

A FORD AUTOMOBILE DEALERSHIP
FOR BOZEMAN, MONTANA

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A FORD AUTOMOBILE DEALERSHIP FOR BOZEMAN, MONTANA

Part I

Undergraduate Thesis in Architectural Design

By

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

at

Montana State College

Bozeman, Montana
March, 1964

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ACKNOWLEDGMENTS

The writer wishes to thank the representatives of the local dealerships and the various companies and corporations who provided information for the research. Also, the advice and guidance furnished by Professor H. C. Rose¹, Professor H. Cheever and Professor J. Parker throughout the preparation of this research is greatly appreciated.

Finally, the writer wishes to express gratitude to his wife, Betty, for her patience, encouragement and help throughout the entire project.

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INTRODUCTION

This research paper is written for the Department of Architecture at Montana State College in fulfillment of the first part of a thesis problem--the research and preliminary concept of a building. This part of the thesis work, done in the first quarter of a two quarter problem in architectural design, is in partial fulfillment for the degree of Bachelor of Architecture. The second part of the thesis work will be a design solution based on the research presented in this paper.

The information contained in this research pertains to a proposed Ford Automobile Dealership for Bozeman, Montana. It is a hypothetical problem, although the actual construction of a dealership facility at some future time is possible. Professional ethics prevent actual construction of a dealership facility from a thesis project.

The research paper is divided into the following sections: conditions creating a need, local conditions, site considerations, function of the building, building program, aesthetic considerations and economic considerations. The most significant portion of this research paper is the information in the building program. This information will be used as a basis for the design solution which is the second part of the thesis work.

Much of the data presented in this paper was obtained through interviews with local dealers and correspondence with representatives of the Chrysler Corporation, Ford Motor Company and General Motors Corporation.

CONDITIONS CREATING A NEED

1. CONDITIONS CREATING A NEED

Just as the automobile has advanced in design for safety, economy, convenience and comfort, so too, have the facilities for merchandising and maintenance. Modern, efficient facilities are a prerequisite to continued successful business development and operation.(1:3)*

For Bozeman's Ford dealership to operate as a successful business the dealer must keep his dealership facilities up to date with the technical and merchandising advances made by the automobile industry. The present Ford dealership building, built about 1919, is no longer adequate. A new dealership facility which would accommodate all of the operations involved in a modern efficient dealership is required. The following are existing conditions which make the present dealership inadequate:

1. Adjacent land for expansion of the existing dealership building is not available.
2. Due to the lack of adjacent land for expansion, the operations of the dealership have become dispersed throughout the city. Figure 1 shows the locations of the various operations and their relation to the dealership building.
3. There are no areas adjacent to the dealership building for customer, service or employee parking.

* The first number refers to the Reference List, page 71; the second number refers to the page.

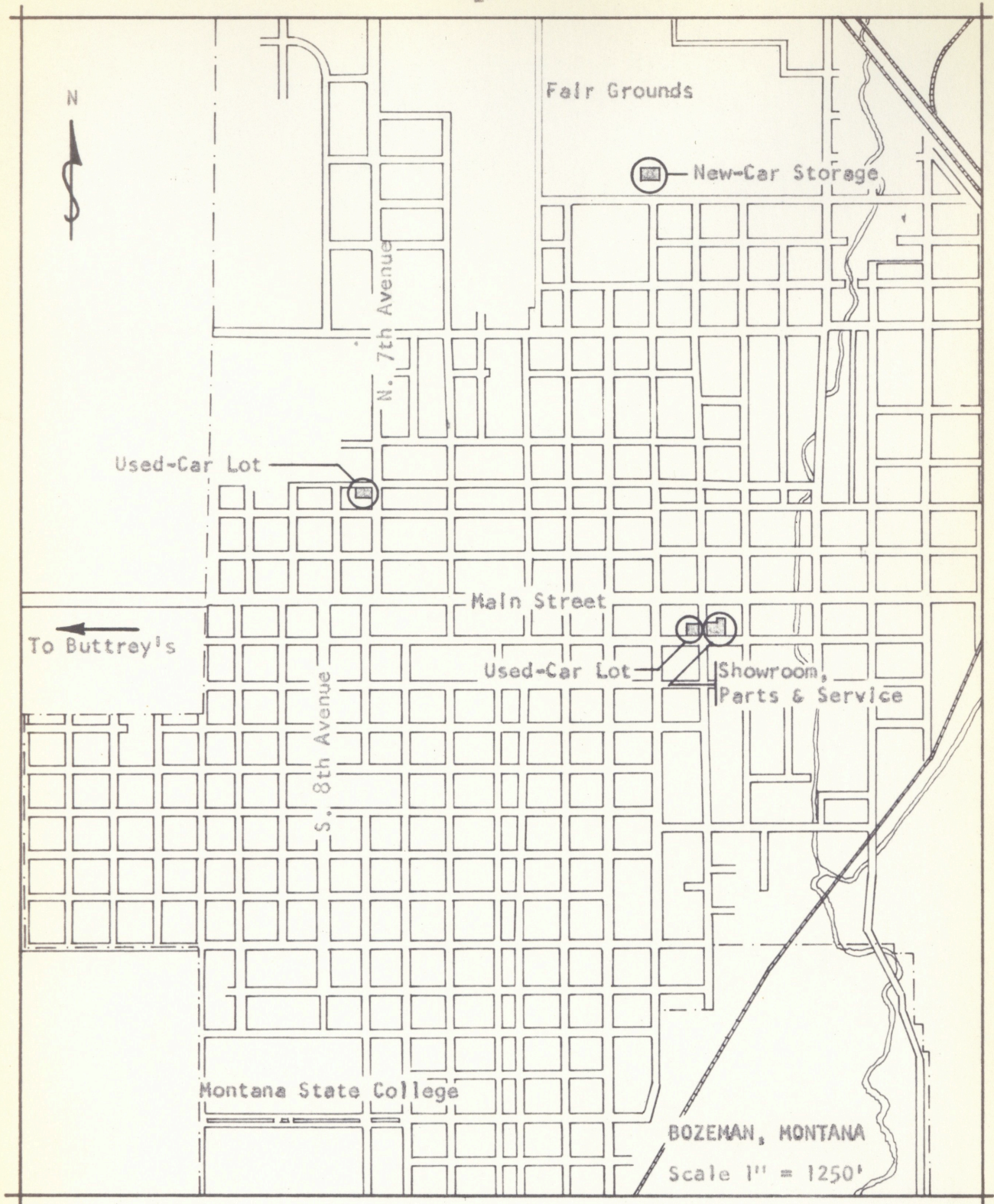


Figure 1. Location of Existing Ford Dealership Operations

4. The dealership building is not located on a major traffic artery.
5. The used-car operations, which are separated from the dealership building, are unattractive and have no provision for feature displays.
6. The showroom does not take advantage of the dealership's corner location. The showroom should take advantage of maximum visibility from both sides.
7. From the exterior the showroom is unattractive and much of the limited glass areas are obstructed by partitions and advertising. This keeps the pedestrian and vehicular traffic from seeing the cars on display. Figure 2 shows an exterior view of the showroom area.
8. The interior of the showroom is crowded and inadequately lighted. Much of the natural light which brings out the true colors of the display cars is kept out by the obstruction of the limited glass areas.
9. The service entrance is located directly off the street and when service traffic is heavy a traffic problem on the street is created. Also, due to the tight conditions existing inside the service area, cars are occasionally required to back out of the service entrance into the street traffic. Figure 2b shows the service entrance directly off the street.



a. Showroom



b. Service Entrance

Figure 2. Photographs of Existing Ford Dealership

LOCAL CONDITIONS

2. LOCAL CONDITIONS

2.1 Geographical

Bozeman, Montana, $45^{\circ}40'$ north latitude and $111^{\circ}03'$ west longitude, is located in the rich, fertile Gallatin Valley at an elevation of about 4,795 feet above sea level.

The city of Bozeman is situated at the base of the western slope of the Bridger Mountain Range at a point where the valley is about ten miles wide east to west. The valley flattens and broadens to the northwest for several miles before narrowing into a shallow canyon near Logan. Except for the narrow Gallatin River opening at Logan, the Bozeman area of the Gallatin Valley is surrounded by mountains.

2.2 History

Gallatin County was one of the original nine counties established by the territorial legislature in 1865. It was named after the river, which had been named in honor of Albert Gallatin, U.S. Secretary of the Treasury. Due to the formation of new counties its original area has been greatly reduced. The county seat was first located at East Gallatin but was later moved to Bozeman.

Unlike other areas in Montana the first real settlements in the Gallatin Valley were not mining towns, but agricultural communities. These mining towns, Virginia City, Butte, etc., indirectly played an important part in the area's settlement by providing a market for agricultural products, and the early-

day lumber industry. The main routes of travel to western Montana crossed the Gallatin Valley and immigrants were attracted by its rich, fertile appearance. In 1864 John Bozeman led a train of immigrants over this route from the Oregon Trail and his friends, D. E. Rouse and W. J. Beall, staked out the present city of Bozeman.

2.3 Climate

Bozeman experiences essentially a mountain valley climate. The relative humidity is low and the air is free from industrial smoke and haze. Winters are relatively cold, and occasionally a winter month has a week or more of severely cold weather, although mild weather is not unusual. Summers are generally pleasant and are characterized by warm days, cool nights and a high percentage of sunshine.

Temperature: The average mean temperature for Bozeman is 43°F. Table I shows the daily maximum and minimum temperature and the monthly average for each month of the year.

The highest recorded temperature is 104°F; the lowest recorded temperature is -43°F.

Precipitation: The average annual precipitation is 17.38 inches with heavy snow occurring from November through March. Summer precipitation falls mostly as showers, sometimes accompanied by thunder and lightening. In the late spring and early

TABLE 1

MEAN TEMPERATURE AND PRECIPITATION FOR BOZEMAN, MONTANA
Period: 1931 - 1960 (30 Years) (13:1)

Month	Mean Temperature (°F)		Mean Precipitation (inches)		
	Daily Maximum	Daily Minimum	Monthly	Total	Snowfall*
January	30.2	10.3	20.3	.90	13.8
February	33.8	13.8	23.8	.74	10.9
March	40.6	19.6	30.1	1.52	16.3
April	53.8	30.6	42.2	1.73	5.9
May	63.7	38.8	51.3	2.34	1.2
June	70.5	44.9	57.7	2.95	.4
July	81.5	51.3	66.4	1.14	0
August	80.3	49.5	64.9	1.17	0
September	70.0	41.6	55.8	1.57	1.0
October	58.4	33.6	46.0	1.40	3.0
November	41.8	21.9	31.9	1.05	8.1
December	35.0	15.8	25.4	.87	12.5
Year	55.0	31.0	43.0	17.38	73.1

* Based on 16 Year Period

autumn showers occasionally give way to steady rains which can total as much as an inch or more in 24 hours. Table 1, page 7, shows the mean precipitation and snowfall for each month of the year.

Wind Conditions: The prevailing winds in the Bozeman area are from the west and northwest. Storm winds generally blow from the east and northeast. The mean wind velocity for the Bozeman area in January is from four to seven miles per hour; in June it is from eight to twelve miles per hour.

Sun Angles: Figure 3 shows the sun's position relative to the earth at 45° north latitude for various times of the day.

2.4 Population

The population of Bozeman, based on the 1960 U. S. Census, is 13,366, (15,450 for greater Bozeman) the sixth highest in Montana. Figure 4, page 10, shows the actual and projected population of Bozeman. Based on data from the 1909 through 1950 U. S. Census the city population has increased at an average of 27.5 percent over each ten-year period. During the period 1950 through 1959 the population has increased 28.4 percent. These population figures do not include approximately 4,000 college students who attend Montana State College nine months of the year and approximately 1,200 in attendance during the three summer months.

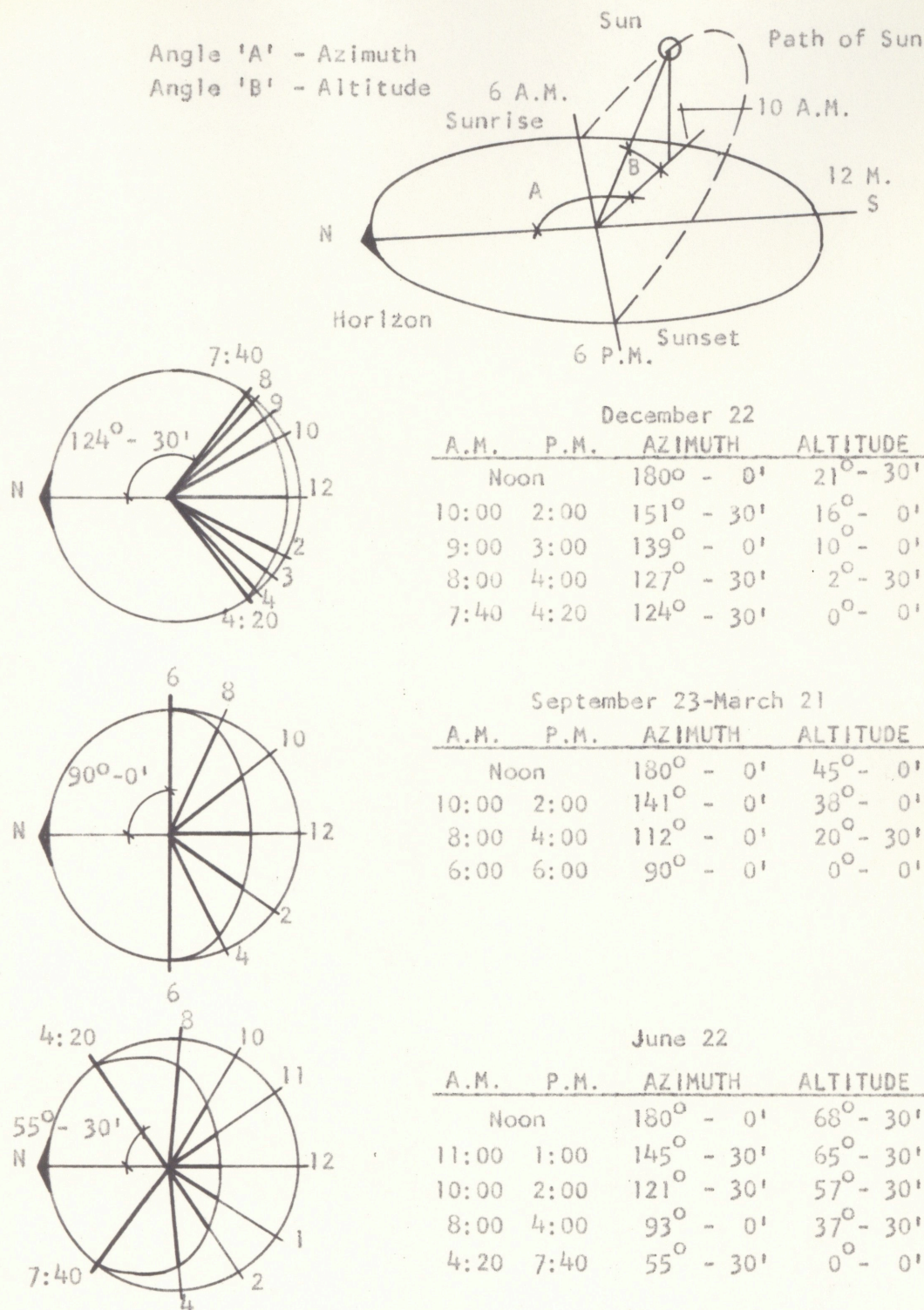


Figure 3. Solar Angles for 45° North Latitude (12:43)

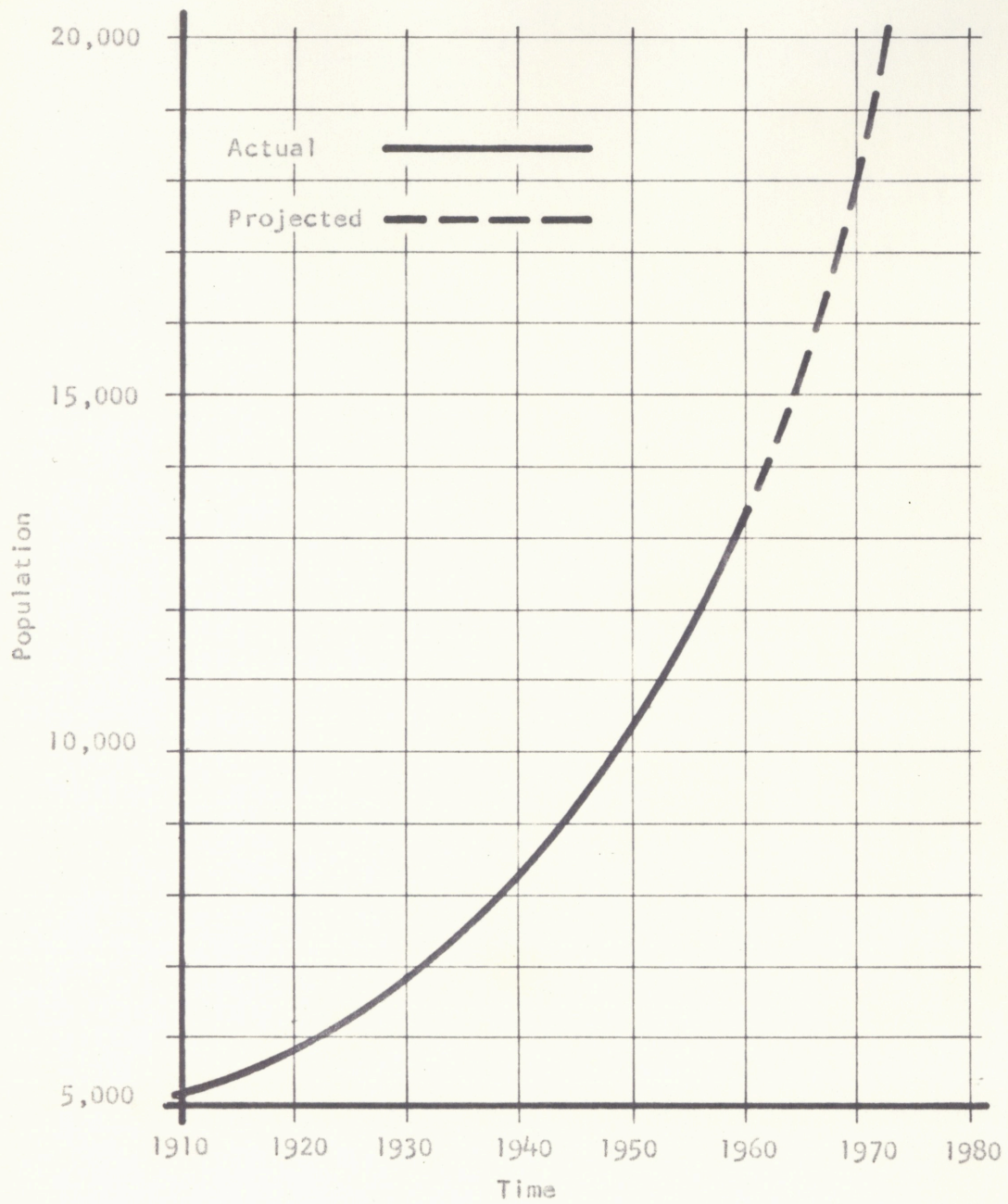


Figure 4. Actual and Projected Population of Bozeman, Montana (6:6)

The future growth of a city depends primarily on the energy, character and intelligence of its people. A study of Bozeman's population by age reveals the following:

Infant (under 5 years)	9.8%
School age (5-14 years)	12.3%
Youth age (15-24 years)	22.7%
Working age (25-54 years)	37.6%
Mature age (54-64 years)	8.8%
Pension age (over 65 years)	8.9% (6:9)

With a large percentage of the population in the youth and working age groups the energy and interest need for the growth and development of the city is present.

2.5 City Growth

The city of Bozeman is built mainly around the north and east boundaries of Montana State College. While there has been some development to the south and southeast of the city, with the establishment of Buttrey's Shopping Center to the west indications are that the city will expand in that direction. Already areas to the west and northwest have been taken into the city.

2.6 Social

Bozeman is an unusually conservative community and its citizens are generally lukewarm to new ideas. An example of this conservatism would be the defeat of the bond issue for a new, modern and much needed city hall.

The culture of a city is indicated by the level of education of its citizens. The average adult in Bozeman has attended school 12.4 years, the highest level of education of any city in Montana.

Montana State College, located in Bozeman, has a major effect on people of all ages and through it brings better education, recreation and culture. Also, there is an adult education council, which sponsors evening classes for adults in a variety of subjects.

2.7 Economic

The economy of Bozeman depends primarily upon revenue income from agricultural sources, together with Montana State College, which employs hundreds of people for the faculty and staff with an annual payroll of almost \$4 million. Agricultural operations are divided among small grains production, livestock, and dairying. Bozeman, although not an industrial center, includes several small plants and manufacturers: lumber, milling and montronics. Tourism is also an important source of revenue.

The retail trade area covers 24,465 square miles, with a population of more than 65,000. Bozeman is classified as one of the State's major retail centers.

A 1959 local estimate divides the Gallatin County labor force into the following categories:

Major Industries	8,792
Services and finance	2,541
Agriculture	2,004
Trade	1,733
Transportant and utilities	752
Manufacturing	627
Construction	564
Public administration	381
Forestry and fisheries	37
Mining	9 (2:4)

Bozeman is served by three banks, with total resources of \$28,607,160.55 and total deposits of \$26,475,968.00. In addition a branch office of the Empire Savings and Loan Association, with resources of more than \$10 million, is located in Bozeman.

2.8 Transportation

Bozeman is located on U. S. Highway #10 east and west, and U.S. Highway #191 south, connecting with Highway #89 north. U. S. Highway #10 is part of the Federal Interstate Highway system.

Bozeman is also located on the main line of the Northern Pacific Railroad. Additional freight service is provided by a branch line of the Chicago, Milwaukee, St. Paul and Pacific Railroad. Supplementary freight service is provided by several motor freight carriers: Northwest Freight Lines, Inc. and Consolidated Freightways.

Northwest Orient Airlines provides service east and west from Gallatin Field, ten miles northwest of Bozeman, with good north and south connections available at Billings and Butte.

Bozeman is also serviced by the Greyhound Bus Line. However, Bozeman lacks a local bus system. There is no adequate, cheap transportation available for residents of outlying areas, college students and faculty and for school children, especially high school students. Private cars and taxis are the only available means of inter-city transportation.

SITE CONDITIONS

3. SITE CONDITIONS

In selecting a site for an automobile dealership there are many factors, both in the nature of the site itself and its general surroundings, which are very important and must be given careful consideration. These are:

1. Location: The site can play an important role in helping to attract customers through its appeal, ease of access and location in connection with customer buying habits.
2. Size: The site must accommodate planned dealership operations, provide ample parking, and afford a smooth flow of traffic through the service department. Consideration must also be given to the used-car operation when it is to be located on the same site.
3. Accessibility: Traffic, both moving and parked, at all times on the street or streets adjacent to the dealership is an extremely important consideration from the standpoint of convenience and ready access to the dealership facilities.
4. Site periphery: This is a determining factor as to the type and layout of the building to be erected, and the image it will present to the customer.
5. Growth flexibility: Times change and so do methods of operation and facility requirements. The site should

be selected with this thought in mind so that the dealership facility can change to meet these new requirements.

All of the above factors can add to or subtract from the desirability of a site location. The location of a dealership site must be a compromise of all the considerations that make an efficient dealership.

3.1 Location

In a city the size of Bozeman the most logical choice for a dealership location would be on Main Street out of the Central Business District where traffic is less congested.

The site proposed for the Ford dealership is an entire city block on the north side of West Main Street, bound on the east by North 9th Avenue, on the west by North 10th Avenue and on the north by West Mendenhall Street. Figure 5 shows the location of the site and the existing zoning in adjacent areas.

The proposed site appears to be ideal for a number of reasons. These are:

1. The site is located about mid-way between the two major retail trade areas, the Central Business District and the new Buttrey's Shopping Center, in Bozeman.
2. While at present there is no local bus system available in Bozeman, the site is located on a main traffic

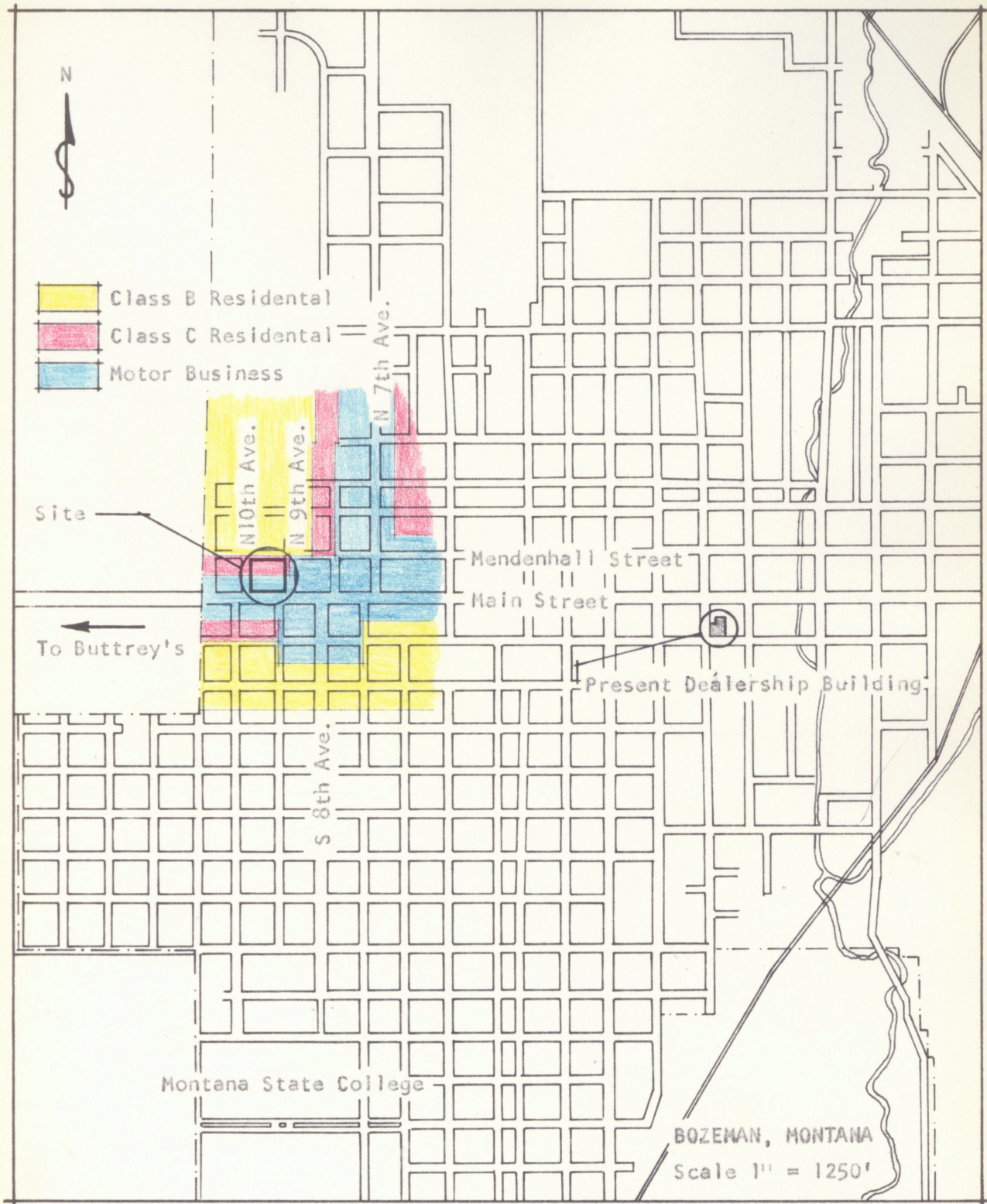


Figure 5. Location of Site and Existing Zoning in Adjacent Areas

artery which would be included on a bus route when the needed system is established.

3. The site provides a corner location on a main artery. This is most desirable because it permits greater accessibility and display which tends to invite business, i.e., develop greater sales and service potential.
4. The site is square. Sites which are regular in shape, preferably rectangular or square, are best suited for dealership activities.
5. The site is large enough to provide room for future expansion.
6. The site is vacant requiring no expensive removal of existing buildings and vegetation.
7. The site provides good sub-soil conditions which are important due to the necessary use of hoists and other heavy equipment in the service area that require heavy construction footings.
8. The site is fairly level and will require only minor grading for building construction and drainage.
9. The adjacent areas are composed of small, low structures with no large obstacles to hinder the public's view of dealership signs and displays.

Several other sites have been considered. These, however, when compared with the proposed site have fallen short in

several respects. Therefore, the proposed site will be used for the design of a Ford Automobile Dealership for Bozeman.

3.2 Description

The site occupies an entire city block comprising 90,000 square feet. Figure 6 shows the overall dimensions, existing property lines and the building lines, as set by Bozeman zoning requirements. There are no existing buildings on the site.

Topography: The site is fairly level with a slight slope toward the northeast corner. All drainage should be directed toward the northeast corner and connection to the existing storm and sanitary sewers made at this point.

The site has no large vegetation only tall grass and brush.

Soil Analysis: There have been no soil tests made on the site. However, past experience in the area indicates a soil condition consisting of two to three feet of sandy clay soil over an uncertain depth of gravel base.

The water table in the area varies, but is probably within a range of four to eight feet below ground level throughout the year. The relatively high water table makes it advisable to waterproof all basement areas incorporated in the dealership design. It would also be advisable to provide drain tile around the basement areas with a sump pump for use during periods when the water table is high.

Figure 6. Plot Plan of Site

Adjacent Environment: The site is relatively free from oppressive adjacent buildings. Figure 7 shows views to the west and northeast which give some idea of the adjacent environment. To the north and east are areas of private dwellings. To the south, across West Main Street, are several vacant lots and small drive-in businesses backed by private dwellings. Toward the west is a vacant block and the Bozeman Senior High School. The High School, the only large building in the area, is a low, brick structure spread over a large area. Also, an area to the northwest is the proposed site for a new Junior High School.

The mountain ranges which surround Bozeman are visible to some extent from any point on the site.

3.4 Utilities

Utilities available to the site include gas, electricity, telephone, water and storm and sanitary sewers. Figure 8, page 23, shows the location of the existing utilities and their relation to the site.

3.5 Traffic

The extension of West Main Street as new U. S. Highway #191 has greatly relieved the north-south traffic on South 8th Avenue. Much of this traffic now uses West Main Street. Also, the establishment of Buttrey's Shopping Center outside the existing city limits, west of the Senior High School, has added to the



a. View to West



b. View to Northeast

Figure 7. Photographs of View from Site

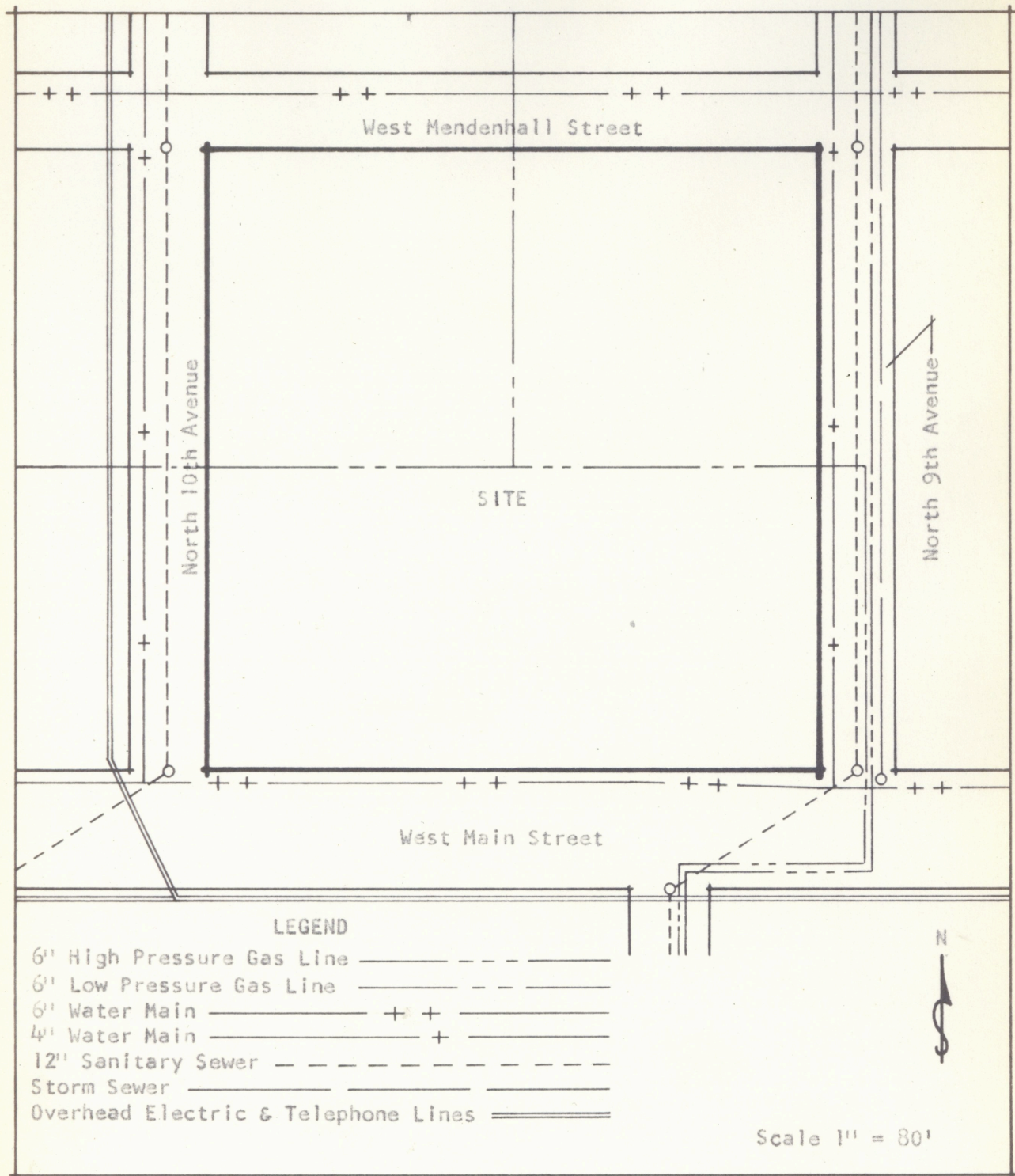


Figure 8. Existing Utilities

traffic flow past the site. Figure 9 shows the main traffic pattern past the site.

The site fronts on West Main Street which at this point consists of a 90 foot right-of-way, 64 foot roadway with four lanes of moving traffic and two lanes of parking. The site is surrounded on the other three sides by paved secondary streets which will provide entry to the site from other than a main highway.

3.6 Zoning

The site is located partly in a Motor Business Zone and partly in a Class C Residential Zone (See Figure 5, page 17). A petition requesting to change the Class C Residential Zone to a Motor Business Zone would have to be submitted to the City County Planning Board. This board makes recommendations to the City Commissioners who would actually grant or deny the request. The granting of the request in this case should present no major problems. The request could be based on the theory that a street makes a better zone division than the middle of a block. Also, the fact that the Class C Residential Zone in this area is an isolated strip, two blocks long and one-half block wide, could be used to support the zoning change request.

Motor Business Districts are usually situated along major traffic streets and surrounded by residential areas. Motorists

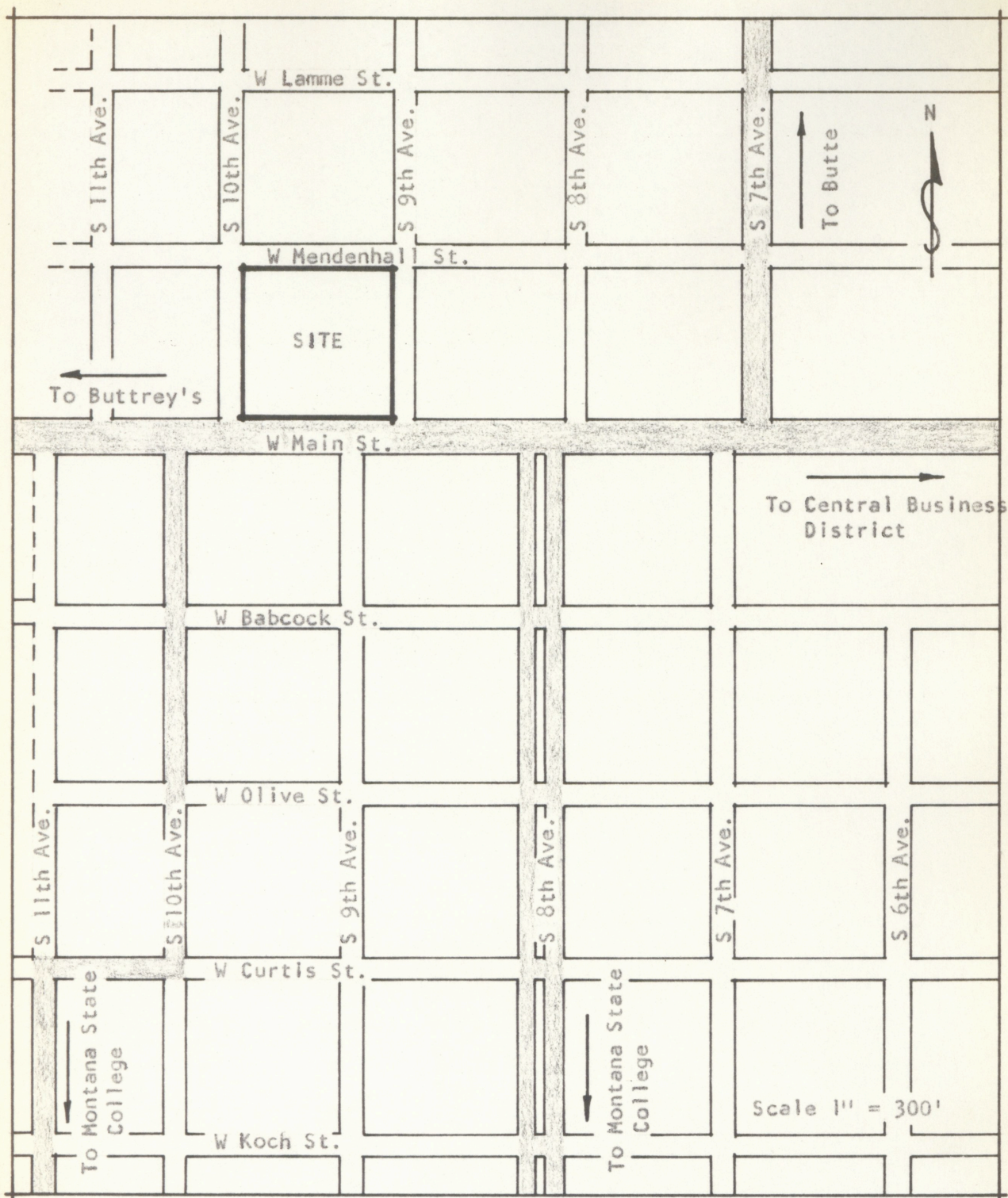


Figure 9. Traffic Patterns in the Site Area

entering the city receive their first impressions from the appearance of these districts.

Motor Business Districts allow all business uses needed by the motoring public, i.e., where driving off the street and onto the property is essential. Sidewalks in these areas are secondary but should be provided. The following zone requirements apply to the site:

Minimum lot area	8,000 sq. ft.
Minimum distance between main buildings and/or wings	16 ft.
Minimum front yard	25 ft.
Minimum side yard	8 ft.
Minimum rear yard	10 ft.
Minimum street side yard, corner lot	15 ft.

A maximum of 40% of the total floor area provided may be in industry or storage use incidental to the primary use.

Landscaped areas: 75% of required front yard areas to be in landscape.

All yards or portions thereof required to be in landscape shall contain a minimum of one (1) living deciduous tree for each 400 sq. ft. or fraction thereof of yard required to be in landscape. Such trees must be continually maintained at a height of eight (8) feet or greater. All required landscape areas must be continually maintained in an attractive and clean condition.

Off-street loading areas: Every hospital, rest home, institution, hotel, commercial, warehouse and industrial building hereafter erected or established on a lot shall provide one permanently maintained loading

space of not less than ten (10) feet in width and thirty-six (36) feet in length and fourteen (14) feet in clear height for each 2,000 sq. ft. of lot area upon which said building is located, to a maximum of three such loading spaces. Such loading spaces to be located at the side or rear of the building.

Off-street parking spaces required: Off-street parking spaces shall be provided in connection with the erection of increase by units or dimension of any building or structure in the following amounts: General business, offices, all commercial uses, clinic, animal hospital and person services: 1/each 300 sq. ft. of floor area plus 1/each three employees.

Location of off-street parking areas: No more than 25% of the parking spaces required may be located within any required side yard. No off-street parking areas are to be located in any required front yard and/or corner lot street side yard. Off-street parking spaces required by this ordinance shall be located on the same lot or premises as the use to be served by such parking areas, excepting those in the "MB" or "CB" zone, or those for apartment use which must be provided within 1,000 feet of the use to be served. (3:1)

FUNCTION OF THE BUILDING

4. FUNCTION OF THE BUILDING

Fundamentally, an automobile dealership facility should dramatically present its products to the buying public in a tasteful, eye-catching manner. In addition to customer appeal, it must also contain all the essential facilities for the smooth functioning of an efficient business establishment including a new-car showroom, offices, service and parts departments, used-car operation and adequate parking and storage areas.

To create a functional dealership, a harmonious balance must be achieved between all of these elements so that one element is not over-emphasized at the expense of another. Each unit must have customer appeal by itself and still make a positive contribution to the entire dealership impression.

The dealership building usually occupies 20-25 percent of the total site, with 70 percent of the building area allocated to the service department, 18 percent to the showroom and offices and 12 percent to the parts department.

4.1 Dealership Identification

The exterior of the dealership is an investment in advertising because it identifies the dealer, his product and his service to the community. A sound identification plan must establish three things in the mind of each prospective

customer; the brand itself, the dealer who sells the brand and the corporation which makes it. The signs which furnish this identification should not be added on as an after thought, but should be considered as a part of the overall design of the dealership facility, i.e., they should be integrated into the dealership design. This consideration should also include signs which are used to identify the different operations, service, parts, etc., included in the dealership facility.

4.2 Dealership Personnel

An automobile dealership for Bozeman, Montana would require 26 to 30 employees. The new-car display and administration areas would require, beside the dealer or general manager, a sales manager, four full-time salesmen and a full-time office manager with two or three clerks to handle the accounting and paper work that would be involved in the dealership operation. The parts department could be handled by a parts manager with one full-time helper. The service department would require a service manager and 16 to 20 mechanics and service personnel (depending upon the season) to handle the work involved in this area.

4.3 Showroom

Without an effective showroom it is almost impossible to realize the full sales potential of a dealership. Therefore,

the showroom should be located to dramatically heighten its impact on pedestrian and vehicular traffic. The broadest possible window space should face the most heavily traveled street with special attention given to adequate lighting, both day and night. An effective showroom design should include the use of a maximum amount of glass. A window slant of 15 to 20 degrees provides minimum reflection and glare during both day and night.

Supervision of the showroom is essential to make certain that prospective customers are not overlooked when they enter. The dealer's or general manager's office and the salesmen's offices should be located directly off the showroom and near the general office for convenience.

It is impractical, in most circumstances, to display indoors the full range of makes and body styles handled by the average dealer. Consideration should be given, therefore, to the coordination of indoor and outdoor display areas. In temperate climates, outdoor display is feasible most of the time. In regions subject to severe weather, provision should be made for the display of cars in outside spaces adjacent to the showroom.

The entire showroom should serve as a setting for cars on display. Neutral colors, with a light-reflective-value of 50-60 percent, should be used for the ceiling, walls and

floors in the showroom area to avoid detracting from the cars on display.

Tile for the showroom floor, should be grease resistant or grease proof with a light-reflective-value of 25-35 percent. Glossy finishes should be avoided because they tend to produce bright spots.

Natural lighting is best for reflecting the true colors of display cars and should be taken advantage of as much as possible. However, it is necessary to supplement natural light with artificial light to provide the level of illumination needed for an effective display. Spot and flood lights should be provided to highlight feature display cars. For maximum effect, highlighting should provide six to ten times the light intensity of the general showroom.

A floating luminous ceiling is well suited to the 12 to 14 foot ceiling height that is most often used in modern showrooms. It provides a uniform, diffused light and brings out the highlights of display cars with a minimum of undesirable shadows. Acrylic or polystyrene plastic is recommended for the diffusing shield. Louvered diffusers should be avoided, since they will be reflected in the car finish. For other types of ceilings, such as acoustic tile, a light-reflective-value of 75-85 percent is recommended.

When provided, air conditioning is almost exclusively confined to the showroom and office areas, but may include the parts department if it is located in the same general area.

Recommended heating of the showroom and office areas is hot water baseboard radiation. This type of heating is economical and blends into the area design.

4.4 Basic Service Pattern

There are certain "flow" characteristics to be considered when laying out the service area: flow of traffic, flow of people, flow of parts, and flow of repair orders. All of these flow factors must be coordinated into one smooth efficient operation which provides convenience to the customer, at a profit for the dealer.

The flow of traffic begins when the customer drives into the service department through a wide and clearly marked service entrance. He is greeted by the service manager in the customer reception area. Either the service manager or a technical specialist can diagnose the customer's mechanical problem. If it is a job for the specialist, the car is placed in a diagnosis stall adjacent to the customer reception area and the customer is directed to the adjacent waiting lounge. The technical specialist locates the trouble and the service

manager writes out the repair order. He then explains to the customer the work to be done, and obtains his approval to perform the repair.

The service manager assigns the job to a service technician who takes the repair order, picks up the necessary parts, and performs the repairs in his work stall. Major repair stalls should be located toward the rear of the service area. Quick service work should be done as near the entrance as possible, without interfering with traffic flow.

After completing the work, the service technician notifies the service manager that the job is completed. He gives the hard copy of the repair order to the service manager, then drives the car to a parking space near the customer lounge exit.

The service manager completes the labor portion of the repair order and gives it to the cashier or parts department for totaling. He notifies the customer that his car is ready and directs him to the cashier's window. The customer pays his bill and walks to his car in the parking area.

This procedure contains all the desirable elements of a dealer's service operation. Although, all dealers may not be able to provide such a facility, it is a goal toward which they should work.

4.5 Service Department

Careful consideration should be given to the service department which provides all types of work required by car and truck owners. The service department should be designed to handle a constant volume of service repairs.

A dealership service facility should be divided as follows:

Lubrication	11%
Engine tune-up and electrical	14%
Body and sheet metal	26%
Brakes	8%
Steering and front end	6%
General repairs	31%
Appearance, wash, etc.	4% (10:43)

Quick service is the name applied to the types of jobs that can be completed in about 30 minutes, or less. Quick service stalls should be located near the entrance to the service department to place the customer near the waiting lounge, showroom and cashier.

Safety, economy and practicality indicate that the location of the body and paint shop should be separated from the main dealership building or at least separated from the other facilities by a firewall. Excessive noise, fumes from welding and painting operations, general unsightliness of damaged vehicles, and the normal fire hazard created by the operation point up the importance of separating this area from the rest of the service department. The body and paint shop, located in the

dealership building should be toward the rear of the service department, away from the customer reception area.

The important height in the service area is the dimension from the floor to the lowest point overhead. To accommodate lifts, there should be 12-14 feet of clearance for passenger cars and light duty trucks, and 14-16 feet for large trucks. Clearance can be increased by keeping overhead plumbing, heating and sprinkler systems above the underside of beams and trusses.

Good service area lighting reduces employee fatigue, helps morale and increases the quality of workmanship. In the low ceiling areas it is desirable to center fluorescent light fixtures between stalls for maximum light where it is needed most. In the high ceiling areas it is usually better to use light-output fixtures mounted directly to beams and trusses rather than incur the expense of long mounting arms.

Explosion-proof lamps are required inside the paint booth and vapor-proof lamps are necessary outside. Deluxe, cool white fluorescent lamps aid in good color matching. For extra-fine hand polishing and finishing, 100 more footcandles than specified is required.

A system of overhead, gas unit heaters and blowers, with thermostatic controls for individual operation, is usually the most economical for service departments. Such a system provides

immediate heat to counteract cold blasts from open service doors. Hot water or steam unit heaters are the next best choice, with the hot water system usually offering the greater economy.

Electrical outlets should be provided for each stall, machine shop, body shop and at other strategic locations. Certain shop equipment, such as welding equipment, requires 220 volts. All electric outlets in the service department should be at least three feet above the floor since gasoline fumes can accumulate below this level and create an explosion hazard.

An exhaust system to remove carbon monoxide from the enclosed service department is a must. In-the-floor systems are preferred to overhead types since the flexible tubes used can be lowered into floor ducts when not in use.

The main floor areas of the service department must be equipped with sufficient drains. A drain trough through the center of the main aisle or across the doorways is the most effective. Floors should be graded to slope approximately $\frac{1}{4}$ percent toward the drains.

A compressed air system is required for operating hydraulic lifts, cleaning equipment and tools. Overhead air lines with a feeder pipe between each pair of stalls and an air hose to each technician are desirable.

4.6 Service Stalls

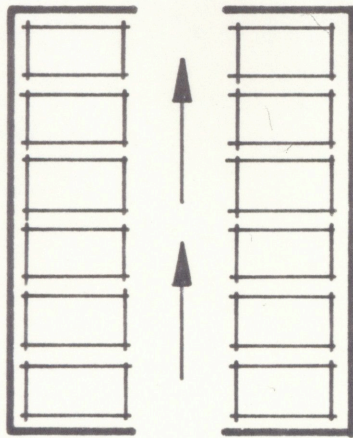
The arrangement of service stalls is one of the most critical factors in achieving an efficient layout. A straight-in stall arrangement requires only eleven feet of wall space per car as compared to sixteen feet per car when stalls are angled at 45 degrees. The straight-in stall arrangement requires a wider building and a 22 foot aisle for a total building width of 70 feet. However, the total square feet required per stall with a straight-in stall arrangement is far less than that required with an angled arrangement.

Figure 10 shows stall and aisle arrangements which take advantage of the efficiency of straight-in stalls. A simple "I" pattern is the most efficient. The "I" pattern will work in most dealerships provided the site permits such an arrangement. However, if the number of stalls required results in an excessive overall length it makes supervision difficult and places end stalls too remote from the parts department.

The "L" pattern is the second most efficient stall and aisle arrangement. It is normally used in cases where straight through traffic flow is not possible. With this arrangement it is necessary to sacrifice a stall in order to accommodate one of the entrances.

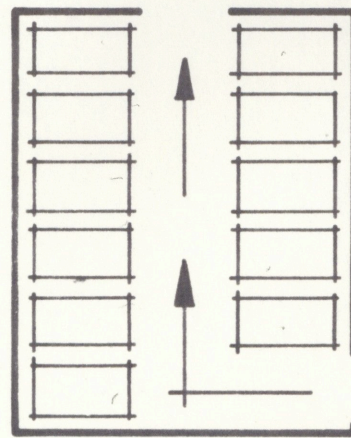
The "T" pattern permits the same number of stalls as the "L" pattern. However, it is not recommended over the "L"

"I" Pattern



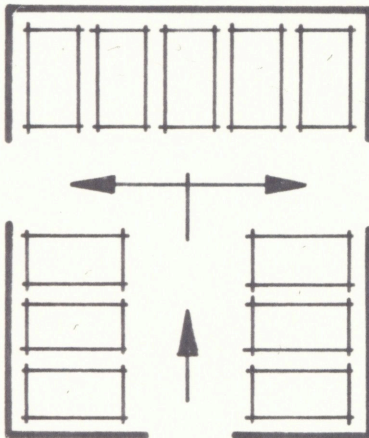
405 Sq. Ft./Stall

"L" Pattern



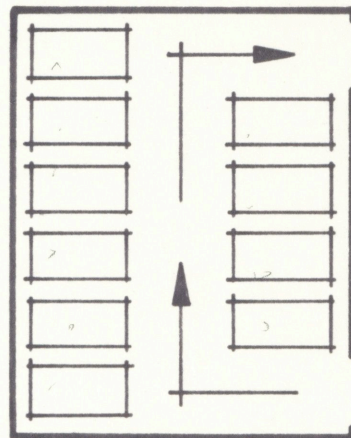
472 Sq. Ft./Stall

"T" Pattern



472 Sq. Ft./Stall

"U" Pattern



515 Sq. Ft./Stall

Figure 10. Service Stall and Aisle Patterns (10:38)

pattern since it creates a problem in jockeying cars into the two end stalls near each exit. This stall and aisle arrangement is useful in those cases when an exit in the rear wall is impossible or the location of an alley makes two side exits more practical.

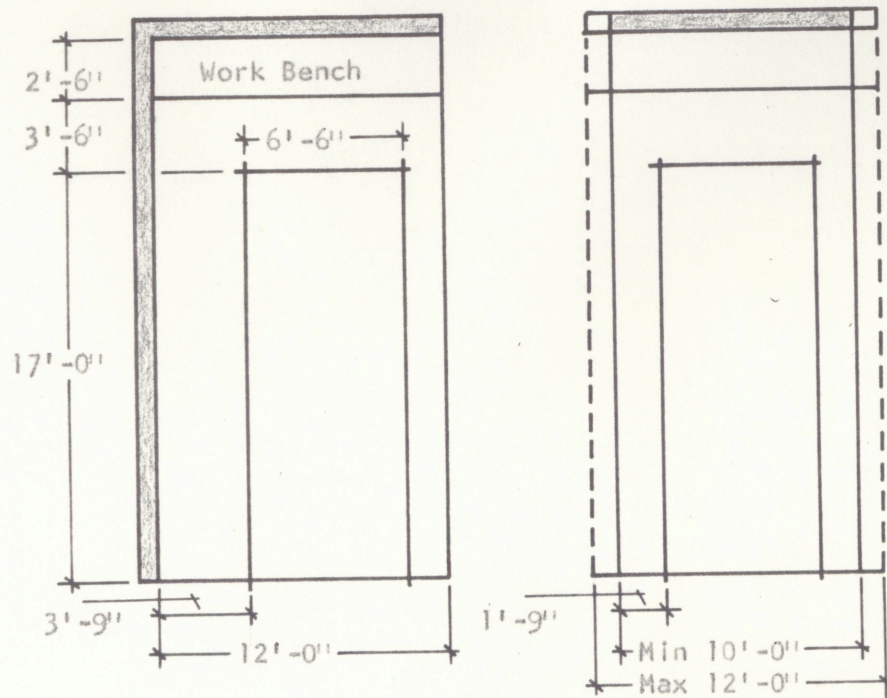
The "U" pattern is one which should only be used in large service operations, or where no other arrangement is permissible because of existing building conditions.

Figure 11 shows standard and special purpose service stalls. The standard stalls will adequately service: customer reception, lubrication, quick service, general repair, body repair, new unit predelivery, and used unit reconditioning. The special purpose stalls will serve: front-end alignment, wash and polish, undercoating, paint and drying oven and frame straightening.

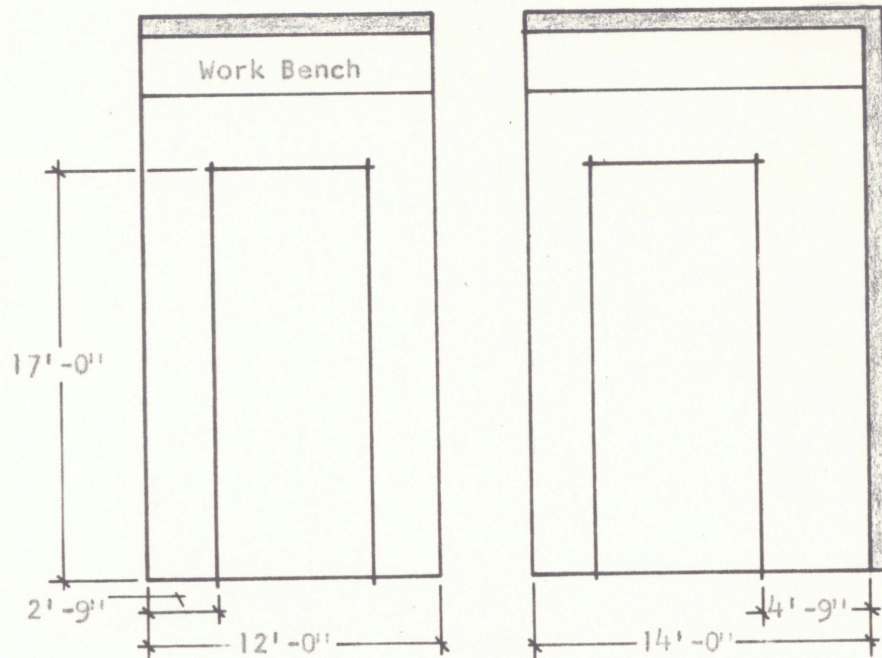
4.7 Parts Department

The layout of the parts department should be flexible. It should permit easy rearrangement of bins and racks as well as provide adequately for future expansion. The distribution of the floor area in a typical parts department is as follows:

Counter, lobby and display	15%
Bins and aisles	30%
Bulk storage and aisles	30%
Shipping and receiving	20%
Office	5% (10:54)



a. Standard



b. Special Purpose

Figure 11. Service Stall Dimensions (8:42)

The parts counter should be located convenient to both the service area and retail customers. Separate counters should be provided whenever possible, however, a L-shaped arrangement of counters permits better service with a minimum of service personnel. Since retail parts are usually sold direct to the car owner, the retail sales counter should open onto a lobby and display area. The parts counter for service orders should open directly into the main service department and be accessible to all service personnel.

4.8 Used-car Operation

A normal ratio of used-cars to new-cars is 2:1. Since much of the dealers working capital is tied up in his used-cars, the lower this ratio the better off the dealer is. Because of the working capital involved the dealer must do an outstanding job of merchandising his used-cars. An important part of this job is displaying, protecting and lighting used-cars in a manner which invites potential customers to stop, look and buy.

The ideal location for a used-car operation is next to the dealership facility. Prospective customers have greater confidence in lots backed by a full-scale dealership. This location also permits better supervision of the used-car operation.

Used-car lots should be hard-surfaced for best merchandising appeal. Six inches of concrete asphaltic paving provides a sufficient surface material. Good drainage of the used-car area is also important.

The possibility of providing a covered area for used-car display should be seriously considered when designing a dealership facility which includes a used-car operation. A covered used-car display area offers many advantages to both dealer and potential customers. A covered used-car area allows:

1. Year-round protection for cars, customers and salesmen.
2. 365 selling days a year.
3. Reduced insurance rates through minimum theft and storm damage.
4. Better illumination control and a reduction in light bills.
5. Lower daily maintenance costs.

Lighting of the used-car area should illuminate the cars and draw attention to them. This can be done by focusing maximum light on the lot perimeter (first 25 feet) with spot lights and using fluorescent lights for general lighting of the interior area. The perimeter of the lot should have 100 to 500 footcandles of illumination and the interior area 40 footcandles.

BUILDING PROGRAM

5. BUILDING PROGRAM

The building program for a Ford Automobile Dealership for Bozeman, has been analyzed in three different ways: 1) a general outline, 2) a detailed analysis of the areas, and 3) a flow diagram.

5.1 General Outline

The general outline shows the major areas and the specific areas within each major area along with approximate square foot requirements. This part of the building program helps the reader to quickly become acquainted with the program and to find the essence of the problem without fruitless searching.

<u>Area</u>	<u>Approx. Sq. Ft.*</u>
<u>Showroom and Office Area</u>	
1. Showroom (5 cars @ 460 sq. ft. each)	2,300
2. Dealer or General Manager's Office	200
3. Sales Manager's Office	120
4. Salesmen's Offices (3 @ 72 sq. ft. each)	216
5. General Office	250
6. Conference Room	300
7. Customer Waiting Lounge	160✓
8. Public Service Area (restrooms)	160
9. Storage Area	120

* This does not include aisles, halls, and miscellaneous storage.

<u>Area</u>	<u>Approx. Sq. Ft.</u>
<u>Parts Department</u>	
1. Parts counter, Lobby and Display Area	600
2. Small Parts Storage	1,150
3. Bulk and Sheet Metal Storage	1,150
4. Inflammable Storage	100
5. Shipping and Receiving Area	700
6. Parts Manager's Office	120
<u>Service Department</u>	
1. Customer Reception (4 stalls @ 288 sq. ft. each)	1,152
2. Lubrication (2 stalls @ 288 sq. ft. each)	576
3. Minor Repair (6 stalls @ 288 sq. ft. each)	1,628
4. Major Repair (4 stalls @ 312 sq. ft. each)	1,152
5. Appearance (3 stalls @ 312 sq. ft. each)	864
6. Body Shop (4 stalls @ 288 sq. ft. each)	1,152
7. Paint Shop (2 stalls @ 312 sq. ft. each)	576
8. Truck Repair (1 stall @ 420 sq. ft.)	420
9. Machine Shop	240
10. Tool Room	120
11. Service Manager's Office	120
12. Employees Facilities (locker room, toilet and shower)	400

<u>Area</u>	<u>Approx. Sq. Ft.</u>
<u>Service Department</u> (Continued)	
13. Mechanical Room	400
14. Janitor and Maintenance Storage	60

Parking

1. Demonstrator (4 cars @ 300 sq. ft. each)	1,200
2. Customer (12 cars @ 300 sq. ft. each)	3,600
3. Employee (24 cars @ 250 sq. ft. each)	6,000
4. Service (48 cars @ 300 sq. ft. each)	14,400

New-Car Storage (29 cars @ 250 sq. ft. each) 7,250

Used-Car Display (43 cars @ 300 sq. ft. each) 12,900

5.2 Analysis of Areas

The following detailed analysis of space requirements is the result of research into dealership space requirement pamphlets and interviews with representatives of the local automobile dealerships.

The analysis shows a general description of area function, equipment, minimum lighting requirements, the desired relationship between the areas and the approximate square foot requirements.

<u>Area</u>	<u>Approx. Sq. Ft.*</u>
<u>Showroom and Office Area</u>	
1. Showroom (5 cars @ 460 sq. ft. each)	2,300
Function - provide area for the display and inspection of new cars.	
Equipment - lounge furniture and shelves or small tables for sales pamphlets and magazines.	
Lighting - 200 footcandles	
Relationship - direct to outside, salesmen's offices, administrative area and customer waiting lounge.	
2. Dealer or General Manager's Office	200
Function - provide individual and small group conference and work spaces.	
Equipment - executive desk and chair, visitors chairs, bookshelves, personal filing cabinet, small work table and coat closet.	
Lighting - 100 footcandles	
Relationship - direct to showroom and general office.	
3. Sales Manager's Office	120
Function - provide individual and small group conference and work spaces.	
Equipment - desk and chair, visitors chairs, bookshelves, personal filing cabinet, small work table and coat closet.	

* This does not include aisles, halls, and miscellaneous storage.

<u>Area</u>	<u>Approx. Sq. Ft.</u>
3. Sales Manager's Office (Continued)	
Lighting - 100 footcandles	
Relationship - direct to showroom, salesmen's offices, general office and convenient to used-car operation.	
4. Salesmen's Offices (3 @ 72 sq. ft. each)	216
Function - provide individual work area and privacy to customers when discussing deals.	
Equipment - desk and chair, customer chairs, bookshelves, personal filing cabinet and coat storage.	
Lighting - 100 footcandles	
Relationship - direct to showroom, sales manager's office, general office and convenient to used-car operation.	
5. General Office (4 people: 100 sq. ft. first person; 50 sq. ft. each additional)	250
Function - provide area for stenographic, recording and accounting functions, and service cashier.	
Equipment - desks and chairs, filing cabinets, calculating machine, typewriters, work table, customer service counter, vault and storage for miscellaneous office supplies and coats.	
Lighting - 150 footcandles	
Relationship - direct to all administration areas and customer waiting lounge.	

<u>Area</u>	<u>Approx. Sq. Ft.</u>
6. Conference Room (20 people: 72 sq. ft. first person; 12 sq. ft. each additional)	300
Function - provide meeting area for dealer- ship personnel, sales representatives and technical service instruction. Possible use as a lunchroom.	
Equipment - conference table and chairs, cabinets, bookshelves, visual aid equip- ment and a small kitchenette.	
Lighting - 100 footcandles	
Relationship - direct to showroom and administration areas.	
7. Customer Waiting Lounge	160
Function - provide comfortable surround- ings for waiting customers and display promotional materials.	
Equipment - lounge furniture, television, vending machines, telephone, lamps, and small tables or shelves for reading materials.	
Lighting - 100 footcandles	
Relationship - direct to service customer reception, general office or cashier and providing a view of showroom.	
8. Public Service Area (restrooms)	160
Function - provide restroom facilities for customer and office personnel.	
Equipment - as required by the <u>National Building Code</u> .	

<u>Area</u>	<u>Approx. Sq. Ft.</u>
8. Public Service Area (restrooms) (Continued)	
Lighting - 25 footcandles	
Relationship - direct to showroom, customer waiting lounge and administration areas.	
9. Storage Area	120
Function - provide storage of bulk office supplies, old records, promotional material, projectors, etc.	
Equipment - wall shelves and filing cabinets.	
Lighting - 25 footcandles	
Relationship - direct to showroom and administration areas.	

Parts Department

1. Parts Counter, Lobby and Display Area	600
Function - provide area for obtaining retail and service order parts and displaying parts and accessories.	
Equipment - L-shaped counter and display equipment.	
Lighting - 100 footcandles	
Relationship - retail parts counter direct to lobby and display area; service parts counter direct to service area; lobby and display area adjacent to new-car showroom.	
2. Small Parts Storage	1,150
Function - provide storage for small and fast moving parts.	

<u>Area</u>	<u>Approx. Sq. Ft.</u>
2. Small Parts Storage (Continued)	
Equipment - 3x1x7 foot high small parts bins with adjustable partitions.	
Lighting - 100 footcandles	
Relationship - direct to parts counter, lobby, and display area.	
3. Bulk and Sheet Metal Storage	1,150
Function - provide storage for large parts, and sheet metal products.	
Equipment - 3x2x7 foot high bins and vertical storage racks with adjustable partitions.	
Lighting -- 100 footcandles	
Relationship - direct to parts counter, lobby and display area.	
4. Inflammable Storage	100
Function - provide storage for oil, paint, and other inflammable materials.	
Equipment - sprinkler system, fireproof door and wall shelves.	
Lighting -- 25 footcandles	
Relationship - direct to service parts counter.	
5. Shipping and Receiving Area	700
Function - provide area for preparing shipments, receiving and inspecting incoming shipments and temporary crate storage.	

<u>Area</u>	<u>Approx. Sq. Ft.</u>
5. Shipping and Receiving Area (Continued)	
Equipment - sorting table, tools for packing and unpacking, small loading deck and heavy equipment hoists.	
Lighting - 100 footcandles	
Relationship - direct to small and bulk storage bins with access to exterior.	
6. Parts Manager's Office	120
Function - provide area for general office work, preparing orders and recording shipments received.	
Equipment - desk and chair, filing cabinets, bookshelves and work table.	
Lighting - 100 footcandles	
Relationship - direct to parts counter, service manager's office and general office.	

Service Department

1. Customer Reception (4 stalls @ 288 sq. ft. each)	1,152
Function - provide area for discussing customer service requirements and display of service merchandise.	
Equipment - write-up desk, small work benches, water, compressed air and electrical connections.	
Lighting - 100 footcandles	
Relationship - direct to outside, service entrance and service manager's office. Write-up desk should be located to the driver's left.	

<u>Area</u>	<u>Approx. Sq. Ft.</u>
2. Lubrication (2 stalls @ 288 sq. ft. each)	576
Function - provide lubrication service for passenger cars and light trucks.	
Equipment - hydraulic lift, overhead lube dispensing equipment, engine oil storage containers, portable mechanic's lamps, special tools and water, compressed air and electrical connections.	
Lighting - 100 footcandles	
Relationship - direct to service entrance and customer reception area.	
3. Minor Repair (6 stalls @ 288 sq. ft. each)	1,628
Function - provide engine analysis, motor tune-up, steering adjustment and alignment and brake adjustment for passenger cars and light trucks.	
Equipment - engine analyzer, spark plug cleaner and testor, small armature lathe, generator and starter motor test bench, carburetor cleaning tank, head light testing and aiming device, wheel aligning equipment, hydraulic car jacks, wheel pullers and adjusting tools, brake drum turning lathe, shoe and/or lining grinder, general work benches, exhaust withdrawal system, portable mechanic's lamps, special tools and water, compressed air and electrical connections.	
Lighting - 100 footcandles	
Relationship - locate toward front of service department direct to service parts counter and tool room.	

<u>Area</u>	<u>Approx. Sq. Ft.</u>
4. Major Repair (4 stalls @ 312 sq. ft. each)	1,152
Function - provide extensive repairs to the engine, internal parts and drive elements of passenger cars and light trucks.	
Equipment - work benches, tool cabinets, large hydraulic car jacks, arbor press, chain falls, exhaust withdrawal system, portable mechanic's lamps, special tools and water, compressed air and electrical connections.	
Lighting - 100 footcandles	
Relationship - locate toward rear of service department direct to service parts counter, tool room and machine shop.	
5. Appearance (3 stalls @ 312 sq. ft. each)	864
Function - provide new-car preparation, used-car cleaning and reconditioning, and washing facilities.	
Equipment - small work benches, vacuum cleaning equipment, small storage cabinets, and water, compressed air and electrical connections.	
Lighting - new and used car preparation areas 100 footcandles, wash area 50 footcandles.	
Relationship - locate toward rear of service department direct to body and paint shop when in same building.	
6. Body Shop (4 stalls @ 288 sq. ft. each)	1,152
Function - provide repair of body, trim, interior furnishings and accessories.	

<u>Area</u>	<u>Approx. Sq. Ft.</u>
6. Body Shop (Continued)	
Equipment - hydraulic body jack, floor jack, combination shop and arbor press, small and large hydraulic spreader, oxygen-acetylene welding equipment, anvil, stationary work bench, portable scaffolds, portable floor lights, storage cabinets, special tools and water, compressed air and electrical connections.	
Lighting - 100 footcandles	
Relationship - ideal location in separate building with paint shop. When located in same building locate toward rear of service department next to paint shop.	
7. Paint Shop (2 stalls @ 312 sq. ft. each)	576
Function - provide facilities for painting cars.	
Equipment - air intake filters, and exhaust fan, safety or explosion proof lighting, drying equipment, portable scaffolds or hinged catwalks, storage cabinets, portable floor lamps, and water, compressed air and electrical connections.	
Lighting - 200 footcandles	
Relationship - ideal location in separate building with body shop. When located in same building should be toward rear of service department next to body shop.	
8. Truck Repair (1 stall @ 420 sq. ft.)	420
Function - provide a repair area for large trucks.	

<u>Area</u>	<u>Approx. Sq. Ft.</u>
8. Truck Repair (Continued)	
Equipment - work bench, exhaust withdrawal system, portable mechanic's lamps, and water, compressed air and electrical connections.	
Lighting - 100 footcandles	
Relationship - direct to service department but toward rear.	
9. Machine Shop	240
Function - provide area for machine work on large equipment.	
Equipment - lathes, grinders, hydraulic press, large drills and various metal working machines and work benches, and water, compressed air and electrical connections.	
Lighting - 100 footcandles	
Relationship - direct to major repair service stalls.	
10. Tool Room	120
Function - provide storage for special tools and equipment.	
Equipment - special tools and company owned equipment, some cabinets and shelves.	
Lighting - 50 footcandles	
Relationship - direct to major and minor repair stalls.	

<u>Area</u>	<u>Approx. Sq. Ft.</u>
11. Service Manager's Office	120
Function - provide individual and small group conference and work spaces. Also, storage of service manuals, and service records. Area raised to provide better supervision.	
Equipment - desk and chair, wall bookshelves, work table and filing cabinets.	
Lighting - 100 footcandles	
Relationship - direct to service customer reception, general office and convenient to all service areas.	
12. Employees Facilities (locker room, toilet and shower)	400
Function - provide locker, toilet and shower facilities, lunch room and lounge areas.	
Equipment - toilet facilities as required by the <u>National Building Code</u> , lockers, tables, lounge furniture.	
Lighting - locker area and lounge 50 footcandles; shower and toilet area 25 footcandles.	
Relationship - direct to service department, lounge, and also direct to outside.	
13. Mechanical Room	400
Function - provide area for equipment used to heat and cool the building, electrical and communication panels.	
Equipment - boiler, air conditioning equipment (when used), electrical and communication central controls.	

<u>Area</u>	<u>Approx. Sq. Ft.</u>
13. Mechanical Room (Continued)	
Lighting - 50 footcandles	
Relationship - centrally located.	
14. Janitor and Maintenance Storage	60
Function - provide storage for cleaning and maintenance equipment.	
Equipment - sink, wall shelves, maintenance equipment.	
Lighting - 25 footcandles	
Relationship - centrally located.	

Parking

1. Demonstrator (4 cars @ 300 sq. ft. each)	1,200
Function - provide parking and display of demonstrator cars adjacent to showroom.	
Equipment - paved and preferably covered area.	
Lighting - display lighting 200 footcandles.	
Relationship - direct to showroom and front of facility for display purposes.	
2. Customer (12 cars @ 300 sq. ft. each)	3,600
Function - provide on site parking for new and used car customers, retail parts customers and sales representatives.	
Equipment - paved area	
Lighting - minimum 40 footcandles	

<u>Area</u>	<u>Approx. Sq. Ft.</u>
2. Customer (Continued) Relationship - direct to showroom, retail parts lobby and counter.	
3. Employee (24 cars @ 250 sq. ft. each) Function - provide on site parking for employees. Equipment - paved area Lighting - minimum 40 footcandles Relationship - accessible to work areas but toward rear of facility.	6,000
4. Service (48 cars @ 300 sq. ft. each) Function - provide on site parking for pre and post service cars. Equipment - paved area Lighting - minimum 40 footcandles Relationship - direct to service area entrance and exit, customer waiting lounge and cashier.	14,400
<u>New-Car Storage</u> (29 cars @ 250 sq. ft. each) Function - provide storage area for approximately 30 days supply of new cars and light trucks. Equipment - covered area, possibly in basement, minimum mechanical. Lighting - 50-100 footcandles Relationship - direct to outside or to service department.	7,250

<u>Area</u>	<u>Approx. Sq. Ft.</u>
<u>Used-Car Display</u> (43 cars @ 300 sq. ft. each)	12,900

Function - provide attractive display area for merchandising used-cars.

Equipment - paved area, possibly covered.

Lighting - general lighting 40 footcandles; display lighting perimeter (25 feet) 200 footcandles.

Relationship - adjacent to main dealership facility.

5.3 The Flow Diagram

Figure 12 shows the flow diagram for the activities involved in an automobile dealership. The flow diagram, a common method for evaluating a building program, demonstrates the organization of areas and their relationship to each other as required by their functions.

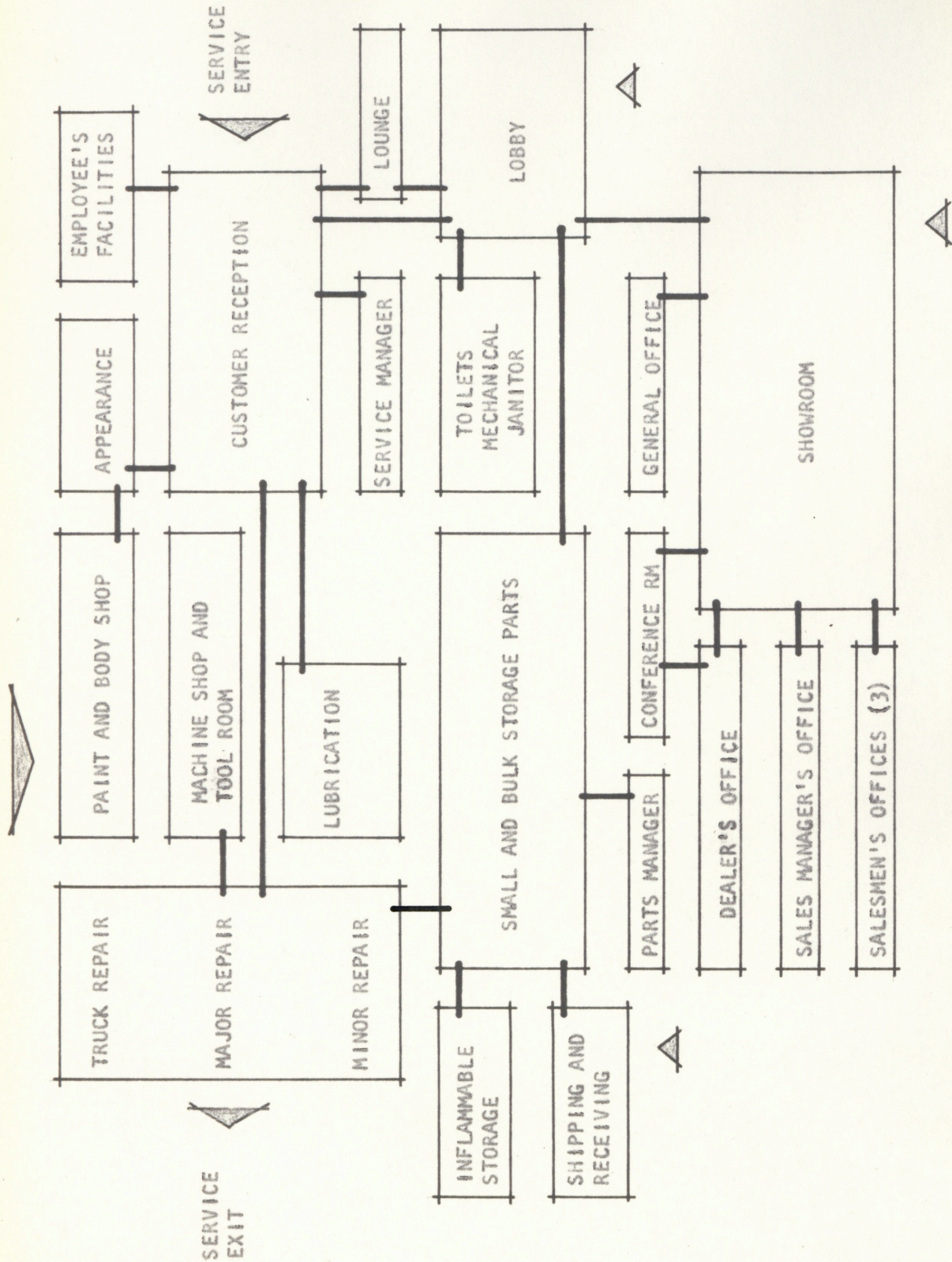


FIGURE 12. FLOW DIAGRAM

AESTHETIC CONSIDERATIONS

6. AESTHETIC CONSIDERATIONS

6.1 Function

The aesthetic considerations of a building are governed by the function which the building is designed to serve. These functions may be viewed through either a narrow or wide frame of reference. Viewing them through a narrow frame of reference the specific building functions must be considered. For an automobile dealership these would consist of: automobile and pedestrian traffic, relationship between areas, circulation, location of stairs, maintenance problems, etc. These are of minor concern but, nevertheless, contribute aesthetic quality to the building. Viewing the building through a wider frame of reference the aesthetic considerations become concerned with the style the building is to take in order to relate pleasingly to the community. Here the aesthetic considerations are concerned with the eye-catching quality the building possesses, the pleasing atmosphere it creates and the welcoming or inviting appearance it has. These functions are of major concern to the aesthetic considerations.

6.2 Form

The architectural style of the dealership is an important factor in attracting the buying public. It should be distinctive so that it creates a definite impression--yet it should not clash with a predominating architectural style in the area. At the

same time it should have a progressive characteristic--friendly but professional and businesslike.

The overall structure should express itself as an automobile dealership and individual areas should be implied without requiring signs. Customer appeal should be the dominating theme motivating the design and construction of the dealership--both inside and outside. The entire building complex becomes an individual business or dealer identity.

6.3 Unity

Beside the aesthetic value determined through function an awareness of the position the building holds to other buildings around the community should be considered. Good building design in combination with tastefully conceived signs, provides positive attraction and even serves as a landmark for the entire area.

An imaginative and dramatic application in showroom design can attract attention and enhance the display of automobiles. However, care should be exercised so that no one part of the facility dominates the layout to the detriment of the other facilities. In the overall design concept the rear areas of the dealership should not be overlooked, especially if it is seen by customers. An effective building design can keep this area from destroying the image created by the frontal treatment.

ECONOMIC CONSIDERATIONS

7. ECONOMIC CONSIDERATIONS

7.1 Financing

There are basically three sources through which a dealer can finance a dealership facility: 1) a loan from a bank, insurance company, or lending institution; 2) a private individual with a large sum of money to invest; or 3) the Ford Motor Company. In all three, the dealer must provide some security.

The third source is a fairly new program. Through it the Ford Motor Company will provide funds to establish a dealership facility in areas which show signs of having good sales potential. Under this program the dealer must repay the loan and take over the Ford Motor Company's share of the dealership facility.

7.2 Cost Analysis

In general there are four different methods by which building cost estimates can be made in the early stages of design. These are:

1. The square foot cost method. This method makes use of the area of a building, and cost is determined by estimating the dollars which the building costs per square foot of floor area.
2. The cubic foot cost method. This method makes use of the volume of a building, and cost is determined by estimating the dollars which the building costs per cubic foot of total volume.

3. The segregated cost method. In this method the cost of various portions of the building are calculated separately until all the parts included in the building have been accounted for. The cost of these parts is then added to determine the total construction cost. This is, perhaps, the most accurate method, but it is also the most difficult. In order to determine a reasonable estimate the design of the building must be near the final stages.
4. The per capita cost method. This method is used mainly in dealing with public buildings. It is a rough way of estimating the cost of a building in relation to the local population. In this method, cost is estimated in dollars per person.

In this report the square foot cost method shall be used. This method seems more adequate than any of the others because most of the information thus far available, as to the size of the dealership, is in terms of square feet. The total cost--or construction cost--is taken to be the cost of only the building itself. This includes construction, fixed equipment, architect's and engineer's fees, and incidentals. It does not include the cost of the land, extensive landscaping, interior furnishings and special equipment.

The figures used in estimating the total cost of the automobile dealership were obtained from the Marshall Valuation Service book. This book breaks the costs of a dealership into the showroom and service areas.

The square foot cost is dependent upon the class of construction used in the dealership building. The Marshall Valuation Service gives a figure of \$14.00 per square foot for a good class C automobile showroom. This consists of:

1. Class C Construction--masonry or concrete load bearing walls with wood or steel floor joists or slab on ground, and wood or steel roof joists with wood or steel deck.
2. Exterior walls--brick, ornamental, store front, large glass area.
3. Interior finish--plaster, terrazzo floor, sales cubicles,
4. Lighting, plumbing and mechanical--display lighting, restrooms.
5. Heating--hot water.

The Marshall Valuation Service gives a figure of \$10.00 per square foot for an excellent class C service garage. This consists of:

1. Class C Construction--masonry or concrete load bearing walls with wood or steel floor joists or slab on ground, and wood or steel roof joists with wood or steel deck.

2. Exterior walls--steel or concrete columns and girders, with masonry walls.
3. Interior finish--painted walls and ceiling, plaster and tile trim.
4. Lighting, plumbing and mechanical--fluorescent, good restrooms.
5. Heating--hot water unit heaters.

These figures are to the nearest dollar and have been corrected to account for local conditions, heating in cold climates and story heights over twelve feet. This is probably the most accurate cost estimate for a dealership that can be made at this stage of design.

7.3 Site and Site Improvement

Waite and Company are the real estate agents for the Holy Rosary Church who is the owner of the site selected for the automobile dealership. The total cost of the site is \$110,000.00

In a well-balanced investment of land and property, the cost of land will approximate 20 percent of the total cost of land and buildings. According to this the total cost of the site is high. However, this may be partially offset by the fact that no costly demolishing or grading will be necessary to make the site ready for construction.

Approximately one percent of the total construction cost should be sufficient for landscaping. The cost of roadways, parking area and sidewalks must also be considered. The Marshall Valuation Service gives the approximate costs as follows:

6 inches asphaltic concrete paving	\$.27 sq. ft.
6 inches concrete curb, no gutter	1.20 sq. ft.
4 inches concrete sidewalk	.49 sq. ft.
5 inches concrete apron	.68 sq. ft.

The possible relocation of a four inch gas main which runs through the site will depend on the design and location of the dealership on the site. The cost of relocating this gas main would be approximately \$5.40 per lineal foot.

7.4 Size and Cost Estimate

The cost of an automobile dealership depends largely upon its size. The size of an automobile dealership, in turn, depends upon the annual new car sales potential in the area in which the dealership is located.

The General Motors Corporation sets up a table showing the relationship between the annual new car sales potential and the approximate minimum space requirements in square feet. Table II shows this relationship. It should be kept in mind that the figures in this table are not given as ideal figures but as a reasonable starting point for determining dealership area requirements.

TABLE II
DEALER FACILITIES SPACE GUIDE RECOMMENDATIONS (5:8)

Building Area (Square Feet)												
Planning New Car Sales Potential	Service Stalls	Service Area	Parts Area	Showroom, Offices	Total Building	Total Land Area Including Building						
175-200	16	8,000	2,000	1,800	11,800	37,150						
200-225	17	8,500	2,500	1,900	12,900	40,500						
225-250	19	9,500	2,500	2,000	14,000	44,700						
250-275	21	10,500	2,800	2,200	15,500	49,300						
275-300	22	11,000	2,800	2,400	16,200	52,250						
300-350	24	12,000	3,700	2,600	18,300	58,850						
350-400	26	13,000	3,700	2,800	19,500	64,550						
Lot Area (Square Feet)												
Service Parking Units	Service Parking Area	Employee Units	Employee Parking Area	New-Car Storage Units	New-Car Storage Area	Used-Car Units	Used-Car Display Area	Total Lot				
32	9,600	16	4,000	17	4,250	25	7,500	25,350				
34	10,200	17	4,250	19	4,750	28	8,400	27,600				
38	11,400	19	4,750	21	5,250	31	9,300	30,700				
42	12,600	21	5,250	23	5,750	34	10,200	33,800				
44	13,200	22	5,500	25	6,250	37	11,100	36,050				
48	14,400	24	6,000	29	7,250	43	12,900	40,550				
52	15,600	26	6,500	33	8,250	49	14,700	45,050				

Most Bozeman dealerships now have an annual new car sales potential in the 200-225 range. Therefore, it would be advisable to design a dealership to handle the 300-350 range in preparation for the future.

Using the area requirements for a dealership with an annual new car sales potential in the 300-350 range from Table II, page 68, and the cost estimate figures obtained from the Marshall Valuation Service (see page 65), the following size and cost estimate can be made.

<u>Item</u>	<u>Area (Sq. Ft.)</u>	<u>Cost Per Sq. Ft.</u>	<u>Total Cost</u>
Showroom and Offices	2,600	\$14	\$ 36,400
Service Area	12,000	10	120,000
Parts Area	<u>3,700</u>	10	<u>37,000</u>
Total Building	18,300		\$193,400
Cost of Land			<u>110,000</u>
Total Cost of Land and Building			\$303,400

This \$303,400 figure does not include the large areas of paving, special equipment or landscaping which will be required.

7.5 Amoritization

The present Ford Dealership Facility is leased, therefore, a construction loan would probably have to include the cost of the site. The Marshall Valuation Service gives a life expectancy for

a good dealership building as 40 years. An annual payment to amortize the loan within this 40-year period, at six percent interest, would be about \$20,000. This amount is not unreasonable because it is not unusual for a dealership to pay as much as ten percent annually of the total cost of land and buildings for amortization, taxes, building maintenance and insurance. Ten percent of the total estimated cost of land and buildings would be approximately \$30,000.

REFERENCE LIST

REFERENCE LIST

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14. Personnal interviews with:

Robert Arpin, Salesman for Rolfe and Wood, Chrysler Motors Dealer, Bozeman, Montana.

Earl Coulton, Area Representative for the Chevrolet Division of the General Motors Corporation,

William Rolfe, Part owner of Rolfe and Wood, Chrysler Motors Dealer, Bozeman, Montana.

Norman Wallin, Owner of Bozeman Motors, Inc., Ford Motor Company Dealer, Bozeman, Montana.

15. Personnal correspondence with:

C. R. Colville, Assistant Director, Dealer Development for the American Motors Corporation, Detroit, Michigan.

H. A. Hanson, Business Management Manager for the Chrysler Motors Corporation, Portland, Oregon.

Stephen E. Madeline, Educational Affairs Department of the Ford Motor Company, Dearborn, Michigan.

Gary W. Bell, Service Promotion Section for the Cadillac Division of the General Motors Corporation, Detroit, Michigan.

Clarke H. Stevenson, Assistant Manager, Advertising and Public Relations for the Stran-Steel Corporation, Houston, Texas.

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