

LIBRARY
Montana State University
BOZEMAN

P378
.a15

1098-17

184

TABLE OF CONTENTS

Page

Introduction	1
A NEW MILITARY SCIENCE BUILDING FOR MONTANA	
STATE UNIVERSITY, BOZEMAN, MONTANA	
History of Montana State University	3
History of Reserve	5
Part I	
Undergraduate Thesis in Architectural Design	7
Geographic Location	10
Climate	12
Conditions	
By	
General	14
Jack Oyama	
Temporary	16
Final	18
Submitted to the School of Architecture as partial fulfillment of the requirements for the degree of Bachelor of Architecture	18
Indicate	19
at	
Overarching of	20
Four Function	22
Montana State University	
Site Conditions	
Location	25
Topography	27
Soil Analysis	29
Adjacent Environment	30
Bozeman, Montana	
Drilled Consider	31
June, 1968	
Practice Patterns	32

P878
.015

CASE
726.6
NA 2340
015

TABLE OF CONTENTS

	Page
Introduction	1
<u>Local Conditions</u>	
History of Montana State University	3
History of Reserve Officers' Training Corps (ROTC)	5
Social Conditions	7
Geographic Conditions	10
Climatic Conditions	12
<u>Conditions Creating a Need</u>	
General	14
Temporary Building	15
Poor Site Conditions	16
Poor Acoustics	17
Inadequate Natural Light	18
Inadequate Ventilation	19
Overcrowding of Spaces	20
Poor Function of Spaces	22
<u>Site Conditions</u>	
Location	25
Topography	27
Soil Analysis	29
Adjacent Environment	30
Drillfield Considerations	31
Traffice Patterns	32

Aesthetic Considerations

	Page
Unity	37
Figure 1 "Enrollment decrease in the ROTC program at A.S.U."	8
Proposal	38
Figure 2 "Map of Program"	31
Concept	39
Figure 3 "Main Floor Plan of Present Military Science Building"	23
Character	40
Figure 4 "Proposed Floor Plan"	24

Economic Considerations

Figure Fundamentals	42
Figure Construction Cost	44
Local Economic Conditions	45
Table I "Estimation of Cost"	44

Function of the Building

General	48
People Using the Building	49
Types and Specific Functions of Space	52

Appendix I

Current Space Inventory of ROTC Building	i
--	---

Appendix II

References	iii
------------------	-----

LIST OF ILLUSTRATIONS AND TABLES

	Page
Figure 1 "Enrollment decrease in the ROTC Program at M.S.U.	9
Figure 2 "Map of Bozeman"	11
Figure 3 "Main Floor Plan of Present Military Science Building	23
Figure 4 "Basement Floor Plan"	24
Figure 5 "Map of Montana State University"	26
Figure 6 "Topographic Map of Site"	28
Figure 7 "Views from the Site"	33
Table I "Estimation of Cost"	44

INTRODUCTION

INTRODUCTION

At the present time the Military Science Building, built in 1947 to serve as a temporary facility for the expansion of the post-war ROTC program after World War II, has long performed its purpose and function. Although the facility is capable of handling the number of students enrolled in the Army and Air Force ROTC program, the facility is not capable of meeting the requirements and conditions of a new Military Science Building. The existing conditions are not adequate in the present facility for future years.

Although no definite plans have been considered for a new Military Science Building, Mr. van Teylingen and Professor Gough feel strongly that a new facility be studied and evaluated. I feel that in the next ten years a new Military Science Building for Montana State University will be greatly emphasized and will be one of the top priority items for request at the Board of Regents meeting.

Being a senior cadet in the Army ROTC program - which gives me a personal interest in the program - I have chosen the project, a new Military Science Building for Montana State University, to do as my architectural thesis. Currently in my fourth year in the four-year ROTC program, I have studied and evaluated some of the existing conditions. With the help of interview sources, they have added to the collection of more authoritative information.

I shall present my research in the following manner:

Winter Quarter, 1968

- (1) Investigate the general existing conditions that requires a new Military Science Building.

- (2) Propose and describe the site condition for the building.
- (3) Investigate the aesthetic and economic considerations for which the building is to be designed.
- (4) Analyze the function of the building.

Spring Quarter, 1968

- (1) Present a program for a new Military Science Building.
- (2) Submit a final design solution for a new Military Science Building by using all the research material.

LOCAL CONDITIONS

LOCAL CONDITIONS

History of Montana State University

Army troops, Indian troubles and gold strikers played their part in the history of the Gallatin area. Names like Lewis and Clark, Jim Bridger and John Bozeman added color to the early history. The Gallatin National Forest takes its name from the Gallatin River which was named by Lewis and Clark in honor of Albert Gallatin who was Secretary of the Treasury at the time of the expedition. The Bridger mountain range was called after Jim Bridger, and the city of Bozeman was named after John Bozeman. (2)*

After a number of years passed, the U.S. Congress passed the Second Morrill Act on August 30, 1890, which made access to an annual grant of \$15,000 for each state college to provide a public educational institution of agriculture and mechanical arts. (3:17) On February 16, 1893, the state legislature of Montana established the Montana College of Agricultural and Mechanical Arts located in Bozeman. On April 17th of the same year, the college registered eight students on a proposed budget of \$48,940. (1:62) Classes were scheduled in an abandoned skating rink building owned by Nelson Story and located at the corner of West Main and South Third Avenue. Courses in Agriculture, Domestic Economy, and Applied Science were offered. (3:43) Later in 1935, the state legislature changed the name of the college to Montana State College, and on July 1, 1965, a confused

* The number contained in the parenthesis and separated by a colon is the method of documentation used in this thesis. The first number specifies the reference (see References) and the following number or numbers are the pages.

situation of modifying the name of the college occurred after a heated discussion in the legislature. The current and appropriate name is Montana State University. (1:62)

Today, after three-quarters of a century since those eight enrolled at this educational institution, the enrollment has grown to nearly 8700 students using approximately 40 building facilities on campus. (1:389)

The university has three major fields of activities: resident and continuing education, experimental stations, and an extension service. (1:62-64) Financing is now supported from biennial state legislative appropriations, special congressional enactments, trust funds, student fees, private and miscellaneous grants, and federal grant land-grant income.

In June 1916, Congress passed a National Defense Act which established the ROTC program, outlined a program of instruction, and authorized the appointment of those who successfully completed the courses as Second Lieutenants in the Organized Reserve Corps. However, on June 4, 1920, Congress passed a sweeping amendment of the National Defense Act of 1916 to activate a greatly enlarged and better-regulated ROTC program. By 1928, there were ROTC units in 325 schools, about 225 of them being senior units enrolling 65,000 students in colleges and universities. At that time 6,000 officers a year were being commissioned as Second Lieutenants through the ROTC program. By the middle of 1941, 96,000 reserve officers, most of them ROTC graduates, had been called into service for active duty. (5:5-6)

Since World War II, the ROTC program has been reestablished and more schools are participating into the program. During the 1964-65 school

History of Reserve Officers' Training Corps (ROTC)

Military instruction in the land-granted public colleges began on July 2, 1862, when the U.S. Congress passed the First Morrill Act. This act established all the land-grant colleges to provide military tactics to male students as part of their curriculum. In the years that followed the number of officers so detailed steadily increased, until in 1893, there were 79 colleges and universities administering military instruction. Montana State University established an ROTC unit in the fall of 1896 to comply with the conditions of the First Morrill Act and the Second Morrill Act. At that time 40 able-bodied male students received military instruction in tactics from civilian faculty members. (4:290,329,363,366)

In June 1916, Congress passed a National Defense Act which established the ROTC program, outlined a program of instruction, and authorized the appointment of those who successfully completed the courses as Second Lieutenants in the Organized Reserved Corps. However, on June 4, 1920, Congress passed a sweeping amendment of the National Defense Act of 1916 to motivate a greatly enlarged and better-regulated ROTC program. By 1928, there were ROTC units in 325 schools, about 225 of them being senior units enrolling 85,000 students in colleges and universities. At that time 6,000 officers a year were being commissioned as Second Lieutenants through the ROTC program. By the middle of 1941, 56,000 reserve officers, most of them ROTC graduates, had been called into service for active duty. (5:5-6)

Since World War II, the ROTC program has been reestablished and more schools are participating into the program. During the 1964-65 school

year more than 260,000 students received Army ROTC training including approximately 160,000 students at college level.

The ROTC program at Montana State University is classified as a General Military Science Unit under the provisions of the National Defense Act of 1920. Its graduates are commissioned as Second Lieutenants upon graduation in all military branches of the Army and Air Force.

Montana State University is growing much faster than other colleges or universities in the same area. Since 1950-1965, Montana State University has grown 40 percent compared to other colleges or universities (200 percent) in the United States for the same length of time. This high increase is the result of a lack of similarity equipped in universities in the same area of the northeastern portion of the United States. Another factor contributing to the growth and for the enrollment surge of Montana State University is the unusually large number of students entering in diversified curriculums.

The military science enrollment is now 12 percent of the total male students attending Montana State University. This is due to the optional military science program the Army and Air Force units have put out and the limiting factors imposed by the advance ROTC program.

Therefore, it will be shown that the ROTC program at Montana State University will continue as it does at the present time even though the program is under an optional requirement of male students only. As it seems the enrollment has declined considerably after the optional program has

Social Conditions

On April 17, 1893, the Agricultural College of Montana enrolled eight students. That fall of the same year 135 students were registered.(7:2)

There were too many students for the one existing building on campus.

However, this existing condition still prevails at Montana State University. There are not enough adequate buildings and laboratory facilities for the students who enroll here.

Montana State University is growing much faster than other colleges or universities of the same size. Since 1950-1965, Montana State University has grown 650 percent compared to other colleges or universities.(200 percent) in the United States for the same length of time. This high increase is the result of a lack of similarity equipped in universities in the wide area of the northwestern portion of the United States.. Another factor contributing to the growth and for the enrollment surge of Montana State University is the unusually large postwar baby students entering in diversified curriculums.(7:4)

The military science enrollment is now 12 percent of the total male students attending Montana State University. This is due to the optional military science program the Army and Air Force units have put out and the limiting factors imposed by the advance ROTC program.

Therefore, it will be assumed that the ROTC program at Montana State University will continue as it does at the present time even though the program is under an optional requirement of male students only. As it seems the enrollment has diminished considerably after the optional program has

been administered. Therefore, the present enrollment has been an average of 118 freshmen cadets, 97 sophomore cadets, 63 advanced junior cadets, and 63 advanced senior cadets in the Army ROTC program.⁽⁶⁾ Figure 1 shows the relative number of students enrolled in both ROTC units.

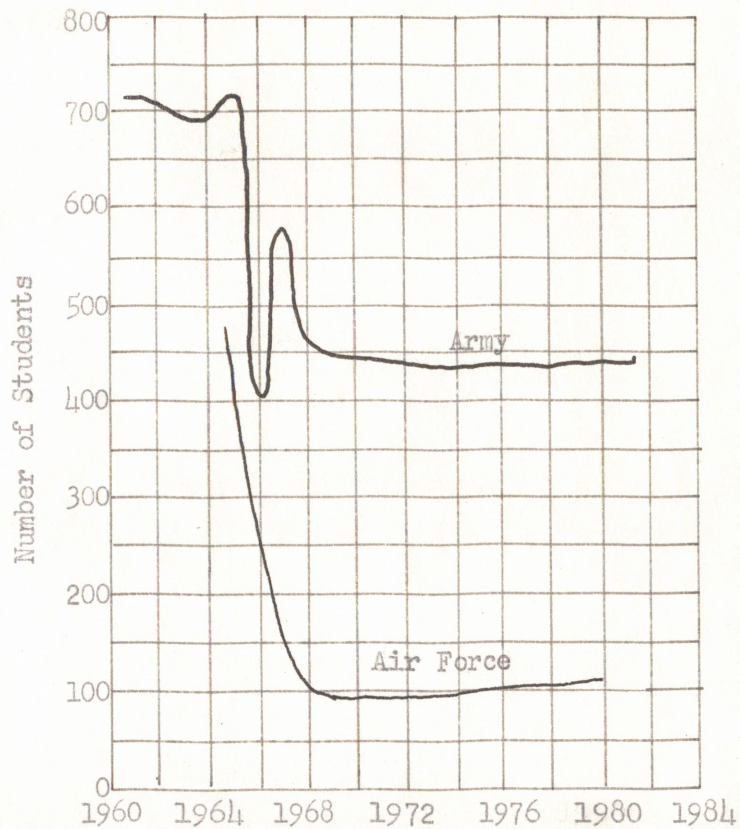


figure 1 ENROLLMENT DECREASE IN THE
ROTC PROGRAM(6,15)

The heavy black line represents the decrease in student enrollment in the Army ROTC program at Montana State University from 1962 to 1980. The thinner line on the graph represents the decrease in student enrollment in the Air Force ROTC program from 1965 to 1980.

Geographic Conditions (8:9)

Montana State University is located in the city of Bozeman, the county seat of the Gallatin County. It is situated in the Gallatin National Forest area which includes 1,700,166 acres and is on the eastern slope of the continental divide in the south central area of Montana. Bozeman is only 90 miles north of West Yellowstone, a tourist attraction bordering the Yellowstone National Park, and 100 miles southwest of Helena, the capital of Montana. The city of Bozeman lies on the east margin of the Gallatin Valley at 45 degrees, 41 minutes north latitude and 111 degrees, 3 minutes west longitude. Bozeman sits at an elevation of 4,793 feet above sea level, and its boundaries cover an area of 2,688 acres.

Two major highways intersect at Bozeman: Interstate 90 or U.S. 10, an east-west thoroughfare; and U.S. 191, a south access from West Yellowstone. Commercial travelling means via to Bozeman are the Greyhound Bus Lines, Northern Pacific Railroad, and Northwest and Western Airlines. There is a major highway proposal on the south portion of Bozeman which will bypass the main central business district of Bozeman.

As shown in Figure 2, the campus of Montana State University is situated on the southwestern section of Bozeman and is about one-half mile from the central business district. The main campus and agricultural area encompasses 921 acres.

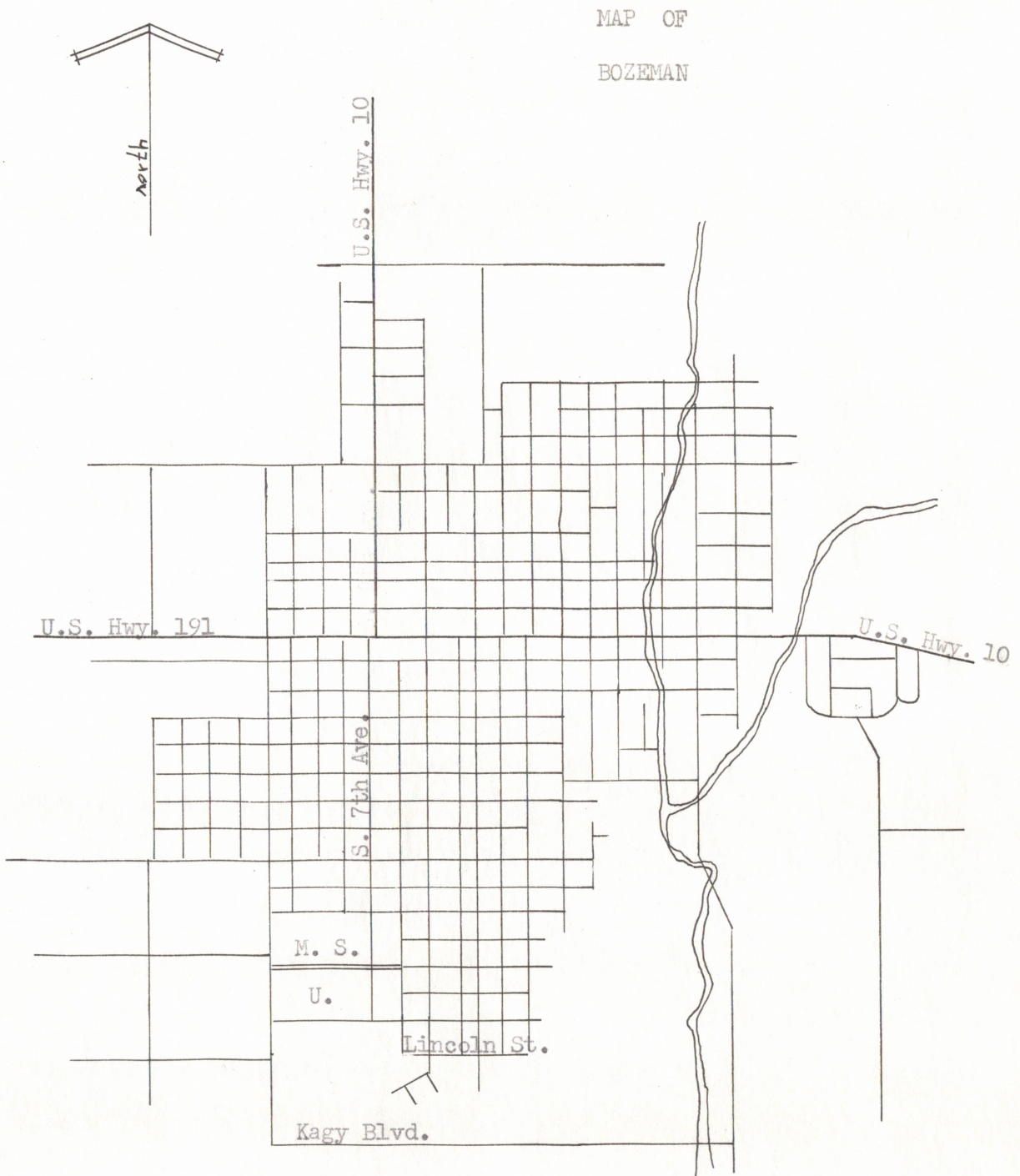


figure 2

Climatic Conditions

Bozeman is located in a middle latitude steppe where a steppe or semi-arid climate exists. It is cold and dry at least once a month when below freezing temperatures occurs. The surface temperature ranges in the hot summer months from above 68 degrees to the cold winter months from below 32 degrees.(9:8)

The winter months in Bozeman varies from relatively cold to severely cold. The average temperature is approximately at 25 degrees with an occasional low of 35 degrees below zero. However, temperatures in January have exceeded 45 degrees so mild to warm weather is not unusual in this semiarid region. The average snowfall is 30-50 inches occurring mostly between November and March. The ground-frost depth in the winter is about two feet. Rain is very infrequent; however, it occurred in the month of January, 1968.(17:122)

Summers in Bozeman are warm and pleasant. Durations of extremely high temperatures are sporadic, and high humidity conditions are rare. High temperatures may reach 100 degrees occasionally, but this condition seldom lasts more than a week at a time. Precipitation usually falls in the form of hail or showers.(17:122) The average annual precipitation ranges from 10-20 inches with more than one-half of the annual precipitation occurring during May through October.(9:52)

The percentage of possible sunshine occurring between December and February is 40-50 percent and 70-80 percent through the months of June and

August. The average annual wind velocity is 10-20 miles per hour. (9:53)

Wind direction usually is from the southwestern or southeastern vicinity of Bozeman.

U.S. GEOLOGICAL SURVEY WATER RESOURCES DIVISION

CONDITIONS CREATING A NEED

General

The present Military Science Building at Montana State University is a quonset-hut-type building located near the corner of West College Street and South Eleventh Avenue (see Fig. 3). This facility is placed on a concrete foundation to serve as a temporary construction to serve for the needs of the ROTC program. (18:417) This temporary building serves the minimum conditions of the ROTC program at Montana State University.

Under the following present conditions, I will describe how the existing conditions make the facility inadequate:

- (1) Temporary Building
- (2) Poor Site Conditions
- (3) Poor Acoustics
- (4) Inadequate Natural Light
- (5) Overcrowding of Spaces
- (6) Inadequate Ventilation
- (7) Poor Function of Spaces

Temporary Building

The present military science facilities, erected in 1947 as a temporary building, is definitely inadequate; however, there are no plans for constructing a new facility for the Military Science Department.⁽¹⁶⁾ The planners for Montana State University's campus stated that there is hardly any area on campus which is considered for a new military science facility but Montana State University does need one badly.⁽¹⁰⁾⁽¹⁶⁾

Another condition is that the only road leading from the Military Science Building to the Fieldhouse or Lewis and Clark Field is on South Eleventh Avenue. Through the center of these drillfield areas creates an interference with acceptable traffic. For safety precautions at the present time, road signs have to be posted at intersections while en route to the drill field area.

View is a different advantage especially in the office rooms. The small windows of the building are inadequate for this purpose. In most cases the height of windows are well off the floor preventing direct vision to the outside. However, this probably is just as well since the surrounding buildings are generally repulsive and drab.

Poor Site Conditions

The location of the present Military Science Building creates an automobile traffic problem at 12 o'clock noon and 5 o'clock afternoon on weekdays. Staff and personnel members leaving the parking area on the west side of the building have a time consuming problem entering on South Eleventh Avenue at the hours specified.

Another condition is that the only foot marching route from the Military Science Building to the Fieldhouse or Lewis and Clark Field is on South Eleventh Avenue. Enroute to both of these drillfield areas creates an interference with automobile traffic. For safety precautions at the present time, road guards have to be posted at intersections while enroute to the drill facilities.

View is a pleasant advantage especially in the office rooms. The small windows of the building are inadequate for this purpose. In most cases the height of windows are well off the floor preventing direct vision to the outside. However, this probably is just as well since the surrounding buildings are generally repulsive and drab. fiber wall board which has a low sound transmission loss. Conversations from other rooms or hallways can easily be heard throughout the offices and classrooms where special concentration is impossible. When classes change and the hallways are filled with cadets, the noise is carried throughout the building.

Poor Acoustics

The major acoustical problem is the cause of the quonset-hut construction on the main floor. The reflected sound waves concentrate at the center of the focus of the curvature. The sound waves are reinforced from the desk tops and diminished near the walls and from the clothing of the students. However, there exists a slight effect of masking as the sound waves reflect from the ceiling and from other reflecting surfaces near them. Therefore, very intense low-frequency speech is especially troublesome for the hearing of speech since the tones mask nearly at the same audible range of frequencies.

When the building was constructed because of an immediate measure, no intentions for acoustical problems were considered. Noise control throughout the existing facility is non-existent. The .22 calibre rifle range is another major annoying repetitive noise. Whenever a round is fired, everyone in the building is startled, or raise their voices to compete the cracking sound.

The type of material employed in the building is fiber wall board which has a low sound transmission loss. Conversations from other rooms or hallways can easily be heard throughout the offices and classrooms where special concentration is impossible. When classes change and the hallways are filled with cadets, the noise is carried throughout the building.

Inadequate Natural Light

Natural light is an expedient method to create physical comfort advantages in a psychological sense; however, view is not directly related to natural light, it also is an expedient method as stated in "Poor Site Conditions". The small windows on the main floor hardly permit any natural light to enter in the offices. The basement section has no windows and consequently no natural light. If the classroom windows are left closed, noises from adjacent rooms are heard. If the windows in the offices on the main floor are left opened, the offices are either too drafty or distracting from the noise along South Eleventh Avenue. The corrugated-galvanized roof construction creates a heat problem in the warmer months, especially in the summer. Air conditioning is an absolute necessity for these warm months.

The basement has no means of ventilation. It is usually hot and stuffy in the summer months.

Inadequate Ventilation

Adequate ventilation is another pleasant advantage for the physical comfort of the occupants in any building. However, considerations for adequate ventilation in the present facility were ignored. In the colder months, the classrooms are very unbearable to sit comfortably since it is nearly impossible to maintain a uniform temperature. In the warmer months the problem of ventilation is increased. If the classroom windows are left opened, noises from adjacent rooms are heard. If the windows in the offices on the main floor are left opened, the offices are either too drafty or distracting from the noise along South Eleventh Avenue. The corrugated-galvanized roof construction creates a heat problem in the warmer months, especially in the summer. Air conditioning is an absolute necessity for these warm months.

The basement has no means of ventilation. It is usually hot and stuffy in the summer months.

At the end of spring quarter, procuring uniforms from the ROTC students is cleaned and stored, it becomes necessary to acquire additional space to compensate for the flowing-in of uniforms. At the present time, both units use the north and south rifle ranges for procuring and storing uniforms.

Although classroom and office actual floor areas are presently adequate, the usable floor area on the main floor is not fully adequate because of the curvature of the walls from the gunnest-hut construction. The office rooms located in the basement have minimal circulation and storage space for Army manuals and mimeograph machines. Since most of the bookshelves are filled with manuals or mimeograph sheets, another room (B-1) which is

Overcrowding of Spaces

The storage areas are the most critical areas of overcrowding of spaces. In the supply section the amount of equipment and uniforms issued to a student is overwhelming. This section is jammed to overflowing with items like fatigues, "class A" uniforms, skis, shoes, steel helmets, gloves, and other smaller items for Special Forces. The 7.62 mm and .30 calibre rifle storage area is often crowded when cadets clean their rifles in this area (4 ft. by 60 ft.). Storage area for the equipment of the rifle team and marksmanship classes is inadequate. The amount of equipment and clothing the students use is not expandable. Therefore, items like spotting scopes, .22 calibre rifles, resting mats, ammunition, scoring sheets and padded jackets will have to be properly stored.

At the end of spring quarter, procuring uniforms from the ROTC students becomes a problem in the supply section. Since all uniforms turned in the ROTC department are cleaned and stored, it becomes necessary to acquire additional space to compensate for the flowing-in of uniforms. At the present time, both units use the north and south rifle ranges for procuring and storing uniforms.

Although classroom and office actual floor areas are presently adequate, the usable floor area on the main floor is not fully adequate because of the curvature of the walls from the quonset-hut construction. The office rooms located in the basement have minimum circulation and storage space for Army manuals and mimeograph machines. Since most of the bookshelves are filled with manuals or mimeograph sheets, another room (B-1) which is

located some 60 feet from room B-7 which currently has shelves for manual books is used as an extension for storage room for manuals (see Basement Plan in Fig. 4).

This temporary arrangement of space creates a communicative problem between the chain of command and clerical assistance. For example, in Figures 1 and 2 respectively, the relationship of B-7 (staff) to Room 2 (clerical) in poor relationship.

When students change classes, they create a disturbance to the two suit clerical offices. The main traffic pattern then between these offices (see Rooms 1-9 and 11). As shown in Figures 3 and 4, the rifle range is directly under the offices in the main floor. This creates an example of functional inefficiency.

The lounge area for staff officers is located near the rifle range from which the cracking of the rifles is extremely disturbing. It is a windowless lounge with no natural light and no ventilation. During drill periods when the Freshman, Sophomore, and Junior cadets draw their weapons from the Rifle Storage Area, the lounge is the center of circulation to and from the rifle rack (see Basement Plan).

Poor Function of Spaces

The present military science facility has staff offices scattered throughout the building. This temporary arrangement of spaces creates a communicative problem between the chain of command and clerical assistance. For example, in Figures 4 and 3 respectively, the relationship of B-7 (staff) to Room 2 (clerical) is poor relationship.

When students change classes, they create a disturbance to the two unit clerical offices. The main traffic pattern lies between these offices (see Rooms 1-9 and 11). As shown in Figures 3 and 4, the rifle range is directly under the offices on the main floor. This creates an example of functional inefficiency.

The lounging area for staff officers is located near the rifle range from which the cracking of the rifles is extremely disturbing. It is a windowless lounge with no natural light and no ventilation. During drill periods when the Freshmen, Sophomore, and Junior cadets draw their weapons from the Rifle Storage Area, the lounge is the center of circulation to and from the rifle rack (see Basement Plan).

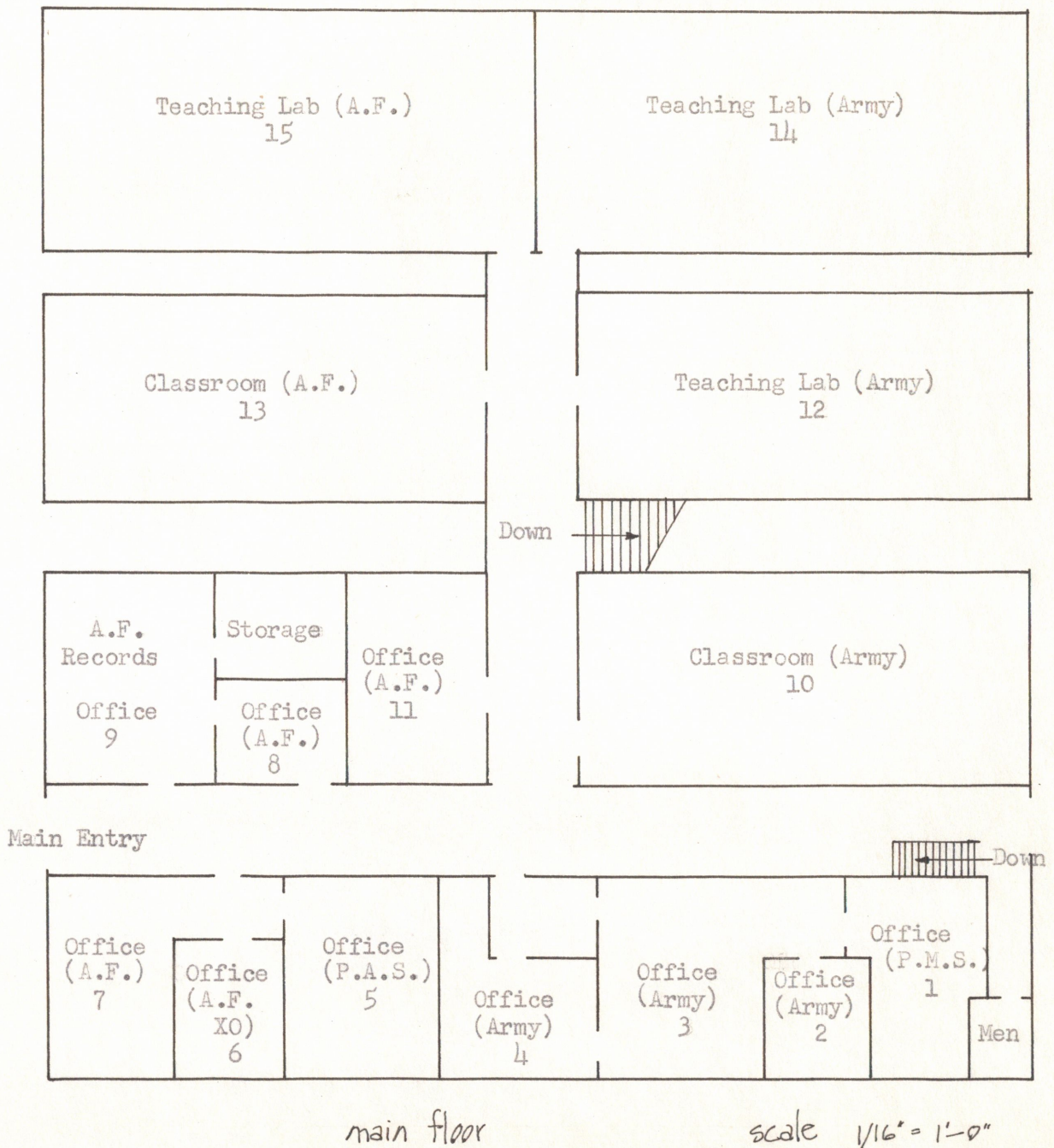
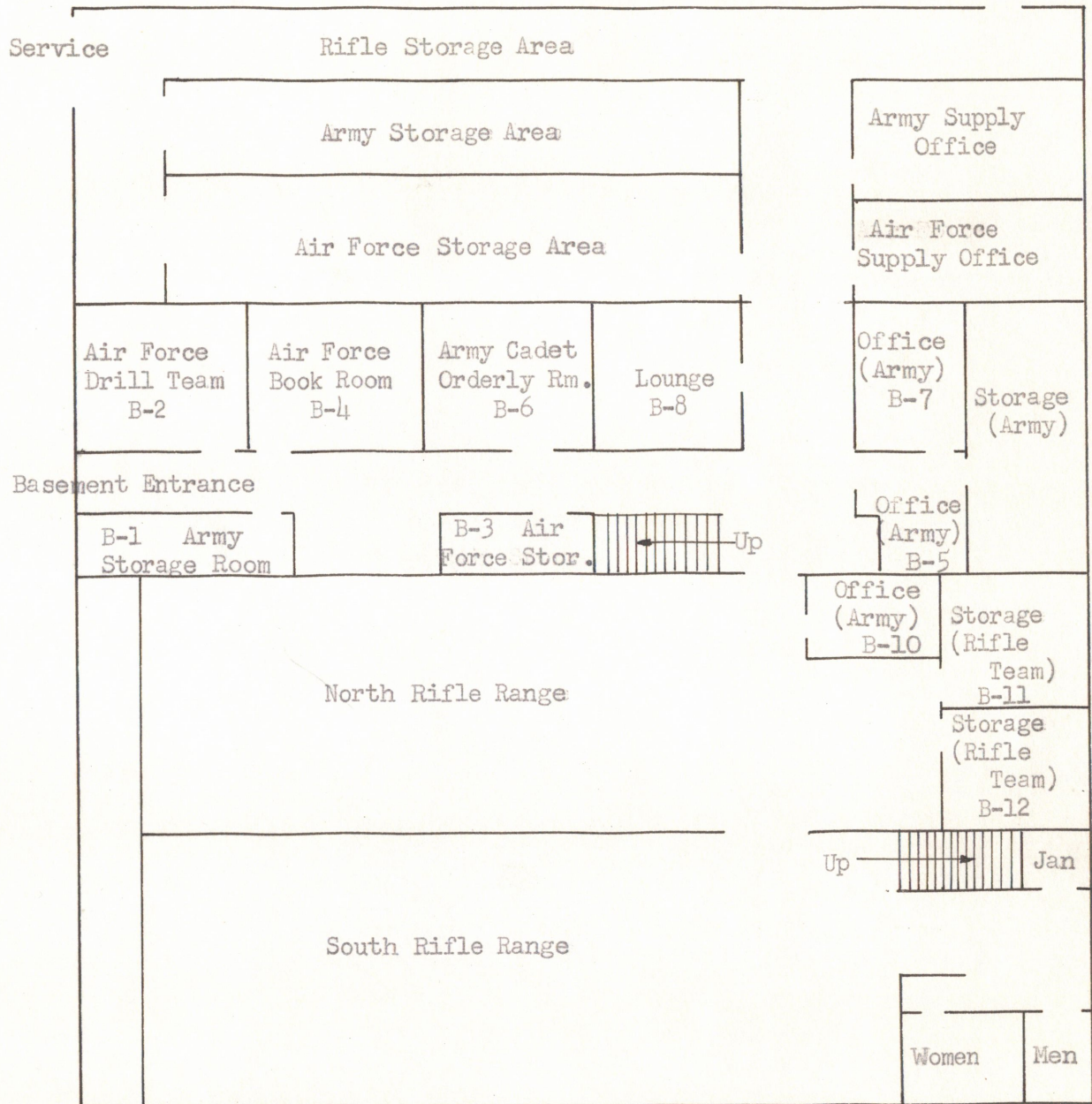


figure 3



basement

scale 1/16" = 1'-0"

figure 4

S I T E C O N D I T I O N S

Location

As can be seen in Figure 5, the proposed site, "A", is located on the southwest corner of the intersection of Lincoln Road and the extension of South Seventh Avenue. Both roads will be paved according to the "Master Plan" in the Architecture Department. South Seventh Avenue will extend from Grant Street to Kagy Lane.

Since the site is part of Montana State University campus, no definite boundaries are shown. No city zoning ordinance govern this site. Also, since the site is very close to the Heating Plant, heating facilities are readily available since the Heating Plant will expand in the future years providing gas heating for the new facilities.(16)

CAMPUS MONTANA STATE COLLEGE

BOZEMAN, MONTANA

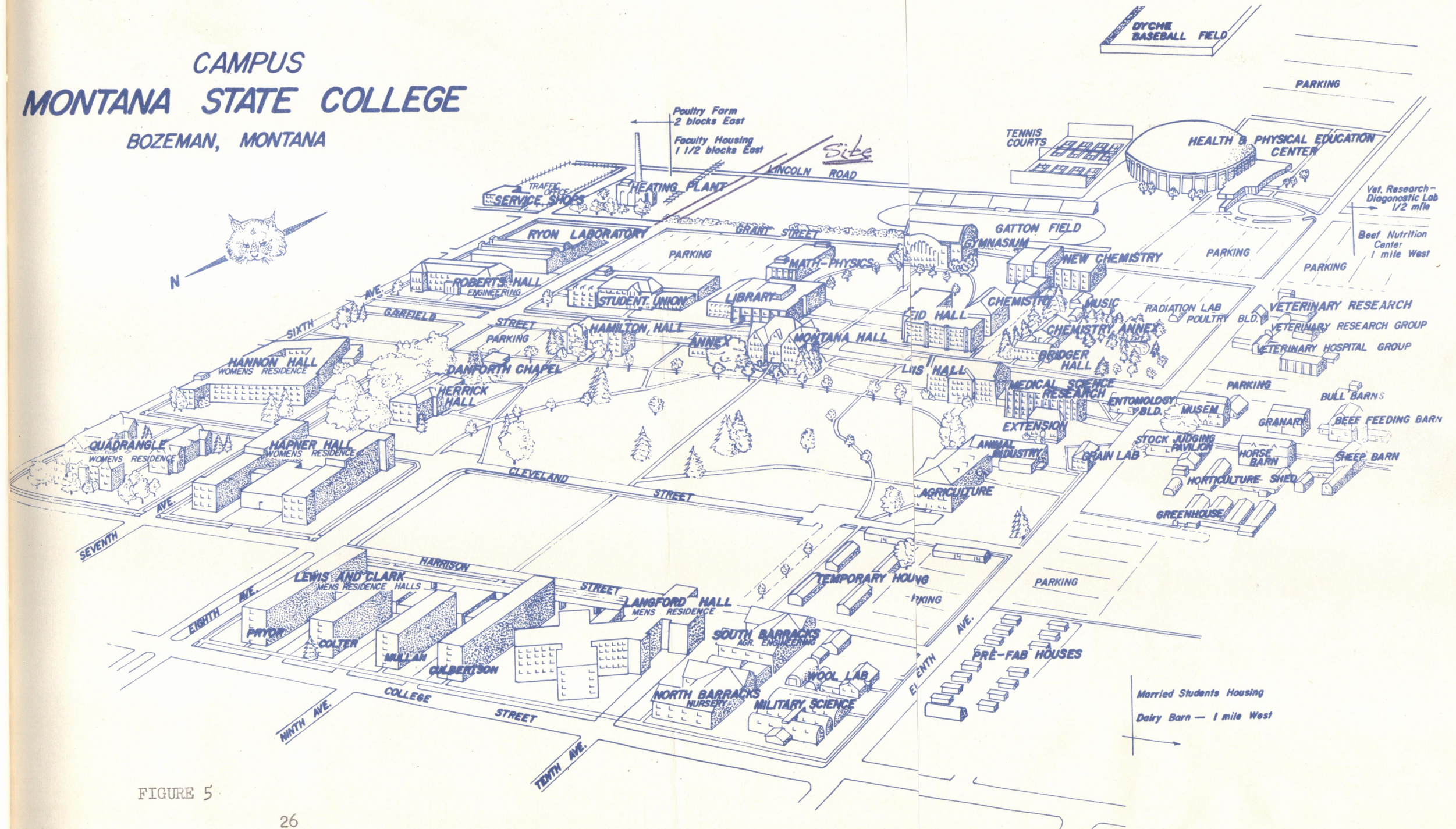


FIGURE 5

Topography

The site slopes less than two percent from north to south and less than one percent from east to west. Figure 6 shows the topography of the site. The existing site consists of various cultivated small grains, weeds, and grass. There are no trees on the site. Although the construction of the extension of South Seventh Avenue and Lincoln Road is necessary, any surface earthwork will be very minor for site preparation. In early spring drainage is a problem since pools of water collect on the surface of the site. (See Soil Analysis.) Therefore, a good surface drainage system is a must.

lincoln road

south eleventh street

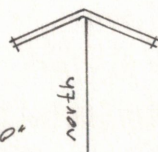
4906

4904

4902

4904

4906



scale 1"=40'-0"

28

topographic map

figure 6

Soil Analysis

Although no adequate soil analysis for "SITE A " is available, a comparison of soil studies from other buildings on the campus makes possible a general prediction of subsoil composition. The first 12-16 feet consists of a sandy-clay composition with only a shallow layer of gravelly topsoil on the surface. The sandy-clay layer lies above a heavy layer of gravel which has good soil bearing properties. At a depth of 12-15 feet, water can probably be found. (11:30)

As Montana State University's campus develops, it will spread to the south. The "Master Plan" calls for Cotton Field to be moved to the far west area, beyond the present married student housing, of Montana State University's property. The present location of Cotton Field will be used as a area for other necessary buildings. Therefore, as the campus expands, the proposed site will become more centrally located. (10)

One of the most outstanding natural environmental features of the proposed site is the beautiful range of mountains. They present a dramatic three direction view (see Fig. 7).

Adjacent Environment

The Forest Research Laboratory is the nearest building to the site. The Fieldhouse is less than 900 feet away and is easily accessible from the proposed site along Lincoln Road. Also, the Student Union Building and the main library are only about 1200 feet due north (see Fig. 5).

The Heating Plant, the most imposing structure of all, is a large brick structure with dominating arches. Despite its unromantic service for the campus, it is an old charming building. It is about 150 yards from the site.

As Montana State University's campus develops, it will spread to the south. The "Master Plan" calls for Gatton Field to be moved to the far west area, beyond the present married student housings, of Montana State University's property. The present location of Gatton Field will be used as a area for other necessary buildings. Therefore, as the campus expands, the proposed site will become more centrally located.⁽¹⁰⁾

One of the most outstanding natural environmental features of the proposed site is the beautiful range of mountains. They present a dramatic three direction view (see Fig. 7).

Drillfield Considerations

One of the most important site consideration is the availability of adequate drill facilities. In dry weather conditions, the intramural fields - directly south of the site - will become the primary military drill area. The parking area south of the Fieldhouse will also be used when fair to dry weather persists. This parking area which is currently gravel-surfaced will be paved when the public athletic facilities move to their new location - an extension of the Fieldhouse. During inclement weather conditions in early spring and late autumn months, the Fieldhouse will be used as an alternate drill facility. During winter quarter the Fieldhouse is used for drill purposes.

Since all drill classes and color guard units practice the year around, it would be a great benefit to have the new Military Science Building as close as possible to the Fieldhouse.

Traffic Patterns

"SITE A" is presently isolated from automobile and pedestrian traffic. However, an extension of South Seventh to Kagy Lane will create a north-south thoroughfare, as shown in Figure 5. Pedestrian traffic to and from the new Military Science Building will require sidewalk construction from the proposed site to the Fieldhouse and also to the existing sidewalks on Grant Street.



figure 7: site conditions of
"site a"



NORTH VIEW



NORTHEAST VIEW



EAST VIEW



SOUTHEAST VIEW



SOUTH VIEW



SOUTHWEST VIEW

AESTHETIC CONSIDERATIONS

Unity

The architectural character of Montana State University began in 1896 with the building of Montana Hall. This building set the feeling, character, and mood from 1930 through 1940 with such buildings as the Agriculture Building, Hamilton Hall, Roberts Hall, and Herrick Hall. The Heating Plant also followed the character of Montana Hall. (13:9-30)

Since that time the aesthetic unity has gradually deteriorated. Each building that came after 1930 marked its own character and mood; however, a few buildings have used the order of the brick work used in the earlier buildings. Each architect designed his own building with his own style and with no relating considerations of the campus as a whole. Today, our campus is a conglomeration of different types of architecture, mood, character, feeling, and material. This adds up to little relationship to one another.

Proposal

Although the proposed site is located apart from the academic and original buildings, I feel that this new Military Science Building should attempt to recapture and relate to the design of the earlier buildings. However, the other newer buildings should not be neglected, but a common unity should be established between Montana State University's traditional architectural character and contemporary buildings.

Consequently, the earlier buildings on Montana State University's campus reflect the architect's desire to harmonize with the rugged mountains of Bridger Range and the mountains south and west of Bozeman. Therefore, the former campus buildings reflect the harmonious aesthetic consideration which would be a part of any new building on campus.

Concept

Regionality of a building is important since this is where the building begins to sink its roots as becoming part of a city. The architect should not fail to recognize the regional resources and yet design a building with decently rich architecture.

Approximately two-thirds of the buildings on campus ignore the regionality of Bozeman. The Library, Lewis and Clark Dormitory, Reid Hall, and Roskie and Hedges dormitories are a few examples which ignore the

regionality of Bozeman and the aesthetic quality of the natural surroundings of the Bozeman area.

Consequently, the earlier buildings on Montana State University's campus reflect the architect's desire to harmonize with the rugged mountains of Bridger Range and the mountains south and west of Bozeman. Therefore, the former campus buildings reflect the harmonious aesthetic consideration which should be a part of any new building on campus.

The exterior construction should be indigenous material. It should be used wherever possible. Stone should be strongly considered since it is an indigenous material to this region. Native stone is also indigenous to this area although its use has not been extensive. Brick should also be considered as a basic material but the selection of color, texture, and bond will determine the relative success of the use of brick.

However, even the advantages of concrete should also be considered although it is not an indigenous material. (12) The success of concrete will

Character

The character of the building plays an important role in any design situation since it reflects the traditional character of its area or other contending buildings. Since the Fieldhouse is a massive structure, it would not be wise to design a building of a petite structure. However, a structure which represents its vitality to remain on the site for a number of years is equally or even greater than its contending buildings - like St. Peters Cathedral in New York City or the Acropolis in Athens, Greece.

The character of the new Military Science Building should reflect some military tradition and the academic campus tradition of Montana State University. The type of material incorporated on the exterior and the interior of the building should enhance these two traditions. The type of structure should also enhance the military and academic characteristics.

The exterior construction should be indigenous material. It should be used wherever possible. Wood should be strongly considered since it is an indigenous material to this region. Native stone is also indigenous to this area although its use has not been extensive. Brick should also be considered as a basic material but the selection of color, texture, and bond will determine the relative success of the use of brick.

However, even the advantages of concrete should also be considered although it is not an indigenous material.⁽¹²⁾ The success of concrete will

be determined by the designers ability to make it a relating factor to the aesthetics of the earlier buildings on campus.

The interior materials should not be only considered for the character of the building but also for their durability, ease of maintenance, and cost. These materials should create a feeling of warmth and security to help bring about pleasant working conditions for the occupants. In some areas it would be advisable to have opened spaces or rooms in an enclosed area for a new kind of enclosed environment where the sense of hearing becomes more acute and attentive - like the classrooms. However, good acoustics should be incorporated.

Before any specific selections may be made, the aesthetics must be clearly defined and rated in importance. Without going into the conditions and judgment needed to develop them, the following is a list of the aesthetic requirements for this project:

- (1) The unit should express pride, stability, constancy and it should give the feeling of individualism and institutionalism.
- (2) The unit should feel comfortable, colorful, though simple.
- (3) The design must appear to the general public as stable, I O N 3 competent, and controlled.

ECONOMIC CONSIDERATIONS

Fundamentals

There are three basic economic considerations of any building - cost, size, and quality. Each consideration relates to one another. For example, if the size of a building is predetermined, the initial total cost will depend upon the quality of constructional materials. Another example is if the cost of the building is predetermined, the initial size is proportional to the quality of the construction.

Since the number of students using a particular facility, such as Science, Education, and Engineering, determines the size of an academic facility, appropriations for the facility is allowed according to the quality of constructions since the number of students in a facility dictates the size of the facility. In other words, to obtain a certain amount of space for a certain amount of money, a certain quality of construction must be used in order to have a feasible facility for students. Usually appropriations are agreed upon before the quality of construction is submitted, and this often leads the architect to select inferior quality of construction in order to meet the spacial requirements within the limits of the appropriated funds.

Therefore, if a certain amount of funds are to produce a certain quality of construction, there is a certain limit of spaces that a facility can adequately enclose.

A reasonable solution to the economic problems of this nature is to concur on the requirements of space and the quality of construction of any building, and then appropriate the necessary funds to design and construct

the building properly. Since the function of the Military Science Building is almost impossible to categorize under any of the academic headings, it is difficult to accurately measure the amount of space and qualitative requirements. However, a thorough study of the spacial, functional, and qualitative requirements of the Military Science Building must be made, and a design solution approved by the military staff as well as Montana State University's administrators before the design request is set before the Montana Board of Regents in Helena.

Construction Cost

For analyzing the estimated cost of a new Military Science Building, I will use the Marshall Evaluation System to show the preliminary cost analysis. (14:Sect.15,pg.15) The Marshall Evaluation System is considered to be one of the most accurate means of achieving preliminary costs.

The costs indicated in the following table are from the Marshall Evaluation System. The values are the average of final cost including built-in equipment, architect's fees, and contractor's overhead and profit. However, the values do not include movable equipment and furnishings.

Table 1

Estimation of Cost

Type	Description	Cost Range	Average Cost
SCIENCE	Buildings with large amount of laboratory space. Good quality construction.	\$17.50-25.00/sq.ft.	\$21.55/sq.ft.
		\$ 1.75-2.50 /cu.ft.	\$ 2.16/cu.ft.
CLASSROOMS	Buildings divided into classrooms and offices. Good quality construction.	\$17.00-25.00/sq.ft.	\$21.45/sq.ft.
		\$ 1.65-2.45 /cu.ft.	\$ 2.15/cu.ft.
ESTIMATED AVERAGE COST PER SQUARE FOOT			\$21.50
TOTAL AREA OF BUILDING			33,000 sq. ft.
TOTAL COST OF BUILDING			\$693,016.00

Local Economic Conditions (11:55-58)

Montana State University, being one of the six divisions of the University System, is financed and controlled by means of the State of Montana. Therefore, any construction to be done on the campus has to be approved by the State Legislature, otherwise the Board of Regents of Montana has the authority to approve the construction.

The Morrill Act of 1890 provided provisions for Montana State University to maintain adequate facilities for the Military Science program. However, due to this act, the responsibility of providing new facilities are in the hands with the State of Montana and Montana State University.

The only possible means of procuring federal funds is through a cooperative effort with the U.S. Army Reserve, but the recent re-classification and the resulting de-activation of most units in the Army Reserve program in Bozeman causes the cooperation impossible. If the present ROTC unit were large in the number of participating college students, perhaps the Federal Government would allot a certain amount of federal funds in building a new military facility at Montana State University which would serve for both the Army and Air Force ROTC units and the Army Reserve.

Since federal funds are an elaborate means of obtaining financial aid for a new Military Science Building at Montana State University, the building could be financed through one of the two proposals:

(1) Appropriated taxation

The State Legislature of Montana has the power to approve appropriation of tax money for a new building on campus.

However, the tax money comes from a two or three cent state cigarette sales tax which recently produced a revenue of $2\frac{1}{4}$ million dollars annually. This revenue was used to retaliate the Korean Veteran Bonuses - all of which was paid off in 1965. Likewise, this money can be directly appropriated by the State Legislature who passed an appropriative fund of \$80,000 in 1962 for the completion of the third floor of Reid Hall.

(2) Grants or Donations

It is very likely that grants or donations given to Montana State University could be used to finance a new building. Student building fees are used for the retirement of Revenue Bonds issued for building construction and not used for operations. But, due to the operations of the military building, student fees cannot be used for construction purposes. Any special imposing and collecting of tax money would be difficult to obtain since a vote of the taxpayers is required. Another financial problem is the lack of means of producing any revenue such as a dormitory or fieldhouse is capable of doing.

Although obtaining financial aid to build a new Military Science Building seems impossible, it is by no means a difficult problem. First, the administration at Montana State University and the Board of Regents must be made aware of the existing conditions of the present Military Science facilities. Secondly, the legislature in Helena can divert the state cigarette tax directly to the University System building fund since the

Korean Veteran Bonuses have been paid off. This alone would yield approximately 5 million dollars for each session the legislature meets to allot to the various elements of the University System.

The method of obtaining the appropriated funds involves of each units' submission of its priority of the construction list and its evaluated ratings of the existing conditions to the Board of Regents of Montana in Helena..

The Board of Regents then categorizes an overall priority list of all construction and advises to the State Legislature that allocated funds be appropriated for facilities needed in the next two-year period. The Governor and State Controller of Montana must also approve the request for appropriations.

As soon as the funds have been set aside, the unit that submitted the request appoints an architect - approved by the Board of Regents - to complete the necessary plans and specifications. After the Board of Regents have officially approved the design of the new building, a public bid is advertised to the contractors of Montana. After the bidding is over, the contract is granted to the low bidder.

FUNCTION OF THE BUILDING

FUNCTION OF THE BUILDING

General

The functional elements of this new Military Science Building will be planned according to the estimated requirements of the Military Science program at Montana State University. I have made this judgment because at the present time there is no authoritative consideration in the "Montana State University future planning program" for a new Military Science Building. The college student is now offered the voluntary elective in every curriculum, authorized by the ROTC Vitalization Act of 1964. Therefore, it will continue to function as an optional program until certain changes can be made to increase the number of ROTC students in the future years. However, unexpected changes in the world situation could quickly and extremely change the ROTC program and affect the lives of the college students. This would instantaneously change the requirements of a new Military Science Building at Montana State University.

Montana State University maintains two military units: an Army unit and an Air Force unit. The ROTC program for each unit consists of two parts: (1) The Basic Course and (2) The Advanced Course. Also, the Army unit conducts a rifle marksmanship class.

- (1) The Basic Course is normally taken by the college student in his freshman and sophomore years. The instruction in the freshman year is known as Military Science (MS) I and in the sophomore year as MS II. The purpose of this instruction is to introduce the student to basic military subjects. All class work - which requires approximately three hours per week - and all practical

People Using the Building

Students

The primary purpose of the ROTC program is specifically designed to give college men "on-campus" training and experience in the art of organizing, motivating, and leading others. It includes instruction to develop self-discipline, physical stamina, and bearing - qualities that are an important part of leadership and that contribute to success in any kind of career. Many college men, if they do not take ROTC, miss this instruction because comparable leadership training and experience are not normally provided in the academic courses required for a college degree.

Opportunities in the military service are unlimited in the near future.

Both regular and reserve commissions can be awarded to men completing their service training phases.

Montana State University maintains two military units: an Army unit and an Air Force unit. The ROTC program for each unit consists of two parts: (1) The Basic Course and (2) The Advance Course. Also, the Army unit conducts a rifle marksmanship class.

- (1) The Basic Course is normally taken by the college student in his freshman and sophomore years. The instruction in the freshman year is known as Military Science (MS) I and in the sophomore year as MS II. The purpose of this instruction is to introduce the student to basic military subjects. All class work - which require approximately three hours per week - and all practical

training - which requires one hour of drill per week - are conducted for two academic years.

- (2) The Advance Course normally is given to the college student who applies for it and wishes to be commissioned as a Second Lieutenant upon graduation. It is administered in the junior and senior years of college. The Advance Course studies in the junior year are known as MS III and in the senior year as MS IV. The instruction consists of approximately three hours of "on-campus" study per week, plus a one-hour drill period per week throughout the academic year. The Advance Course summer camp normally is held between the junior and senior year. It is four weeks for the Air Force cadets and six weeks for the Army cadets.

In addition to the textbooks, uniforms, and equipment which are provided without cost, the advanced cadet receives \$50 per month during the school year and \$120.60 per month for the summer camp period. He also receives six cents per mile for travel to and from the summer camp.

Also, both units offer a flight training program to students in the second year of the Advance Course who have an aptitude for flying, and meet the required physical qualifications. Students who successfully complete the flight training may qualify to take the Federal Aviation Agency examination for a private pilot's license.

(3) The Rifle Marksmanship Course is administered by the

Physical Education Department but is conducted by the Army unit. College students (male and female) may take this three-credit course. Instructions and practical work are conducted two hours a class period for three

times a week. There are both basic and advance marks-

manship course taken by students.

Staff

The Army unit has a Professor of Military Science (PMS) who acts as co-ordinator and head of the Army staff at Montana State University. There are five officers as instructors and four non-commissioned officers

(NCO's) as assistant instructors. The Army unit employs three civilian

clerical assistants.

The Air Force unit has a PMS who coordinates and assists the staff and cadets. There are four officers as class instructors and three NCO's - two whom are in charge of student records and one whom is in charge of

administration. The unit has two civilian employees as clerical assistant and supply assistant.

At the present time there are adequate staff members and civilian assistants in both units.

the remainder of the day will be spent in their offices in preparing their next lecture, counseling cadets, and researching new material.

It is important that these offices be located near clerical assistance and reference sections, and as close as possible to the PMS office since the staff as a whole serves in an advisory capacity to

the PMS.

Types and Specific Functions of Space

Montana State University maintains two units of ROTC - both of which are organized through military tradition. Although each unit functions independently, the types and functions of spaces run essentially parallel.

(1) Office of the Professor Military Science (PMS)

The PMS is a regular officer in the Army or Air Force who commands his ROTC unit. His authority encompasses all phases of the Military Science program at Montana State University. He works closely with his Executive Officer, Staff Officers, and the Sergeant Major in formulating policies, decisions, plans, and appointments.

(2) Office of Executive Officer(XO)

The XO is the chief administrative assistant to the PMS. In cases involving absence or disability of the PMS, he acts PMS. The XO is responsible for the function of the staff members. Therefore, it is

important that the XO's office be located near the unit clerical office and the PMS office.

(3) Offices for Staff Officers

The Staff Officers primary duty is similar to that of the college professors. They will teach an average of four hours per day and the remainder of the day will be spent in their offices in preparing their next lecture, counseling cadets, and researching new material.

It is important that these offices be located near clerical assistance and reference sections, and as close as possible to the PMS office since the staff as a whole serves in an advisory capacity to the PMS.

(4) Offices for Assistant Staff NCO's

The primary duty of the NCO's as assistant instructors is to aid the regular commission officers both in instruction and preparation.

These offices should be located near the officers' office.

The Sergeant Major is the administrative NCO in handling of the clerical services.

He is primarily an instructor in charge of the rifle marksmanship course - basic and advance. Therefore, it is necessary

that his office be located near the rifle range. He keeps all re-

records of the rifle range - rifles, scopes, score sheets, jackets,

and ammunition. The Range NCO is responsible for the safety of mil-

itary cadets and also of regular PE classes. The Air Force unit

does not have a rifle range sergeant.

The training NCO's office handles all training equipment such as,

visual aids, films, ROTC manuals, etc. Each unit will have a

(5) Unit Clerical Office

The Unit Clerical Office handles all records of the students in the ROTC program and assists the instructors in matters pertaining to

typing examinations. This office is also in charge of distributing

the cadets monthly pay checks. Reception is another function of the

clerical office. Therefore, this office should be located near the

PMS's office. Organizational charts, displays, dia-

(6) Library

Each unit will maintain its own library of reference material. Study

areas must be provided and maximum control of the ROTC manuals must

be maintained.

(7) Supply

Adequate area must be provided to store the non-expendable items as clothing and equipment. Ventilation is required for the proper storage of some supplies as skis, rifles, and ammunition. Provision must be made for issuing and returning of uniforms and equipment.

The Supply Sergeant's office handles all records of uniforms, equipments, and maintenance for the unit. He controls all supply material issued by the unit. Therefore, an office space should be included near the supply area to maintain maximum control of the material.

(8) Training Aids and Reproduction Room

Military instruction is supplemented by a variety of training aids as motion picture projector, overhead projectors, slide projectors, charts, rifle models twice their actual size, aerial photographs, and models of rockets, jets, missiles, etc. Each unit will have a storage area to include all training aids. This room will be located as near as possible to the Staff Officers' Office and refer-

(11) ence area. At the present time some of the machines are located in the academic officers' room, clerical office, and storage room.

Each unit needs an area for drafting and reproduction work as maps. Outdoor maneuvers, especially for the Special Forces section, must

(12) be carefully plotted on maps. Organizational charts, displays, diagrams, and posters are to be made within this area. Mimeograph machines, photostat machines, and similar equipment will be located in this room.

(9) .22 Calibre Rifle Range

All Army ROTC cadets and PE students taking the Rifle Marksmanship Course receive instruction in rifle marksmanship and rifle safety measures. Storage area for the .22 calibre rifles, spotting scopes, score sheets, jackets, resting mats, and ammunition is required. A lecture area should be provided for receiving instructions. Adequate space for the spectators and rifle teams is a must when the Montana State University Rifle Team competes with other universities at Montana State University.

(10) Conference Room

Although much counseling work will be done within each office, it is desirable to have a central conference room for each unit. The units' board of officers interviews prospective basic cadets who wish to further their military training into the advance course. Such interviews will be held in this room. Also, staff meetings will be held in such a room.

(11) Government Vehicle Garage

Storage for two sedans, one bus, one $1\frac{1}{2}$ -ton truck, and one $3/4$ -ton truck must be provided. Maintenance is handled by Bozeman's gas stations.

(12) Lounge

The Army and Air Force personnel will relax during breaks within this area. Limited facilities for refreshment (as coffee and doughnuts) and entertainment (as reading material) should be provided.

Privacy, comfortable seating, relaxing atmosphere, and desirable view are features necessary for this area. The lounge should not be located near the congested circulation nor the Rifle Range as it is presently.

(13) Cadet Orderly Room

The advance senior cadets holds weekly staff meetings to organize the weekly drill periods. A cadet lounge should also be provided for discussion. All cadet cadre meetings and conferences will be held in this room. Provisions must be made for posting announcements and for showing films. In addition, adequate display areas should be provided.

(14) Classrooms

All class instructions are taught in the Military Science Basic Course and Military Science Advance Course.

- A. Teaching laboratories for basic cadets are used for instruction and practical exercise in military organization and tactics. Training aids will be used in these rooms when necessary. Therefore, adequate blackout or semi-blackout is necessary when showing overhead projectors or motion picture projectors. Semi-blackout is used when the instructor comments on the main points using an overhead projector.
- B. Classrooms for advanced cadets will be similar to the teaching labs; however, adequate provisions must be provided for discussion group learning. Practical exercises from class participation or discussion group participation are often practiced on maps and sand tables.

(15) Lecture-Assembly Room

This room will have to be large enough so that several groups (approximately 100 students) may be brought together for lectures, movies, or other activities. Ceremonies like award presentation or commissioning exercise would be held in such a room. Since each unit has an association for advance cadets only, the associations could hold their meetings in this room or the conference room, depending on the size of their association.

Instructions for advance cadets will be in this hall when indoor instructions are given such as assembly and disassembly of the M-14 rifle, or the insurance of an operations order for an overnight maneuver.

APPENDICES

APPENDICES

APPENDIX I - CURRENT INVENTORY of Existing Military Science Building
at Montana State University

Room No.	Type of Room	Unit	Floor Area (Sq. Ft.)
1	Office (P.M.S.)	Army	220
2	Office	Army	120
3	Office	Army	352
4	Office	Army	220
5	Office (P.A.S.)	A.F.	300
6	Office	A.F.	140
7	Office	A.F.	300
8	Office	A.F.	120
9	Office	A.F.	320
-	Storage	A.F.	120
10	Classroom	Army	860
11	Office	A.F.	260
12	Teaching Lab	Army	860
13	Classroom	A.F.	840
14	Teaching Lab	Army	1108
15	Teaching Lab	A.F.	1108
-	Hallways	-	1374
-	Men	-	48
B-1	Storage	Army	120
B-2	Drill Team	A.F.	224
B-3	Storage	A.F.	90
B-4	Book Room	A.F.	224

Room No.	Type of Room	Unit	Floor Area (Sq. Ft.)
B-5	Office	Army	80
B-6	Orderly Room	Army	224
B-7	Office	Army	140
B-8	Lounge	-	196
-	Storage	Army	312
-	Supply Office	Army	242
-	Supply Office	A.F.	110
-	Storage	A.F.	648
-	Storage	Army	486
Rifle Storage	Armory	Army	492
-	Hallways	-	1394
B-10	Office	Army	96
B-11	Storage	Army	168
B-12	Storage	Army	168
Rifle Range	Armory	Army	3292
Janitor	-	-	42
Women	-	-	120
Men	-	-	30
TOTAL			17,478 sq. ft.

APPENDIX II - REFERENCES

1. "Scope", Montana State University Bulletin, Vol. XX, no. 1, February, 1966
2. Gallatin National Forest, Bozeman, Montana, map and precis of Region One - U.S. Forest Service, 1960
3. Burlingame, M. G., Montana State College - A Preliminary Sketch, Montana State College, 1943
4. Department of the Army, American Military History 1607-1958, July 17, 1959
5. Department of the Army, Organization of the Army and ROTC, May, 1965
6. Mr. T. M. Shema, civilian personnel for Army ROTC Unit, February 1968, Montana State University
7. "An Eye to the Future", Montana State College Alumni Association Pamphlet, 1952
8. Richardson, Kenneth, cited in his research for a Junior High School for Bozeman, Montana State College, 1963
9. Espenshode, Edward B., Goode's World Atlas, Chicago: Rand McNally and Co., 1960
10. Professor J. D. Gough, Director of School of Architecture, February, 1968, Montana State University
11. Overturf, Thomas A., cited in his research for A New Military Science Building, Montana State College, March 13, 1964
12. Mr. Jean Holt, Assistant Instructor of Architecture
13. The Exponent of Montana State University, Vol. 59, no. 16, February 16, 1968

14. Marshall Evaluation System, Marshall and Stevens Publication Co.,
1962
15. Captain Richard E. Ness, staff member in Air Force ROTC Unit,
February, 1968, Montana State University
16. Andrew A. van Teylingen, Campus Planner, February, 1968, Montana
State University
17. U.S. Department of Agriculture, Climate and Man, No. 59, Washington
D.C., 1959
18. Inventory of Existing Facilities, Educational Research and Service,
Montana State College, Vol. 3, 1961

A NEW MILITARY SCIENCE BUILDING

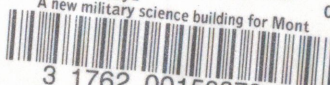
for

M.S.U., Bozeman

ARCH. 490
THESIS
Jack Oyama

Concept to Design Solution

Military is based on organization and order to the chain of command of ranking officers to non-commissioned officers. My general concept was to create a simple, organized building with spaces of specific order according to the functions of the spaces. In addition, the character of the building plays the most significant role of my design solution. First of all, the early academic buildings on campus have a most distinct character compared to the relatively newer buildings. Since most of the early buildings carry the value of the arch, I have incorporated the arch in a similar fashion throughout the building. Second, the role of military order is carried through the spaces of the building. The chain of command is supreme by having the Professor of Military Science or Professor of Air Science the last consulting member of the ROTC personnel staff- similar like a person going from lower channels to higher channels. In order to emphasize the command, I have designed the administration area on the second level.

MONTANA STATE UNIVERSITY LIBRARIES
stks 720.6.M760y1 CA
A new military science building for Mont

3 1762 00158379 6

MT 2540
720.6
M76
0y1

~~LIB. USE ONLY~~

