions are treated together for the purpose of space allotments.

The barber shop is in considerably less demand than formerly. Less than half of the recently constructed hotels have this facility. If provided, the allotment is about 1.5 sq ft per guest room. Typically, the barber shop requires 90 sq ft per chair and a minimum of 4 chairs.

There were insufficient data on the *beauty parlor* to warrant a graph. The beauty parlor, if provided, usually has about half as many chairs as the barber shop in the same hotel. The required area, including space for manicure tables and lockers and toilet for employees, is about 200 sq ft per chair.

The cigar and news stand is customarily operated by the front desk in the smaller hotels. Medium-size hotels often place this area adjacent to the front desk so that it can be operated by a separate clerk during busy hours and by the front-office personnel during slack periods. In some hotels, this area is operated by the drugstore concession. The largest hotels may place the cigar and news stand across the lobby from the front desk.

The valet shop handles the pressing and cleaning of the guests' garments. Usually the service is provided for the guest through the bellman. The valet shop is generally located adjacent to the laundry in the larger hotels and is allotted about 1 sq ft per guest room. Many hotels, finding that guests expect this service, have had to improvise because it was not included in the plans. Sometimes the area has no pressing equipment but merely serves as the pick-up and delivery station for a local concern in the business.

A telegraph office, requiring 40 to 60 sq ft, may be desirable in the larger hotels to relieve the front desk of the work of processing guest telegrams.

The extremely high cost of land and the heavy tax assessment in the choice retail district of a city generally make it necessary to count on store rentals to carry the premium cost of the land, regardless of whether the owners prefer the inclusion of stores.

The number of rented stores, as indicated by the wide dispersion of the data points on the graph, depends more upon circumstances than upon the number of guest rooms. The graph does not indicate the percentage of hotels without stores. If stores are included, however, there is generally about one store for every 35 guest rooms.

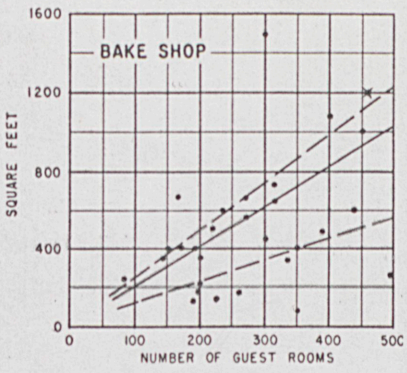
The total area of rented stores increases with the size of the hotel. Rented stores are well advised to have a direct entrance from the street; however, an additional entrance from the lobby increases the rental value. If stores are provided, 20 sq ft of store area per guest room is the average allotment. Some designers increase the income potential by raising this figure to 30 sq ft of store area per guest room.

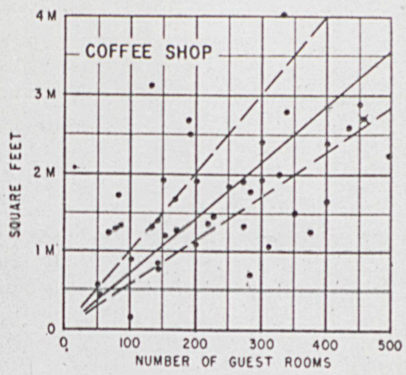
Storage space for rented stores enhances the rental value of the store. Most hotels provide a separate area, often in the basement (where space is far less valuable), to serve as a receiving room, a place to open boxes and to store a moderate amount of merchandise. A comparison of the typical values shows that the storage space is frequently about one-fifth of the store area, and in some instances at least one-third of the store area.

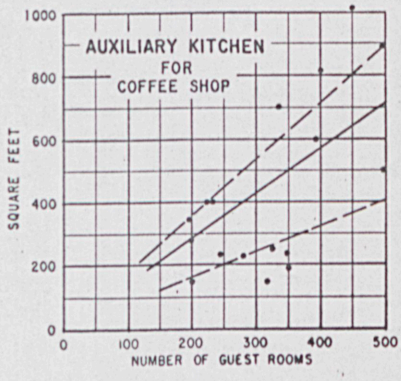
Other subrental areas are sometimes provided for travel agencies, offices, and club quarters. No definite conclusions can

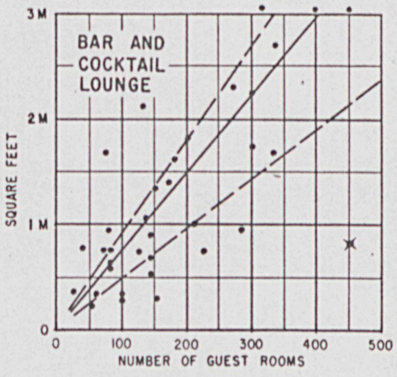
Space allotments—food and beverage services

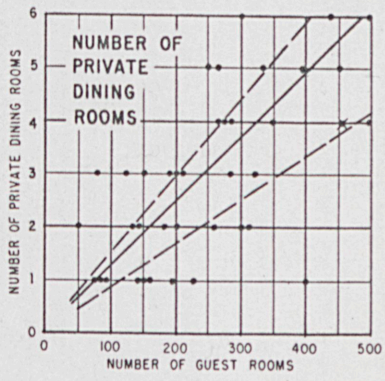












be drawn, however, because of fragmentary data on the scattered uses of these areas.

FOOD AND BEVERAGE SERVICE SPACE

This division includes all areas used for the receiving, storage, preparation, and service of food and beverages for guests, the general public, and employees. It includes the receiving area, storerooms for food and beverage supplies, china, glassware, and silver, and also the kitchen, restaurants, banquet hall, private dining rooms, employees' dining area, food service pantries, bar, cocktail lounge, and garbage room (sometimes with an incinerator).

The main dining room area should not be determined merely on the basis of average data. The probable demand for a main dining room should be estimated with care, for, at best, profitable operation is especially difficult. The difficulty is due to the necessity of long hours of operation at slack load together with competition from other restaurants. About 16 sq ft per seat is required for the dining room. The allotment varies from 18 sq ft for de luxe dining rooms to 14 sq ft for popular priced places. The typical allotment of 16 sq ft of main dining-room area *per guest room* is not especially helpful in planning.

The main kitchen should be sized for the work load. In addition to the main dining room, the main kitchen may also have to service the coffee shop, the banquet hall, private dining rooms, employees' meals, and room service to guests. Such conditions apply to the Hartford Statler, for example, where the kitchen is 33 per cent *larger* than the main dining room. If the kitchen is to service only the main dining room, however, its area is customarily 40 to 45 per cent of the dining room area. In two of the hotels studied the kitchen serviced only the coffee shop; in two other hotels, it serviced the coffee shop, private dining rooms, and, presumably, employee meals.

It was not feasible in analyzing and presenting the data to separate the kitchen work load into its several types of components and their sizes or the number of persons served.

A bake shop, of one type or another, is usually provided. In many of the smaller hotels, the baker occupies a corner of the kitchen. If a separate bake-shop area is provided, the typical allotment is 2 sq ft per guest room. However, it is preferable to size it for the work load. If a separate bake shop is provided, its area is usually equal to 20 per cent of the kitchen area.

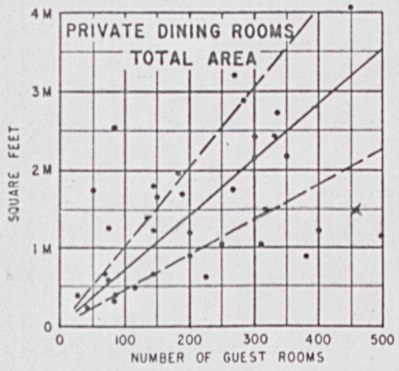
The coffee shop provides quick food service at moderate prices. Of the 46 hotels analyzed, 63 per cent had a coffee shop. About 7 sq ft per guest room is the usual allotment.

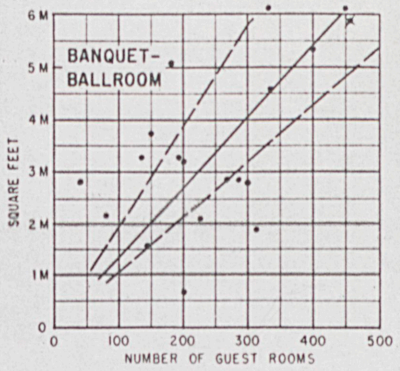
The area required per seat in coffee shops is about 18 sq ft per seat for counter service only, (this area includes the counter), 16 sq ft per seat for both counter and table service, and 14 sq ft per seat for table service only. Frequently about one-third of the seats are at the counter.

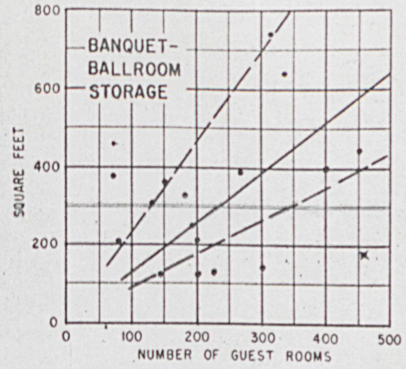
An auxiliary kitchen for the coffee shop is customarily provided if the coffee shop is remote from the main kitchen. Under these circumstances, the auxiliary kitchen may be "backed-up" by the main kitchen, which prepares such heavy-duty items as roast meats, or it may have complete facilities for cooking almost everything on its menu. The auxiliary kitchen is generally from 20 to 25 per cent of the area of the coffee shop. However, the extra kitchen payroll and equipment required make it desirable to plan so that an auxiliary kitchen is not needed.

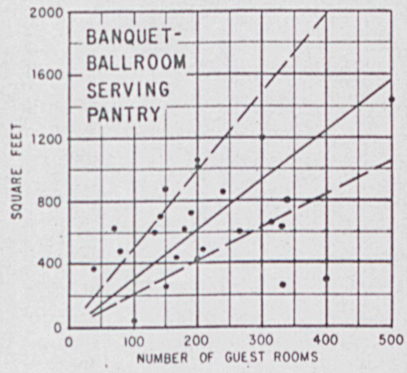
The bar and cocktail lounge may be separated, adjoining, or combined. Sometimes one area is shown without the other. For each hotel analyzed, the data point shows the total area. No data point is shown for any of the several hotels that had neither bar nor cocktail lounge.

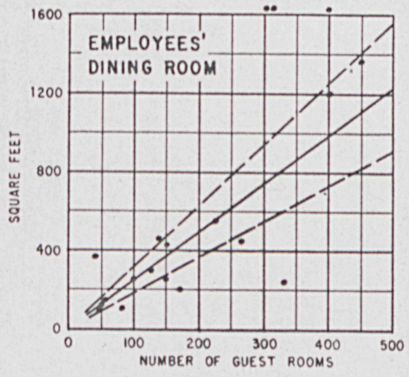
If the area is provided, 7.5 sq ft per guest room is the typical allotment. However, it is well to estimate the amount of

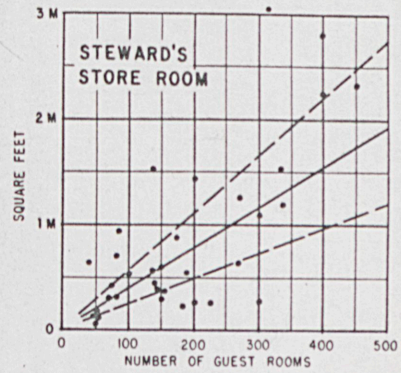












business that the bar and cocktail lounge will handle in view of the characteristics of the community and the type of patronage likely to be attracted. The space allotment should then be altered proportionately.

The number of private dining rooms indicated on the graph does not include instances in which the banquet hall is divided into smaller dining areas by folding walls or sliding partitions. Most hotels that serve food have private dining rooms, with an average of one room for 80 guest rooms. The use of private dining rooms depends more upon the demand in the particular community than upon the number of guest rooms.

The total area of private dining rooms is typically 7 sq ft per guest room, but variations are extremely wide. The seating capacity is often estimated at 10 or 11 sq ft per seat. However, much depends upon the right dimensions to accommodate the desired layout of tables, chairs, and aisle spaces, which have certain minimum sizes. If the room is large and its dimensions are right, 9 sq ft per seat is a possibility. Small rooms with random dimensions may require nearly twice as much area per seat.

The typical private dining room has an area of 600 sq ft, for the graphs show that 6 of them have a total of 3600 sq ft. If several private dining rooms are provided, it is usual to have the sizes increased progressively to care for various size groups. For example, capacities of 15, 25, 40, and 70 seats would provide a good variety. There is a decided advantage in having private dining rooms adjoining and separated by folding, sound-absorbing partitions.

The banquet-ballroom was provided in half of the hotels studied. It is generally used more frequently for banquets than for dances. The probability of its operation being financially successful is often a serious question. If provided, the allotment is usually from 10 to 20 sq ft per guest room.

A banquet-ballroom foyer is recommended. The size is usually one-sixth to one-third of the banquet-ballroom area.

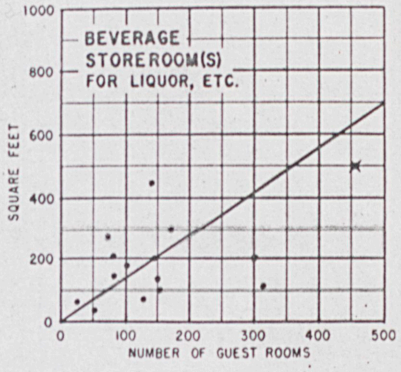
Banquet-ballroom storage, preferably adjoining the banquet hall, is required for chairs and tables. This storage area is typically about one-tenth of the size of the banquet hall, as may be determined from the two graphs.

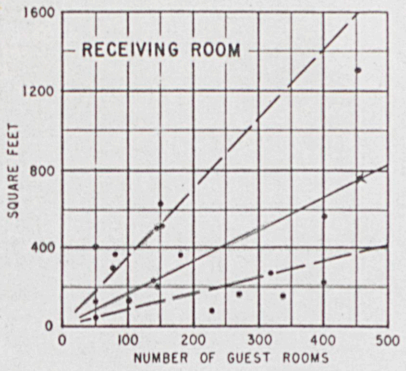
The banquet-ballroom serving pantry is often simply a food-assembly and pick-up area. Pantry space is sometimes provided within the main kitchen if adjacent to the banquet hall. In other instances, a separate room is provided adjacent to the banquet hall, with plate warmers, hot-top serving tables, refrigerators, serving counters, coffee urns, and sometimes dishwashing facilities. Occasionally, cooking equipment, such as broilers, is included and the area is then known as the banquet kitchen. Obviously, the requisite space allotment per 100 banquet seats varies with the function of the pantry. The typical ratio assigns to the pantry an area equal to 23 per cent of the banquet-hall area, but in a dozen separate investigations the ratio was from 12 to 38 per cent.

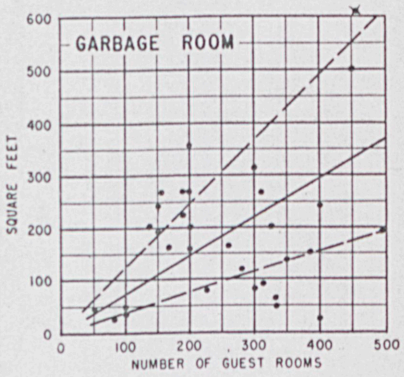
An employees' dining room is provided for the bellmen, maids, elevator operators, and the like. (Other employees such as the staff from the front office and the accounting department usually eat in the coffee shop.) Seats are usually provided for half of those on hand for the noon meal, since all do not eat at one time. Food service is often cafeteria style with a simple menu. The necessary space including the serving counter should be determined on the basis of 18 sq ft per seat and the number of employees to be seated at one time. If this is not feasible, the graph shows that 1.4 sq ft of employees' dining room is the typical allotment per guest room, a value that is generally satisfactory.

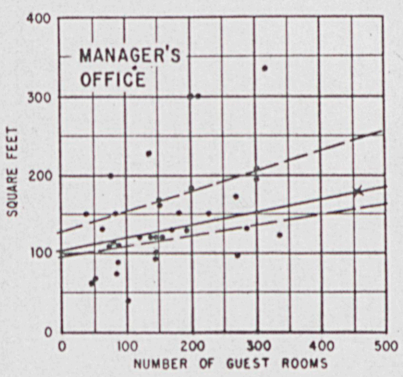
The steward's storeroom provides the storage space for dry foodstuffs, canned goods, vegetables, dairy products, and meat. Platforms, shelves, refrigerators, and freezers are needed. Deliveries are usually made at least three times a week, although

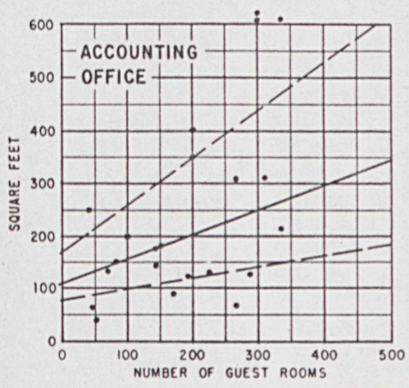
Space allotments—food and beverage services











the service is less frequent in larger storage facilities. Typically, 4 sq ft is allowed per guest room for hotels having the average ratio of food and beverage sales to room sales.

Beverage storeroom(s) should be provided separately from general food storerooms in order to ensure adequate control. Sometimes beverage storage space is provided in the steward's storeroom, generally in a fenced-off area. Wine and liquor are of such value as to definitely warrant separate storage under lock and key. Beer and soft drinks are desirably, but not necessarily, stored in separate rooms. The areas on the plans studied are not always marked specifically; the designation may be beverage storage, or wine and liquor storage, or four separate rooms for wine, liquor, beer, and soft drinks. Whatever the designation on the plans, this area was considered as the beverage storage space in the analysis.

The typical allotment is 1.4 sq ft of beverage storage area per guest room, although often this figure was only for wine and liquor. Probably 2 sq ft of total beverage storage should normally be allotted per guest room.

The receiving room is provided for food, beverages, linen, and other supplies which, upon arrival, are customarily checked against delivery slips, weighed, counted, and inspected. These supplies remain in the receiving room until time and manpower are available to take them to appropriate stock rooms. The typical allotment for the receiving room is 1.6 sq ft per guest room, although the graph shows wide variations.

A garbage room is required for quantities of garbage, bottles, cans, and cartons, which accumulate between daily removals or longer intervals over the weekends. Such refuse should not clutter the receiving room or be placed outside the back door. Health authorities object to garbage cans being kept in the kitchen.

Nearly half of the plans studied in the basic survey had no area designated as the garbage room. Plans of additional hotels were consequently studied to give more data points on the graph. The typical allotment for the garbage room of 0.75 sq ft per guest room is generally satisfactory. The use of garbage- and trash-disposal equipment will also influence the size of the room.

GUEST-ROOM SPACE

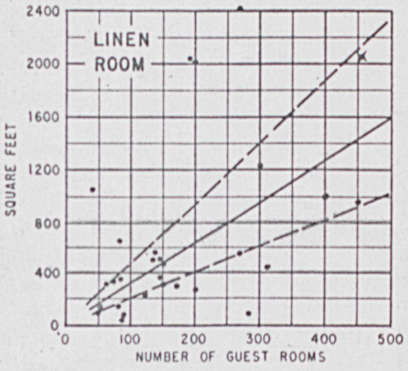
This division includes the guest rooms together with guest bathrooms, clothes closets, and entrance vestibules, the sum of which is the area that the guest rents. Also included are the necessary auxiliary areas found on the typical floor, such as guest corridors, stair wells, elevator shafts, and maid's closets. Any parlors (usually part of a suite) are included. If provided, sample rooms for the display of merchandise are also considered guest-room space, regardless of their location.

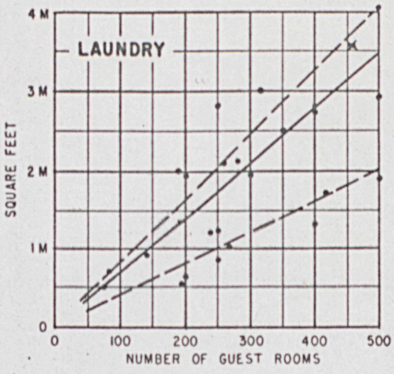
A schedule is customarily prepared stating the approximate total number of guest rooms. This is subdivided to give the number and approximate size of each type of room desired, such as single, double, and twin beds, and any sample rooms. Decision must be reached on what proportion of the rooms of each type is to be of the conventional and of the studio styles. King-length beds versus those of standard length must also be considered. Unless stated otherwise, each guest room has a three-fixture bath and a clothes closet.

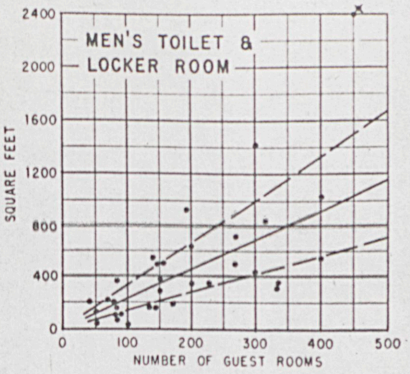
These problems of guest-room space must not be considered trivial; indeed, the main reason for building a hotel is to rent guest rooms, which are the unquestioned source of greatest profits. Every mistake, every omission, and every point of excellence is multiplied by the number of rooms constructed. Extremely careful planning is warranted for it pays big dividends.

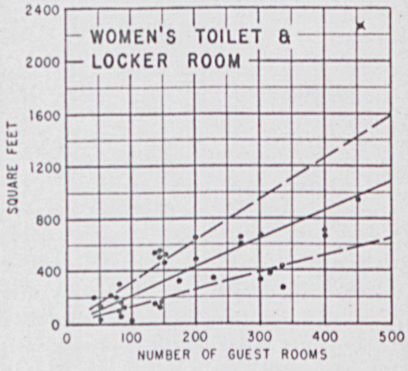
GENERAL SERVICE SPACE

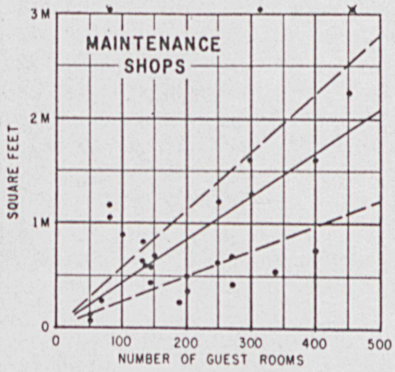
This division, classed as nonproductive space, includes those areas for general administration, operation, maintenance, and storage that are not otherwise classified.

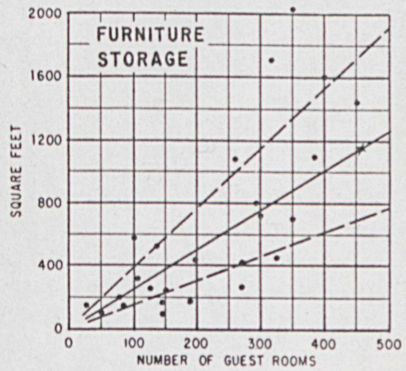












They include executive and administrative offices; areas devoted to the handling and storage of linen; help's quarters; maintenance shops; rooms for housing the mechanical equipment for heat, light, power, ventilation, and refrigeration; and also certain storerooms. Areas related to food and beverage are not included because they have been classified separately.

The manager's office requires a minimum area of about 100 sq ft. (Note that the trend lines on the graph are not drawn through the "zero-zero" point.) This area may well increase slightly with the size of the hotel, but the activities in this office seldom justify more than 200 sq ft. About 140 sq ft is the most common space allotment, regardless of the size of the hotel.

The accounting office should have a minimum area of about 100 sq ft to accommodate one person at a desk with appropriate record-keeping and filing equipment. (On this graph also, the trend lines are not drawn through the "zero-zero" point.) As the size of the hotel increases, more accounting personnel are needed requiring more space. The typical area of the accounting office for a 200-room hotel is shown on the graph as 200 sq ft, whereas for a 400-room hotel it is 300 sq ft.

Quite often the plans do not provide for the accounting office. Since the hotel operator cannot get along without this facility, he is generally forced to adapt one or two guest rooms (along with bathroom, clothes closet, and vestibule) for the purpose. The investment in the bathroom area and plumbing equipment is lost, the potential profit of five dollars per day on the room is wiped out, and the location of the improvised accounting office is often inconvenient. If an effort to economize caused the accounting office to be omitted from the plans, it was certainly misdirected and proved to be very costly.

A linen room is necessary to accommodate the housekeeper's office and the shelves of neatly stacked linens, together with the counter over which the maids receive their supplies. Often the lost-and-found cabinets for articles left in guest rooms are located here. Frequently a sewing machine and mending table are provided. Various employee uniforms are stocked and distributed here. The space allotment for the main linen room is usually from 2 to 4.5 sq ft per guest room, according to the graph, with many hotels favoring the larger value.

A laundry is sometimes operated by the hotel, although frequently the hotel laundry services only flat work and uniforms, and sends out guest laundry. To determine whether the hotel should operate its laundry requires an analysis of the costs of complete linen service, costs of commercial laundering, local wage rates, relative life of linen, availability and costs of space, necessary linen inventory, responsibility of running another department, and other factors. In general, the larger the hotel, the more likely it is to run its own laundry. (For a more detailed discussion of this subject, see section on Hotel and Motel Laundries.)

The graph shows that if a laundry is installed, it is usually allotted 7 sq ft per guest room. In a few cases, the allotment is only 4 sq ft per guest room.

The men's toilet and locker room in the employees' quarters is generally allotted 2.4 sq ft per guest room. Thoughtful planning justifies at least half again as much space, or 3.6 sq ft per guest room. The Hartford Statler with 455 guest rooms allotted 2,550 sq ft, with the ratio being 5.6 sq ft per guest room. There is reason to believe that the average figure results in crowded and unsatisfactory conditions.

Two separate but adjoining rooms are generally but not always provided. In general, about 35 per cent of the area is allotted for the toilet facilities and 65 per cent for the locker room. The requisite number of toilet fixtures for the size of the staff is the logical but more detailed way to arrive at the solution.

The women's toilet and locker room is usually allotted about the same space as the men's, and should be increased by the same amount.

In providing equal space for men and

women, we of course assume that they will be employed in approximately equal numbers. If the operating policy favors waiters instead of waitresses, then the space allotment should be adjusted accordingly.

Maintenance shops are necessary to keep the hotel running. There should generally be a minimum of three separate rooms: (1) Plumbing-and-electric shop, (2) Carpentry-and-upholstering shop, and (3) Paint-and-varnish room. The work in each shop is such that it does not mix well with the others. The plumbing shop is sometimes in the boiler room although not marked on the plans. The typical allotment for maintenance shops is 4 sq ft per guest room.

Some hotels have cut this allotment in half. General maintenance suffers as a result. When the means for repair are lacking, things that could be fixed have to be replaced by buying new ones. The reduction in initial cost is more than offset by increased operating expense.

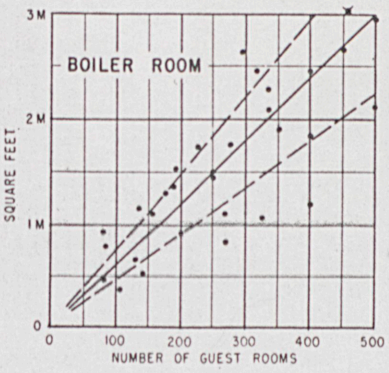
Furniture storage is required for extra items of furniture and broken pieces awaiting repair. They should not be placed in basement corridors. The typical allotment for furniture storage is 2.5 sq ft per guest room, apparently a reasonable and satisfactory amount.

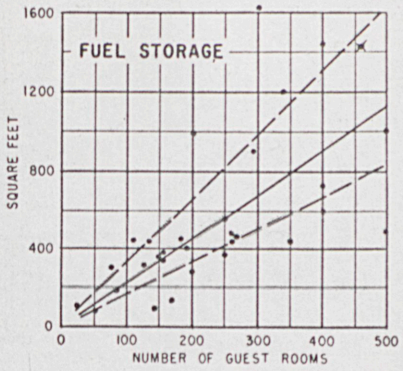
The boiler room space allotment is determined by many factors, such as the climate, the various uses of steam, the type of boilers, and the capacity of the standby boiler. Water heaters for the usual hot water supply are often placed in the boiler room although not noted specifically on the plans.

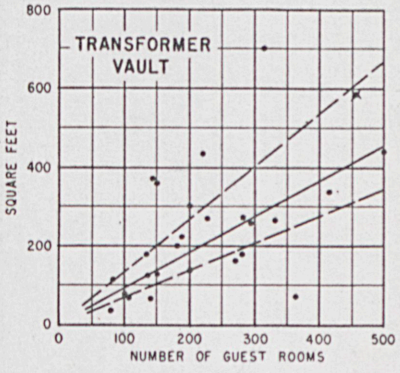
The graph shows the angle between the two broken lines to be relatively narrow. The middle 50 per cent of the points do not "fan out" over a wide angle. Consequently, the typical allotment for the boiler room of 6 sq ft per guest room may be used as a preliminary figure subject to possible revision after details have been developed.

Fuel storage is not required if gas or district steam is used exclusively. If coal or oil is the only fuel or reserve fuel used, however, then storage space is needed. The amount of storage, of course, depends on such factors as maximum rate of use, frequency of delivery, and cost of providing storage space. It is not surprising that some of the data points are far from the average line. The typical value for fuel storage is about 2.2 sq ft per guest room. This value may well be revised to suit the specific conditions that apply.

A *transformer vault* is a necessary part of the hotel's electrical system. The electric energy used goes through a bank of transformers, which are sometimes located outside the hotel but more frequently in the basement in a specially constructed vault. An allotment for the transformer vault of 1 sq ft per guest room is usually adequate. If very extensive use of electricity is planned, the allowance should be checked with the electric service company as a precautionary measure.







PRELIMINARY SCHEDULE OF SPACE ALLOTMENTS AND FLOOR ASSIGNMENTS

The following example of applying the statistics to a proposed typical commercial hotel of 100 rooms is presented as a guide. First the general data indicate the over-all characteristics of the hotel. These data are followed by more specific space allotments, which adhere closely to the typical values shown on the graphs. Items marked with an asterisk have been added to furnish desired areas for which no graph was given; items designated by a question mark may be omitted if the size of the hotel or other considerations do not warrant the area. In addition, the floor assignments are designated as follows: basement (B), ground floor (G), and typical guest floor (T).

Since many of the hotels in this survey were planned without certain desired areas,

SPACE ALLOTMENTS AND FLOOR ASSIGNMENTS FOR TYPICAL HOTEL OF 100 ROOMS

General data and approximations

Height of building above ground (ground floor plus 6 typical guest floors)	7 stories
Ground-floor area	10,000 sq ft
Typical guest-floor area	6,000 sq ft
Guest rooms per typical floor,	17 rooms
Stairways on the typical floor,	2 stairways
Elevators (1 guest and 1 service car)	2 elevators

The first four factors listed above are of course all interrelated and must be organized as a compatible group.

Public space	*Productive area, sq ft*	*Nonproductive area, sq ft*
Lobby and front office		1,100(G)
Lounge		600(G)
Corridors adjoining (total of above, 1,900 sq ft)		200(G)
Men's toilet for guests		150(G)
Women's toilet for guests		100(G)
Women's restroom for guests		100(G)
*Coat checkroom		120(G)
*Bellman's checkroom		40(G)

APPENDIX II

AVERAGE DAILY EXPENDITURE PER PARTY REPORTED BY
ROADSIDE INTERVIEWS OF OUT-OF-STATE MOTORISTS
(Percent)

Purpose of Expenditure	Reported Trip Purpose: Vacation	Business Only	Business and Pleasure	Other Personal Affairs	Moving	Other
Lodging	21.8	24.4	20.6	22.2	19.9	8.8
Meals & Refreshments	21.3	27.7	22.8	20.8	19.6	20.0
Food & Groceries	7.5	1.6	4.9	4.7	5.7	1.2
Automobile Expense	31.1	27.0	33.7	33.5	44.2	47.0
Recreation and Entertainment	5.9	8.3	9.1	3.4	7.0	1.3
Other Items	12.4	11.0	8.9	15.4	3.6	21.7
Total	100.0	100.0	100.0	100.0	100.0	100.0
Average Daily Expenditure Per Party[1]	$25.72	$23.39	$26.72	$18.96	$25.74	$22.09
Persons Per Party	3.1	1.7	2.9	2.6	3.0	2.3
Average Daily Expenditure Per Person[1]	$ 8.30	$13.76	$ 9.21	$ 7.29	$ 8.58	$ 9.60

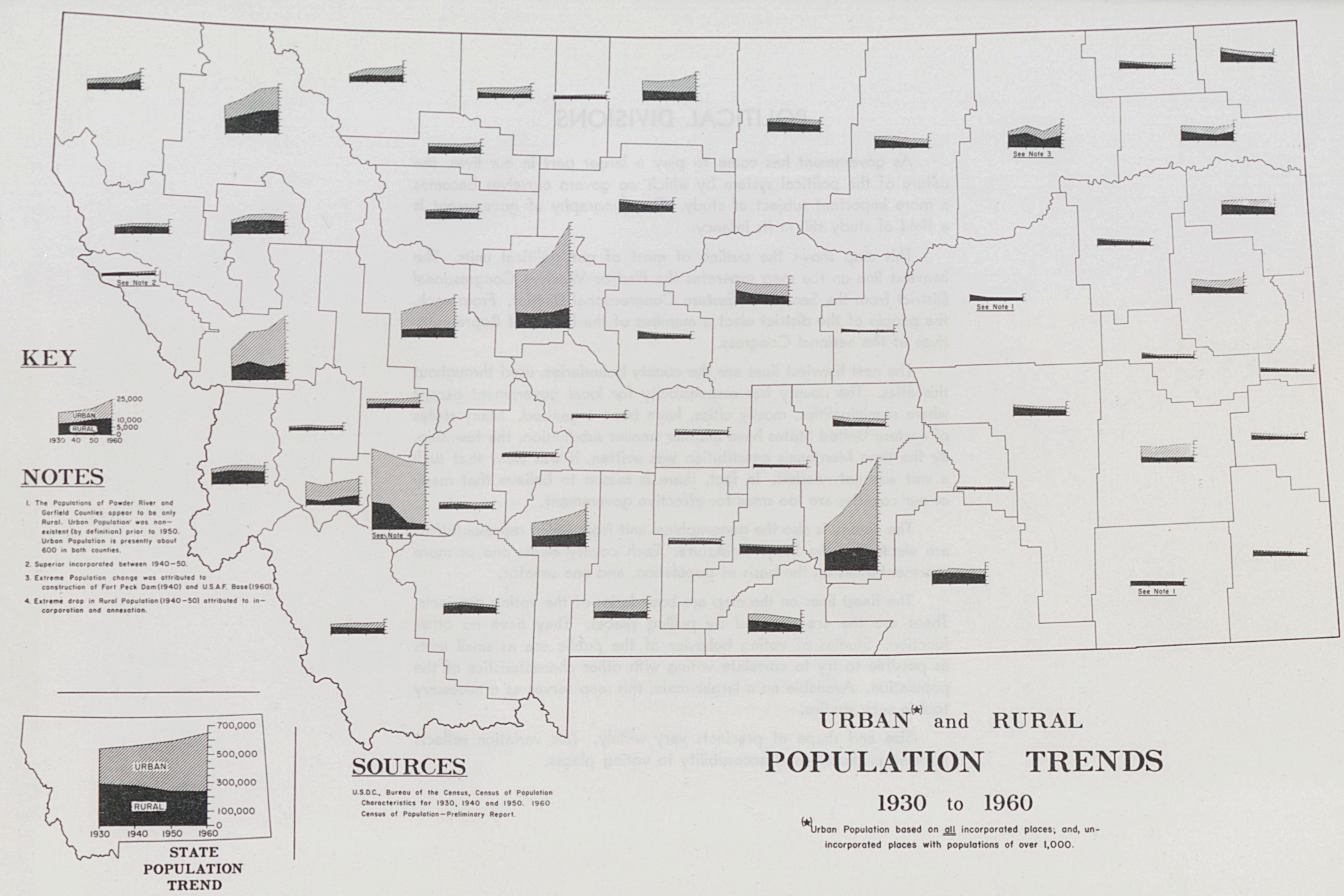
1. Based on an average of two days' record of expenditures.

(Taken From Montana Travel Study, Roadside Survey, Inbound Motorists, Table 46, Page 90.)

AVERAGE DAILY EXPENDITURES REPORTED BY TRAVEL PARTIES
BY PURPOSE OF EXPENDITURE AND TYPE OF LODGING
SUMMER SEASON
(Percent)

Purpose of Expenditure	Hotels		Motels		Campgrounds		Dude Ranches	
	All Parties	Out-Of-State	All Parties	Out-Of-State	All Parties	Out-Of-State	All Parties	Out-Of-State
Lodging	31.1	33.4	32.9	32.1	2.2	2.5	42.8	42.5
Meals	34.3	33.8	29.7	29.9	20.2	21.0	40.2	41.3
Food	0.7	0.9	3.9	3.8	30.1	29.2	2.5	1.1
Auto	16.6	15.7	22.9	23.9	33.1	31.6	7.3	7.9
Other Transportation	1.0	0.9	0.8	0.9	0.2	0.2	2.5	2.8
Recreation	9.6	10.7	4.9	4.3	2.4	2.7	2.6	2.1
Other	6.7	4.6	4.9	5.1	11.8	12.8	2.1	2.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Average Daily Expenditure	$29.00	$32.00	$30.00	$31.00	$18.00	$20.00	$49.00	$50.00

(Taken From Montana Travel Study, Lodging Survey, Table 47, Page 91.)



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

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.

POLITICAL DIVISIONS

As government has come to play a larger part in our lives, the nature of the political system by which we govern ourselves becomes a more important subject of study. The geography of government is a field of study still in its infancy.

This map shows the outline of most of our political units. The heaviest line on the map separates the First or Western Congressional District from the Second or Eastern Congressional District. From each, the people of the district elect a member of the House of Representatives of the national Congress.

The next heaviest lines are the county boundaries, used throughout this atlas. The county has responsibility for local government except where municipalities, mostly cities, have been organized. Many states of eastern United States have another smaller subdivision, the township. By the time Montana's constitution was written, it was clear that such a unit was not needed. In fact, there is reason to believe that many of our counties are too small for effective government.

The county is also the geographical unit from which representatives are elected to the State legislature. Each county elects one or more representatives on the basis of population, and one senator.

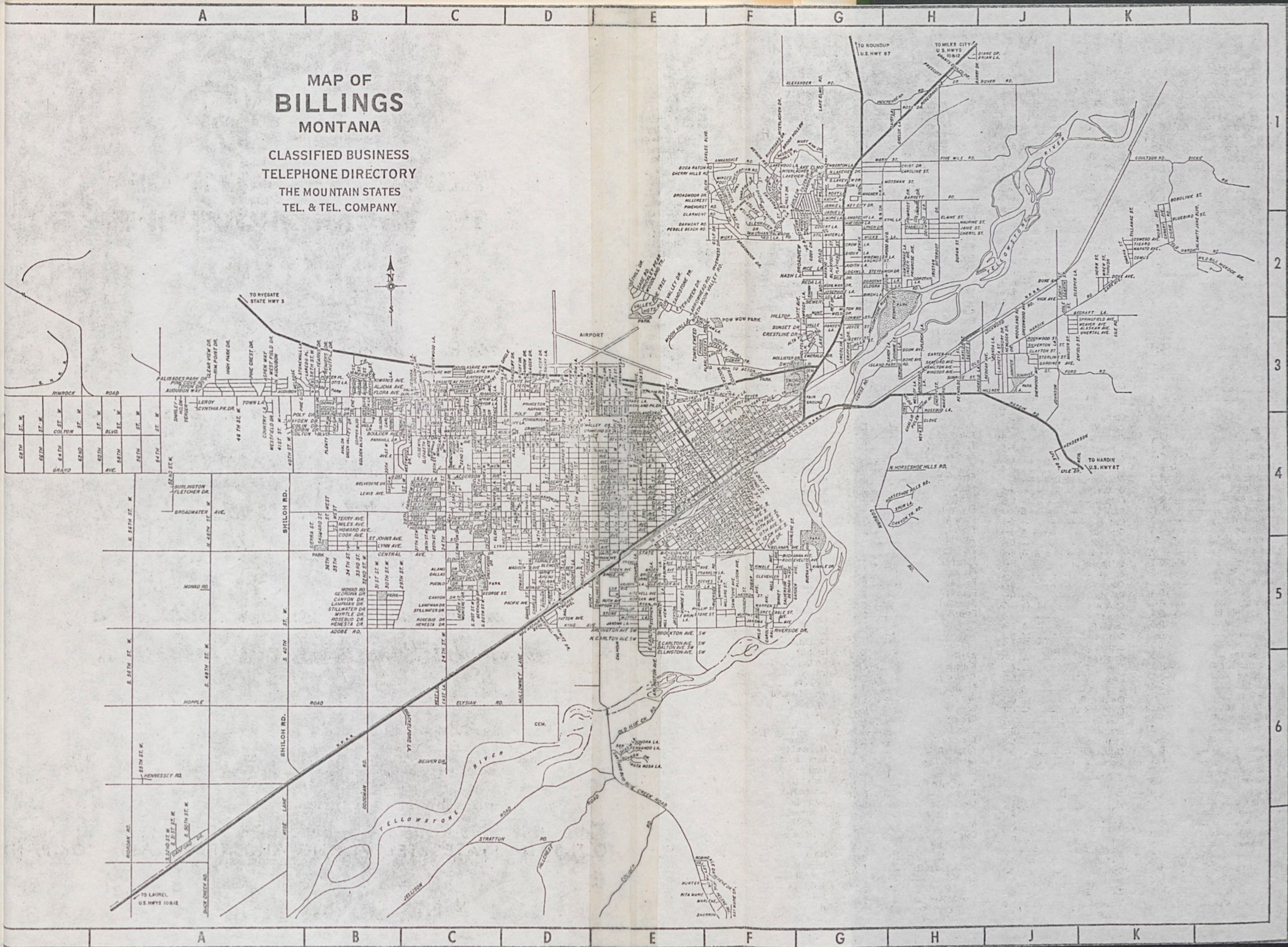
The finest lines on the map are boundaries of the voting precincts. These are the areas served by polling places. They have no other function. Studies of voting behavior of the public use as small units as possible to try to correlate voting with other characteristics of the population. Available on a larger scale, this map serves as a necessary tool in such studies.

Size and shape of precincts vary widely. This variation reflects population density and accessibility to voting places.

MAP OF BILLINGS MONTANA

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