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Bozeman

HI-LINE CONSIDATED SCHOOL

ARCHITECTURE THESIS PROJECT

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The subject of the project is the study of the feasibility and design of a secondary school plant for the area including the present school districts of Chester, Joplin, Inverness, Rudyard, Hingham, and Kremlin-Gildford in north central Montana. Faced with a declining population over the total area and a particularly fast decline in the student population of the area schools, the present educational setup is being forced to consider alternatives to compensate for deficiencies this change is causing.

It is my contention that consolidation of the secondary school is a necessary and feasible project for both reasons of improvement of the educational quality and economic considerations. It is my thesis that the architecture profession can become the catalyst to help correct an environmental and social problem, where polictical pressure has so far stifled any progress, as in this particular case. This could be done by the architect instigating the studies needed to provide proof of the feasibility of, or necessity of the project. The profession in this way could help correct the present problems as well as increase the total quantity of work the profession will effect.

In the design phase of the project I will have to contend with the program that requires a diminishing utilization of the plant as the student population declines.

In this particular case the school districts are operating within a linear distance of nearly 50 miles along highway U. S. 2. Each unit, with the exception of Chester, has a total student population of less than 80 students, yet each is attempting to

provide as complete an educational experience as possible as well as providing a certain amount of extra-curricular activities. In all cases this attempt to provide such a variety is heavily taxing the energies of the teachers, students and administrators as well as the tax dolloars of the communities.

With some form of reorganization of these schools the student population would be of a size that would allow the retention of all of the programs of the individual schools, and since so many of the programs overlap or are identical, released energy of the teachers and students could be used to instigate new programs not now possible.

The idea of consolidation has been discussed for many years in this area and has been given additional emphasis in recent years by the fact that the Office of the Superintendent of Public Instruction of the State has come out in favor of the consolidation of many of the smaller schools throughout the state in the interest of economy and educational quality. But the local rivalries between the towns about the location of the new unit if one were to be built, what types of control each community would be able to exert over a combined unit and the fears of each community of their future should they lose their present high school, have so far totally discouraged any concerted effort at producing a solution to the problem.

I hope in my research to be able to combine information in a way that will show the consolidation can prove to be an advantage in enough ways for the students and for the communities in terms of return on money spent that these advantages can far outweigh the

disadvantages involved and when this has been done to attempt to design a physical plant that can prove to be a thing of pride to the communities it serves as well as provide facilities to handle the combined educational programs of the separate units, taking into account the differences in educational philosophies of the educators of the present units.

The superintendents of each of the schools involved will be used to find the majority of the answers as to present programs in the schools, philosophies of education now being followed, present sizes and projections of student populations and faculty requirements, present financial requirements and future projections, present interaction between schools and other similar needs.

For information on the economic, polictical, climatic, and social conditions of the region data gathered by the State Extension Service and the Center for Industrial Developement will be used.

Also involved in the research material will be a study made by the personel of the Northern Montana College Consulting Service of the schools involved on the possiblities of consolidation. The Office of the Superintendent of Public Instruction will be used as the source of information on the state's part in financial aid to the schools.

The research will be broken into two areas. The first will be information relating to the region as a whole. This information will include the facts about the political conditions, economics, physical features and social systems since a good part of the success of this project will lie in the ability to show the people of the area that

they have such a similarity of problems that they must begin to think in terms of regional planning for the betterment of all, rather than in the terms of the communities. The second part of the research relates to the educational process both in terms of the educational philosophies and the particular educational needs of the area under study.

The analysis of the information collected will be done as a means to attempt to find facts to support the contention of economic and educational advantages of the new school. Also similarities in the educational philosophies of the present units will be looked for, so that means incorporating the architecture into these philosophies can be found.

The information will also be used to make a logical selection of a site for the new plant to be built.

HISTORY:
(See Fig. 1)

The development of the north central area of Montana was totally dependent on the expansion of the Great Northern Railroad across the area to the Pacific. Prior to this time the area's only known natural resource, it's fertile soil, was useless since no supplies could reach any would-be settler, nor could he ship any produce to a market. As J. P. Hill pushed the railroad west, his construction crew built stations in almost every township along the track. These station points provided the essential points for settlers to get necessary supplies and to sell their produce. Around each station grew up towns to provide for the needs of the people, and as the towns grew they developed the necessary school systems. Since even the distance of six miles between towns could mean a trip of nearly an hour, each town built a very diffinent area of trade influence.

As available land next to the railway right of way was taken up settlers were forces farther north and south. As the distance from the railroad began to exceed the convenient traveling distance, interprizing merchants began to transport supplies to where the people had settled and around their stores grew up other communities and again the necessary school building needed to educate the children of the area was provided.

Although these communities could supply most of the needs of the people they could not provide the market for the farmers products so that the railside towns retained a dominance over the area.

But as means of private transportation improved and road systems were developed, the convenient travel distance could now extend from

these outlieing areas as far as the railside towns, and the people began to often bypass the smaller stores in favor of the greater variety and lower prices the larger communities could provide. Working on a marginal basis as the smaller communities were, this lose of business signaled the end of their usefullness and their death closely followed.

Compounding the death cycle was the fact that as the children of the area approached the high school age transportation to the secondary schools in the larger towns became necessay. And often the complications of having children from the same family attending far separate schools forced parents to transport elementary students to the same schools as the high school students forcing the death of the smaller communities' schools as well.

Now as cars and trucks have made travel easier, poeple have again begun to look to the larger trade centers for the larger selections of goods and the cheaper prices. Many of the more specialized businesses especially in the area of agricultural eqüipment and dry goods have already closed or moved to the larger areas, and in some cases even the most basic businesses such as food stores have been forced to close.

With present trends in the field of agriculture where each owner can handle larger and larger farms and more owners absentee during the winter months the population has been in a downward trend for more than a decade.

NEED:

With the population of the area in a heavly downward trend, educators and parents alike have began to study the effects of the drastic decline in the schools' enrollments on the education the children will recieve. (For present and projected figures on the area see Fig. 2)

At present each of the schools provide a curriculum of the basic subjects in a college prepartory curriculum plus a limited number of elective sujects.

The present student-faculty ratio in each of the schools runs near 1:12 which although an excessively favorable one compared to standards throughout the country, does not give a total picture of the educational program. Even with this ratio each of the faculty members have to prepare lesson plans for at least four classes each day and in some cases up to six, taxing their time and energy far beyond the normal recommended level.

As the schools decline in enrollment, in order to maintain the present level of the curriculum would require the same faculty for a lot fewer students or an even heavier load on a smaller faculty. Either solution would raise the cost of ecucating each student far higher than any acceptable level.

As the selected questions from the opinion poll show, this is not a particularly satisfactory answer to the educational needs of the area. (See Table 1)

To contend with this increasing cost problem, two school districts have attempted a consolidation. But even this only produced a unit on

the same level of financing as the neighboring districts which are operating far above the state average of costs.

Consolidation could produce the financial relief necessary and at the same time continue all the courses offered in all of the schools as well as adding others. Also the load each of the faculty members would carry could be brought back in line with recommended levels.

Another factor that could be improved under the consolidation plan is that the library units could be combined, producing a satisfactory sized unit to comply with state accreditation levels. This has been a problem in the past with each of the schools in achieving accreditation renewal and even in cases where accreditation has been renewed inadequatcies in the library has been almost invaribly cited as needing attention.

REDISTRICTING:

Study of the seven districts from Chester on the west through Kremlin on the east indicates that a combination of all would produce a school of nearly 500 students. Yet the district would have a total width of 61 miles and would produce bus routes from the outlieing areas to a central point of over 50 miles and would mean bus rides of nearly an hour and a half one way for students. This in itself would be sufficient to force a decision on a logical division to produce two separate districts.

With the division of the district corresponding with the Hill, Liberty County Line, two districts are produced of roughly equal conditions. (See Fig. 3) The Chester District would annex the present Joplin School District and utilize the present school plant at Chester since it would require little if any additional space to accomidate the increased enrollment.

In the Hi-Line District, as the combined districts of Inverness, Rudyard, Hingham and Kremlin-Gildford will be called in future references, a new plant will need to be constructed since none of the present facilities could handle the new student body size.

The Chester District would have a school of 240 students as compared to 247 for the Hi-Line District. Each of these would be nearly in the middle of the size bracketing dictated by the Montana High School Association for a Class B school and put each in a fairly good position for competition in atheletic events and other extra curricular activities.

Taxable valuation for the two districts would be roughly equal putting the two districts on a relatively equal footing for financing the school districts.

Lastly, by dividing the districts at the county line any complications involved when school districts cross the county line would be eliminated. It also conforms with the personal preference of the people in the Joplin District who presently feel a closer association with the Chester area than with the Hill County communities.

BUSSING:

(See Figs. 7 & 8)

Each of the present schools in the area have a large portion of the student bodies living outside the communities where the schools are located, and therefore each runs bus routes to provide transportation for the students. Any new school built in the district would still require the continuation of the bussing program plus the addition of the routes along Highway US. 2 to the site picked for the school. But no additional expense for new busses will be required since when each of the present bus routes reaches its present destination, the elementary students will be unloaded and all the secondary students living in the community who presently require no bussing will be picked up at a central meeting place, (the present school building) and the bus will continue to the new school site. The evening routine will be a reversal of this procedure.

Since each prospective school site would require a different number of students to be bussed and the number of miles the students would be bussed the bussing program becomes a major factor in the selection of a site.

The following calculations will produce numeric information on present bussing programs and the bussing programs required for any new site.

All calculations will produce figures in student miles (the number of students multiplied by the miles on the bus). In the case of present rural bus routes, the total number of students will be assumed to be evenly distributed along the route so that on an average each student will ride the bus for half the total lenght of the route. Between

present school sites and the new site all students will be assumed to be riding the buses.

PRESENT BUS ROUTES (STUDENT-MILES)

Inverness:		
North Route (24 miles)	15 students X 12 miles	= 180
South Route (20 miles)	14 " X 10 "	= 140
	Total	320
Rudyard:		
North Route (28 miles)	12 students X 14 miles	= 168
South Route (20 miles)	10 " X 10 "	= 100
	Total	268
Hingham:		
North Route (24 miles)	17 students X 12 miles	= 204
	Total	204
Kremlin-Gildford:		
From Kremlin to Gildford (20 miles)	30 students X 20 miles	= 600
	Total	600
TOTAL PRESENT ROUTES	1392 student-miles	

FUTURE BUS ROUTES

TO SITE #1 RUDYARD

From Inverness	48 students X 6 miles	= 288
From Rudyard		= 0
From Hingham	58 students X 6 miles	= 348
From Kremlin-Gildford	60 students X 12 miles	= 720
Plus Total of Present Routes		1392
	Total	2748

TO SITE #2 HINGHAM

From Inverness	48 students X 12 miles	= 576
From Rudyard	81 students X 6 miles	= 486
From Hingham		= 0
From Kremlin-Gildford	60 students X 6 miles	= 360
Plus Total of Present Routes		1392
	Total	2814

TO SITE #3 CENTER POINT

From Inverness	48 students X	9 miles	= 432
From Rudyard	81 students X	3 miles	= 243
From Hingham	58 students X	3 miles	= 174
From Kremlin-Gildford	60 students X	9 miles	= 540
Plus Total of Present Routes			1392
		Total	2781

SITE SELECTION:
(See Figs. 9 & 10)

Three sites for the new school have been proposed near the geographical center of the proposed district. The following is a listing of the advantages and disadvantages of each site.

SITE #1 RUDYARD

Total bussing 2748 student-miles

Advantages:
- Use of present town water and sewer systems
- Use of present electrical and gas distribution systems
- 40 students would need no bussing
- Shop facilities built in 1966 could be used by new school
- Gym built in 1965 could be used as practice facility
- New Athletic Field built 1971 could be used for competition
- The town is the present business hub of the area and provides additional student association with the business comunity. (See Figs. 4-6)

Disadvantages:
- Other communities dislike increasing influence of Rudyard in the area and oppose the additional power the school site might bring to the town.

SITE #2 HINGHAM:

Total bussing 2814 student-miles

Advantages:
- Use of present town water and sewer systems
- Use of present electrical and gas distribution systems
- 31 students would need no bussing
- Swimming Pool available for limited use
- Resistance of other communities to the site is less

Disadvantages:
- No facilities of present school plant are useable in new school
- New Athletic Field would have to be built
- There would be no business community for school association

SITE #3 CENTRAL LOCATION (midway between Hingham and Rudyard)

Total bussing 2781 student-miles

Advantages:

Although all the towns would resent losing their school, no resistance of one town to the selection of another would exist.

Disadvantages:

Sewer system would have to be built
Water, electrical, and gas transmission systems all pass the site, but distribution systems would need to be built
No present facilities could be used
All students would need some bussing
New Athletic Fields would have to be built
No normal community ties would be available

SITE CHOICE:
(See Figs. 11 & 12)

The site proposal chosen for the project is the first of the alternatives, that being the town of Rudyard. The choice was partially a matter of expense. Firstly, with the choice of this site, the facilities of a shop building, an existing gym, and the atheletic field can be used by the new school. This can be quiet important in the fact that each of these units are presently not totally paid for, and to allow them to fall into disuse at this point would be a drastic waste of money. Secondly, the total bussing necessary in terms of total numbers of student-miles, and the number of students requiring busing would be smaller than the other sites. Also involved is the fact that busses will be running relatively equal lenght routes.

The most important point though that I feel qualifies the town of Rudyard as the site for the school comes from my interpertation of the past historical trends and how I feel the trend will carry through in the future. With the death cycle of the communities as it is, I feel that the eventual maps of the area will show only one town of consequence between Havre and Chester. With the present dominance of Rudyard in the area (See Figs. 4 - 6) and its importance increasing rapidly it would seem logically that Rudyard would be this town. With this in mind, it would seem that the school should be where the future community contact will be possible.

TEACHING METHODS:

The present teaching methods used by the schools in the district center basically on the teacher oriented lecture style lesson. Variance to this method comes namely in the vo-tech types of classes; welding, woodwork, mechanics, ect.

More recently adjustments of teaching methods to requirements of class size and subject material, have been the introduction of the use of individual student instruction in the form of audio-visual capsules under the supervision of the faculty. Also the expansion of the use of seminar type classes in hagher level courses has been noted.

So far the lack of attempts into other teaching methods has been brought on more by the lack of sufficient faculty time and freedom due to the large class preparation load rather than an unwillingness of the faculty or administration to experiment. Indications are that if more faculty time were available or more secialized classes were to be brought into the curriculum with the reorganization of the schools or district many new and liberal methods would be attempted.

As of now the majority of the lecture classes range near the size of about 20 students, but with the larger enrollment classes would increase in size to nearer 30 students per class and classrooms should be able to accommidate this size group. Seminar classes in order to function as a seminar would have to remain in the size range of from 10 to 15 students. The individual study with the lesson capsule would need only enough privacy to allow concentation and could well be incorporated into other areas such as a library space.

CURRICULUM:

The following is a probable curriculum for the new Hi-Line School which incorporates all the curriculums of the present schools plus certain of the desired programs that none of the schools now are able to provide due to their size. The enrollment figures for each of the classes is a total of the number of students now taking the course in the schools and the numbers are only an estimate used for planning of classroom sizes and numbers of necessary faculty.

SUBJECT	ENROLLMENT
Shop	
Arts and Crafts	20
Woodwork	3
Mechanical Drawing	26
Welding	39
Small Engines Repair	33
Auto Mechanics	33
English	
Freshman English	62
Sophomore English	66
Advanced English Studies	114
Home Economics	
Home Economics I & II	83
Marriage and Family Life	3
Science	
Earth Science	29
Biology	72
Advanced Biology	30
Physics	20
Chemistry	20 *
General Science	25
Math	
General Math	53
Algebra	47
Geometry	32
Algebra II	29
Senior Math	23

* Estimated enrollment since at present physics and chemistry are offered on alternate years.

Commerce	
Bookkeeping	28
Typing I	51
Typing II	33
Office Practice	17
Business Math	14
Business Math II	9
Shorthand	9
Business Law	9
Commerical Economics	4
History & Government	
World History	34
US History	61
Government & Current Events	37
Economics & Sociology	5
Music	
Band	53
Chorus	98
Physical Education	
Girls PE	60
Boys PE	60
Drivers Education	50
Journalism (Offered at only one school now)	7
Art (No school offfers it presently)	
Foreign Lang. (Only one school offers it now)	7

FACULTY:		NO. OF CLASS PREPARATIONS
Shop	2 2	3/3
English & Library	4	3/3/3/4
Home Economics	1	3
Science	2	3/3
Math	2	2/3
Commerce	3	3/3/4
History & Drivers Ed.	2	2/3
Music	1	2
Art & Language	1	3
Physical Ed.	1	2
Total Faculty	18	
Administrator & Staff	3	
TOTAL STAFF	21	
Present Faculty of 4	23	
Administrator & Staff	16	
Total Staff of 4	33	

BUILDING BUDGET:

Total Bonding Potential of the four districts	$1,058,000
Cost of Land (6 acres at $150 per acre)	1,000
BUILDING BUDGET	$1,057,000

Total possible building size(at $25/sq. ft.)	42,280
Present Useable Shop Facility	1,200
Present Useable Gym	5,000
TOTAL SIZE OF NEW PLANT	48,480

OPERATIONAL BUDGET:

Total operational budget of present schools	$429,082
Cost per Classroom Unit, Staff of 33	$ 13,002
Average cost per student	$ 1,515

Under consolidation the staff can be cut to 21. The cost per classroom unit can be estimated to remain nearly equal so the total budget can be estimated at $273,063 per year and the average cost per student would drop to $1,092. This plan would produce an annual savings of $156,019 or savings over a twenty year period of $3,120,380.

Under the present school systems the State Foundation Program provides $187,785 of the budget leaving $241,297 of the cost to be picked up by the local residents in special levies. Under the consolidation plan the State Foundation Program will provide $145,919 leaving only $127,144 of the budget to be carried by the special levies.

Total Cost of the new school construction	$1,058,000
Total savings over 20 year period	$2,062,380

Additional bussing costs would be incurred under the consolodation plan, but offsetting savings could be provided by the closing of portions or all of the present plant facilities in each of the towns.

SPATIAL REQUIREMENTS:

Administration Spaces:

Reception and Secretarial Work Area:
Area for a secretary to work for the superintendent and as a receptionist for the school. Area must be large enough for the two staff members and several visitors. Must be readily accessible from the main enterance and might act to supervise access to the school.

Superintendent's Space:
Work space for school superintendent. Must have ease of acess for public, students and faculty, subject to the receptionist's screening. Area must provide enough privacy for confidential meetings. Direct visual contact with the school may be useful.

Faculty Work Area:
Work space for faculty of 18 to prepare calss material and projects. Certain amount of privacy would be necessary.

Faculty Lounge:
Provide private space for faculty members to relax during free time. Space need only accommidate a portion of the faculty at one time since offices will provide certain private areas.

Storage:
Space to hold supplies for school. Access from work area useful.

Shop:

Faculty space:
Space for two faculty members to work and meet with students and visitors. Control of student work areas from the space necessary.

Metal Work Area:
Area for 20 students to work with metals. Area requires spaces for welders, power tools, metal lathes. Ventilation necessary for painting area. Acoustical separation from the other instructional spaces necessary.

Woodwork area:
Area for 15 students to work with wood. Area requires spaces for power saws, lathes, sanders and hand tools. Ventilation necessary for painting area. Acoustical separation from other instructional areas necessary.

Drawing Area:

Area for instruction in drafting for up to 15 students. Area can also be used as art instruction area. Area requires tables, storage space for equipment, and an area for graphic instruction by the teacher.

Mechanical Shop:

Instructional spaces for up to 20 students in auto mechanics and small engine repairs. Space requires entry and work area for cars. Ventilation system for exhaust mandatory. Acoustical separation from other instructional spaces necessary.

Arts and Crafts Area:

Area for instruction of up to 20 students in leather work, plastics, sculpture, engraving, ect. Area requires ventilation, work benches, tool storage, and water connections.

English:

Faculty Spaces:

Spaces for four faculty to work or meet with students or visitors. privacy desirable for meetings or work.

Lecture Spaces:

To accommidate up to 30 students. Exterior light blockout necessary for use of audio-visual material.

Seminar Spaces:

To accommidate up to 15 students in upper level courses. Useable as meeting room for school board or similar meetings. Light blockout necessary for audio-visual material. Decor needed to act as meeting room.

Individual Study Area:

Semi-private area to accommidate one student and the audio-visual equipment for students to study private subject material.

Home Economics:

Faculty Spaces:

Space for faculty to work and meet with students or visitors. Privacy desirable at times. Supervision of cooking and sewing areas from the space is desirable.

Cooking Area:

Area to accommidate up to 20 students in instruction in cooking and baking. Area requires stoves and ovens, counter top preparation area, water connections and sinks, frig., and freezer. Area for serving and eating of prepared food necessary.

Sewing Area:
Area to accommidate up to 20 students in instruction in sewing and mending clothes. Area requires sewing machines, cutting tables, dressing and fitting area.

Lecture Space:
To accommidate up to 30 students

Individual Study Spaces:
Same as earlier listing.

Sciences:

Faculty Spaces:
Same as other faculty spaces. Supervision of lab spaces from faculty spaces desirable.

Lecture Spaces:
To accommidate up to 30 students

Chemistry Lab:
Lab space to accommidate up to 25 students in group and individual study of practical chemistry. Spaces require water and sinks areas, gas connections at each lab station, chemical and heat resistant counter height work space, chemical storage space, protective shower space. Instruction demonstration space necessary. Ventilation of space very necessary.

Physics Lab:
Lab space to accommidate up to 25 students in group and individual study of physics. Space requires water and gas connections, counter top and floor work space, storage space and an instructor demonstration space.

Biology Lab:
Lab space to accommidate up to 25 students in group and individual study in biology. Space requires water and sink spaces, counter height work space, and instructional demonstration area. Ventilation required.

Math:

Faculty Spaces:
Same as other faculty spaces

Lecture Space:
Same as other lecture spaces to accommidate up to 30 students

Commerce:

Faculty Spaces:
Same as other faculty spaces. Supervision of typing and business machines area from faculty space desirable.

Typing Instruction Area:
Area for the instruction of 25 students in typing. Area requires typewriters and electrical connections, visual display area for instruction. Acoustical separation from adjoining spaces necessary.

Business Machines Area:
Area for instruction of 20 students in use of business machines including dictaphones, duplicating machines, mimeographs, copiers, ect. Area requires room for machines, instructional display area.

Journalism Work Area:
Area to provide space for production of school newspapers, yearbooks, and other published material under the supervision of the faculty. Area requires work areas table top and counter top heights, area for duplicating machines, photographic work area, ect.

Darkroom:
Darkroom for photographic developing and printing. For use of journalism groups and camera club.

Lecture Spaces:
Same as above for up to 30 students.

History:

Faculty Spaces:
Same as other faculty spaces

Lecture Spaces:
Same as other lecture spaces to accommidate up to 30 students

Music:

Faculty Space:
Same as other faculty spaces. Must be able to supervise music area.

Band and Choral Practice Area:
Seating space for band up to 50 members and choral area for up to 60 members. Area requires acoustical dampening to reduce reverberation. Total acoustical separation from surrounding areas required. Nearness to auditorium space desirable.

Practice Space:
Acoustically separate areas for individual and small groups to practice instrumental and choral music.

Storage Area:
Area to store musical instruments, uniforms, and robes, music, repair equipment, ect.

Driver's Education:

Lecture Space:
Same as other lecture spaces. Area must accommidate up to 50 students.

Library:

Stacks:
Storage space for books, periodicals, films, slides, ect.

Reading Space:
Area for up to 10% of student population to relax and read material or study.

Circulation Control and Work Space:

Area for librarian to supervise space, control circulation, catalogue and repair books.

Auditorium:

Stage:
Stage adaptable to drama (Traditional and contempory), concerts (Vocal and Instrumental), and public gatherings.

Dressing Area:
Two dressing areas for up to 15 actors in each plus makeup area and restroom facilities for performers.

Storage:
Area for storage of Props, Scenery, Costumes, Lectern, ect. for use in the Auditorium.

Seating:
Seating for 400 to attend concerts, plays, meetings ect.

Gymnasium:

Seating:
Gym must seat 1200 for indoor events such as basketball, wrestling, or gymnastics.

Playing Area:
Area must be large enough for a basketball court when all seating capacity is in use.

Practice Area:
Retractable seating will allow additional practice space. Physical separation of space may be desired for instruction of several sports or physical education classes at one time.

Dressing Area:

Two dressing areas useable as mens and womens spaces or by opposing teams. Area requires dressing area, clothing storage (team storage spaces being separate from classes' storage is desirable), showering and toilet spaces for up to 40 people.

Storage:

Storage space for uniforms and sports equipment.

Common Entry Area:

Lobby Area:

Entry must be readily accessable from the parking without entering the remainder of the school. Area must be large enough to handle the incoming crowd and gatherings at intermission times.

Ticketing Area:

Area to control access to facility and sell and/or gather tickets to functions. Security for sales area need only be minimal.

Concession Area:

Area for the sale of concessions to spectators including some minor cooking spaces for light snacks or else access to a cooking area.

Restrooms:

Two restrooms to provide toileting facilities for the crowds.

General Use Areas:

Janitorial Spaces:

Storage and work space for cleaning materials.

Mechanical Space:

Area to hold equipment to heat, light, and provide necessary mechanical services to the building.

Parking:

Parking spaces for up to 50 cars for normal daily activities and 200 cars for special events. Also parking for 8 busses during daylight hours and two busses for night parking. Protected loading and unloading for busses in foul weather near the entry would be useful.

SPACE REQUIREMENTS:

Administration:	
Reception	150 sq. ft.
Superintendent's Office	150
Faculty Work Area	400
Faculty Lounge	200
Storage	150
	1050 sq. ft.
Shops:	
Faculty Offices (2)	200 sq. ft.
Welding Shop	1000
Woodworking Shop	1000
Drawing Area	600
Auto Shop (Small Engines)	1200
Arts & Crafts	400
	4400 sq. ft.
English:	
Faculty Offices (4)	400 sq. ft.
Lecture Classrooms *	
Seminar Classrooms (2)	500
Study Carrells (5) *	
	900 sq. ft.
Home Economics:	
Faculty Offices (1)	100 sq. ft.
Lecture Classrooms *	
Sewing Area	500
Cooking Area	500
Study Carrells (15) *	
	1100 sq. ft.
Sciences:	
Faculty Offices (2)	200 sq. ft.
Lecture Classrooms *	
Chemistry Lab.	400
Physics Lab.	900
Biology Lab.	
	1100 sq. ft.
Math:	
Faculty Offices (2)	200 sq. ft.
Lecture Classrooms *	
	200 sq. ft.

Commerce:	
Faculty Offices (3)	300 sq. ft.
Typing Area	400
Business Machines Area	400
Lecture Classrooms *	
Darkroom	100
Publications Area	400
	1600 sq. ft.
History & Government:	
Faculty Offices (2)	200 sq. ft.
Lecture Classrooms *	
	200 sq. ft.
Music:	
Faculty Office (1)	100 sq. ft.
Band & Chorus Practice Area	800
Private Practice Areas (4)	200
Storage	300
	1400 sq. ft.
Library:	
Stacks	500 sq. ft.
Reading Area	700
Circulation and Admin.	200
	1400 sq. ft.
Auditorium:	
Stage	1500 sq. ft.
Storage	500
Dressing Rooms (2)	600
Seating (400)	3000
	5600 sq. ft.
Gymnasium:	
Seating (1200)	5000 sq. ft.
Playing Area	3500
Dressing Rooms (2)	1200
Storage	400
	10,100 sq. ft.
Common Area:	
Lobby	1800 sq. ft.
Restrooms (2)	400
	2200 sq. ft.
Cafeteria:	
Eating Area (150)	1800 sq. ft.
Kitchen	500
Food Storage	300
Dish Washing Area	300
	2900 sq. ft.

Mechanical Space:

Boiler room	1500 sq. ft.
	1500 sq. ft.

* Study of the total needs for lecture spaces at 100% utilization of the spaces produces a total requirement of eight classroom spaces. Each of the classrooms requires a total of 1050 sq. ft.

Study Carrells each require about 15 sq. ft. of floor space and a minimum of 20 will be required for direct class period work.

CLIMATE:

The climate of the area could best be characterized by cold windy winters and hot dry summers. Major factors effecting the design of any structure in the area would be the cold, the strong winds and relatively low humidity levels. Winter temperatures have been known to drop to -40°F. and -50°F. And winter winds, generally from the north and west can reach velocitiies of near 40 mph producing chill factors in the range of -70°F. and below during blizzard conditions.

Southern and easterly winds known as Chinooks are rare and cause lesser problems to designs since they tend to produce moderating temperatures and generally these winds never reach the intensities of the predominent winds.

Winter snowfall although light and generally with a relatively low water content produces problems due to the winds. Drifting snow produces conditions of extreme discomfort and often block roads, driveways and sidewalks, and can produce blockage of enterances and exits on most structures.

The low relative humidity, especially during the winter months, creates problems in comfort control for interior spaces. Any mechanical systems would require adjustments to allow the production of an interior humidity level in the comfort range.

VEGATATION:

The normal vegatation of the area consists mainly of short native grasses and some low brush. Mative trees are few and appear mainly in the lower wetter more sheltered areas as does the majority of the brush. Harsh weather conditions make the cultivation of trees slow and laborious, often requiring twelve to fifteen years before the trees reach sufficient size to provide adequate shelter of wind breaks.

Introduction of cariganda trees for use as shelter belts has meet widespread success. The relatively short, bushy plants adapt to and survive well in the harsh conditions of the area and in the span of several years are developed to the point of providing excellent low wind breaks.

But since many of the normal means of landscape sheltering will not be possible new methods based on orientation and use of present land forms for sheltering will be necessary.

CANADA

LAIRD

WHITLASH

KING

FAIRCHILD

BUTTE

SIMPSON

GOLDSTONE

LILAC

MILK RIVER

HILL

LUCERNE

SAGE

HAUSMAN

LIBERTY COUNTY

HILL COUNTY

449

FRESNO

231

XENIA

KREMLIN

JOPLIN

INVERNESS

RUDYARD

HINGHAM

GILDFORD

U.S. 2

BISON

BURLINGTON NORTHERN

TIBER

CHESTER

448

LOTHAIR

432

223

TIBER RES.

BOX ELDER

U.S. 87

0 1 2 3 4

SCALE IN MILES

BRINKMAN

PONDERA

MARIAS RIVER

MARIAS

SELMA

INTERNATIONAL BOUNDRY

COUNTY LINE

PAVED HIGHWAY

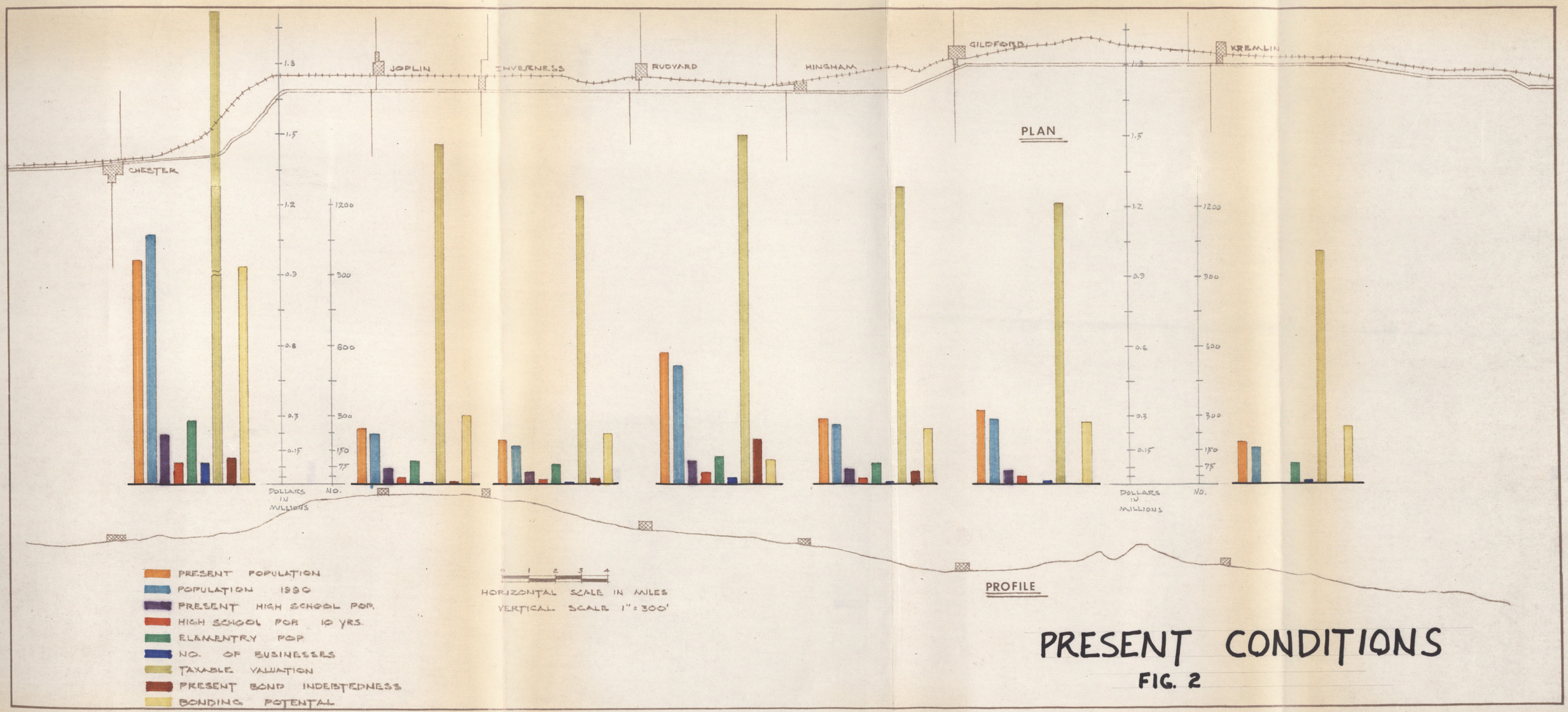
MINOR ROADS

FUNCTIONING COMMUNITY

DEAD COMMUNITY

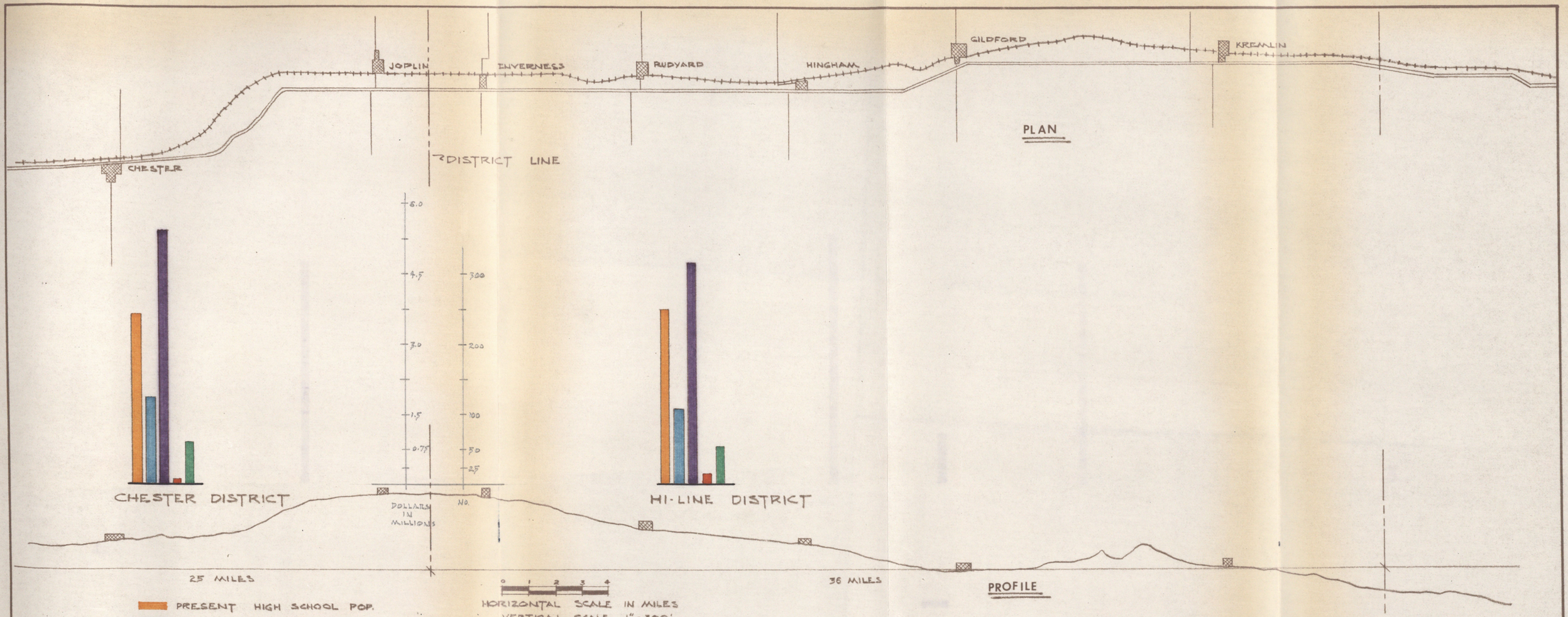
HISTORY

FIG. 1



PRESENT CONDITIONS

FIG. 2



NEW DISTRICTS

FIG. 3

CANADA

LIBERTY COUNTY

HILL COUNTY

MILK RIVER

FRESNO

KREMLIN

GILDFORD

HINGHAM

RUDYARD

INVERNESS

JOPLIN

U.S. 2

BURLINGTON NORTHERN

CHESTER

449

231

448

432

223

TIBER RES.

MARIAS RIVER

BOX ELDER

U.S. 87

CHESTER
JOPLIN
INVERNESS
RUDYARD
HINGHAM
GILDFORD
KREMLIN
HAVRE

0 1 2 3 4
SCALE IN MILES

INTERNATIONAL BOUNDRY
COUNTY LINE
PAVED HIGHWAY
MINOR ROADS

AG. NEEDS SOURCE

FIG. 4

CANADA

LIBERTY COUNTY

HILL COUNTY

MILK RIVER

FRESNO

KREMLIN

GILDFORD

HINGHAM

RUDYARD

INVERNESS

JOPLIN

BURLINGTON NORTHERN

CHESTER

TIBER RES.

MARIAS RIVER

FOX ELDER

U.S. 87

U.S. 2

231

449

448

432

221

CHESTER
JOPLIN
INVERNESS
RUDYARD
HINGHAM
GILDFORD
KREMLIN
HAVRE

0 1 2 3 4
SCALE IN MILES

INTERNATIONAL BOUNDRY
COUNTY LINE
PAVED HIGHWAY
MINOR ROADS

RECREATION SOURCE

FIG. 5

CANADA

LIBERTY COUNTY

HILL COUNTY

MILK RIVER

FRESNO

KREMLIN

GILDFORD

U. S. 2

RUDYARD

HINGHAM

JOPLIN

INVERNESS

BURLINGTON NORTHERN

CHESTER

TIBER RES.

MARIAS RIVER

BOX ELDER

U.S. 87

449

231

448

432

223

CHESTER
JOPLIN
INVERNESS
RUDYARD
HINGHAM
GILDFORD
KREMLIN
HAVRE

0 1 2 3 4
SCALE IN MILES

INTERNATIONAL BOUNDRY
COUNTY LINE
PAVED HIGHWAY
MINOR ROADS

BASIC NEEDS SOURCE

FIG. 6

CANADA

LIBERTY COUNTY

HILL COUNTY

MILK RIVER

FRESNO

231

449

JOPLIN

INVERNESS

RUDYARD

HINGHAM

GILDFORD

KREMLIN

U.S. 2

BURLINGTON NORTHERN

CHESTER

448

432

221

TIBER RES.

MARIAS RIVER

BOX ELDER

U.S 87

0 1 2 3 4

SCALE IN MILES

INTERNATIONAL BOUNDRY

COUNTY LINE

PAVED HIGHWAY

MINOR ROADS

DISTRICT BOUNDRIES

BUS ROUTES

PRESENT DISTICTS

FIG. 7

CANADA

LIBERTY COUNTY

HILL COUNTY

MILK RIVER

449

FRESNO

231

JOPLIN

INVERNESS

RUDYARD

NINGHAM

GILDFORD

KREMLIN

U. S. 2

BURLINGTON NORTHERN

CHESTER

448

432

221

TIBER RES.

MARIAS RIVER

FOX ELDER

U.S. 87

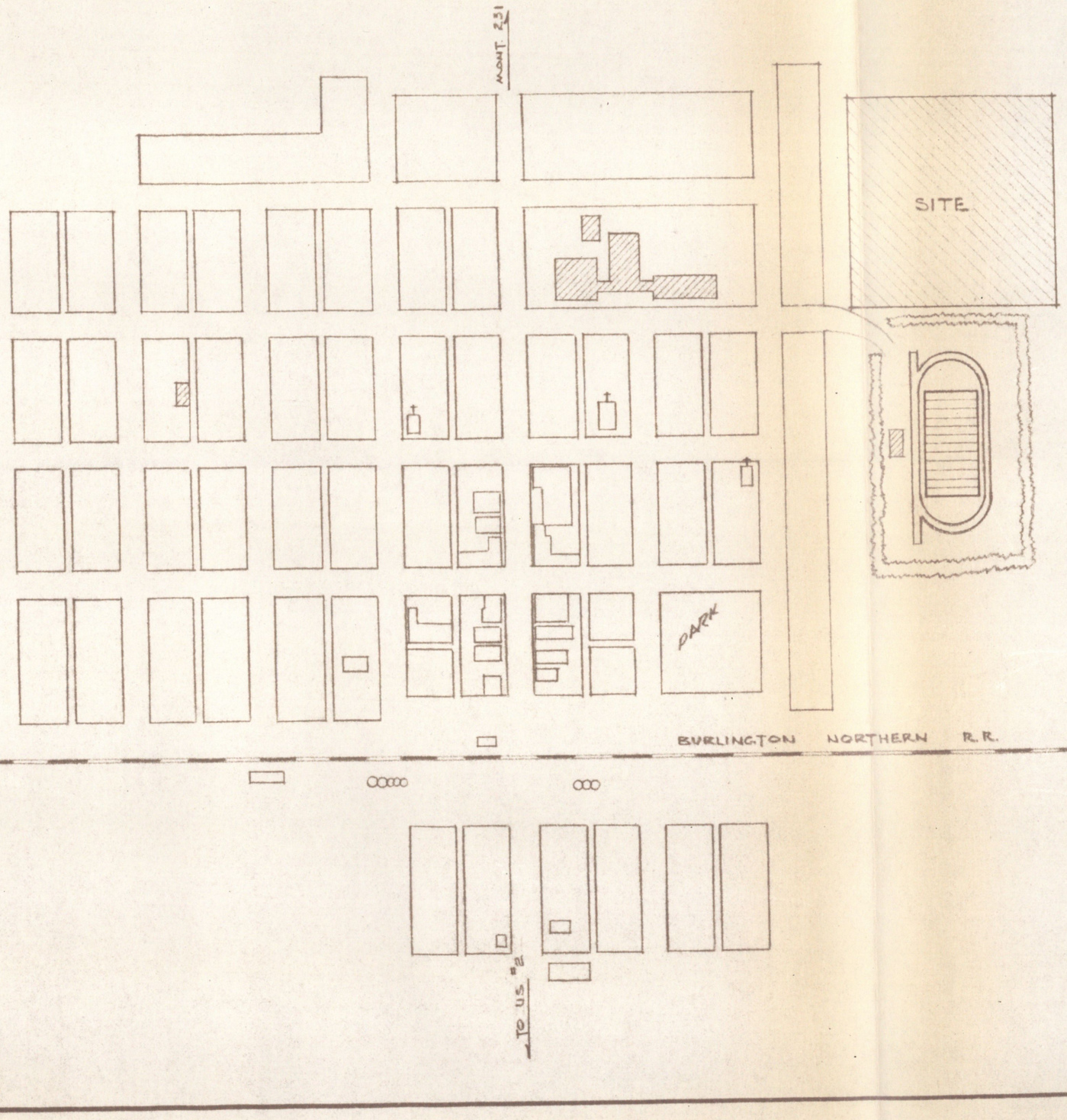
0 1 2 3 4
SCALE IN MILES

INTERNATIONAL BOUNDRY
COUNTY LINE
PAVED HIGHWAY
MINOR ROADS
DISTRICT BOUNDRIES
CHESTER DISTRICT BUSES
HI-LINE DISTRICT BUSES

NEW DISTRICTS

FIG. 8

RUDYARD, SITE 1



LEGEND

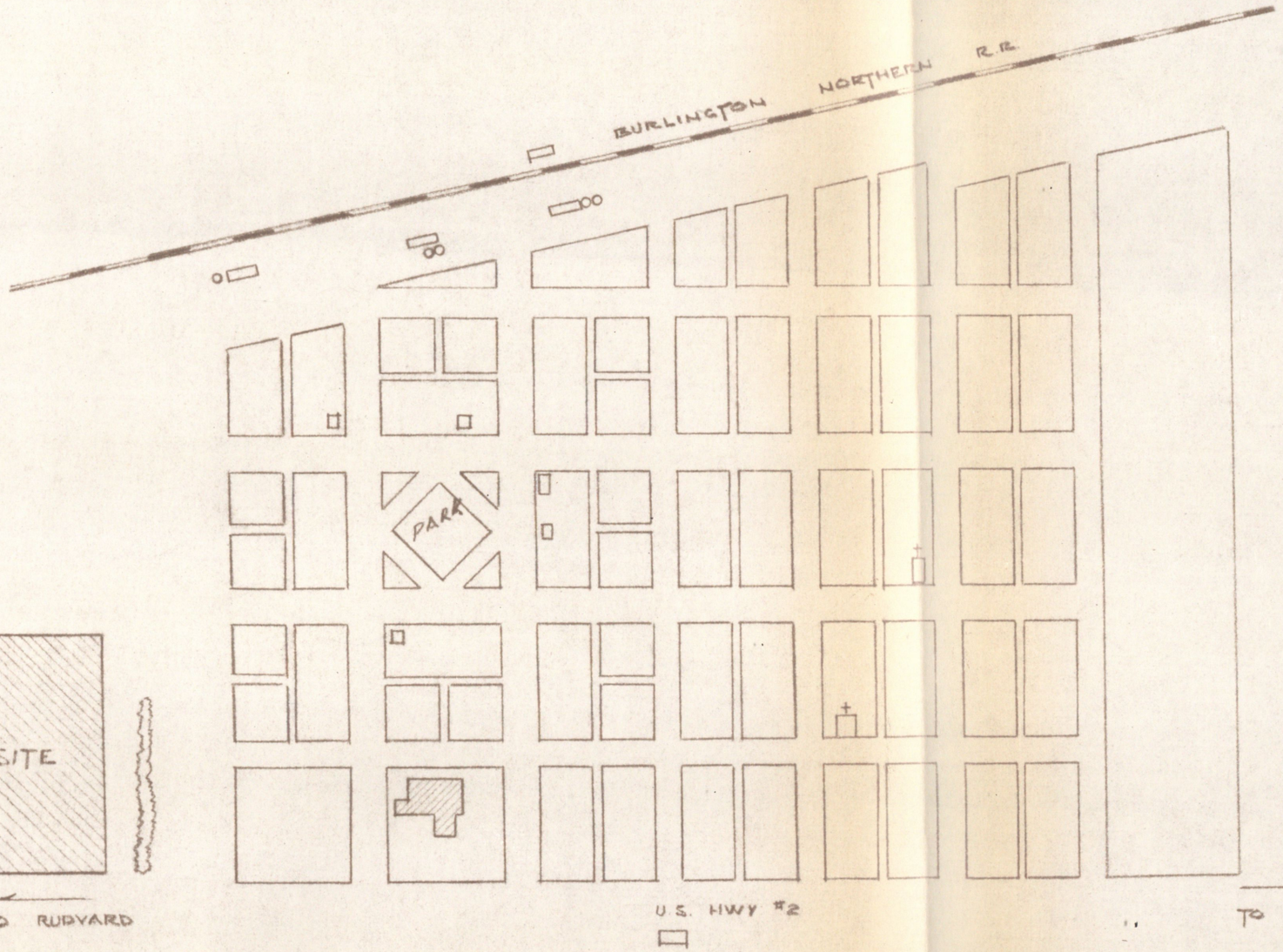
SCHOOL FACILITIES
BUSINESSES

0 200 400
SCALE IN FEET

N

FIG. 9

HINGHAM, SITE 2



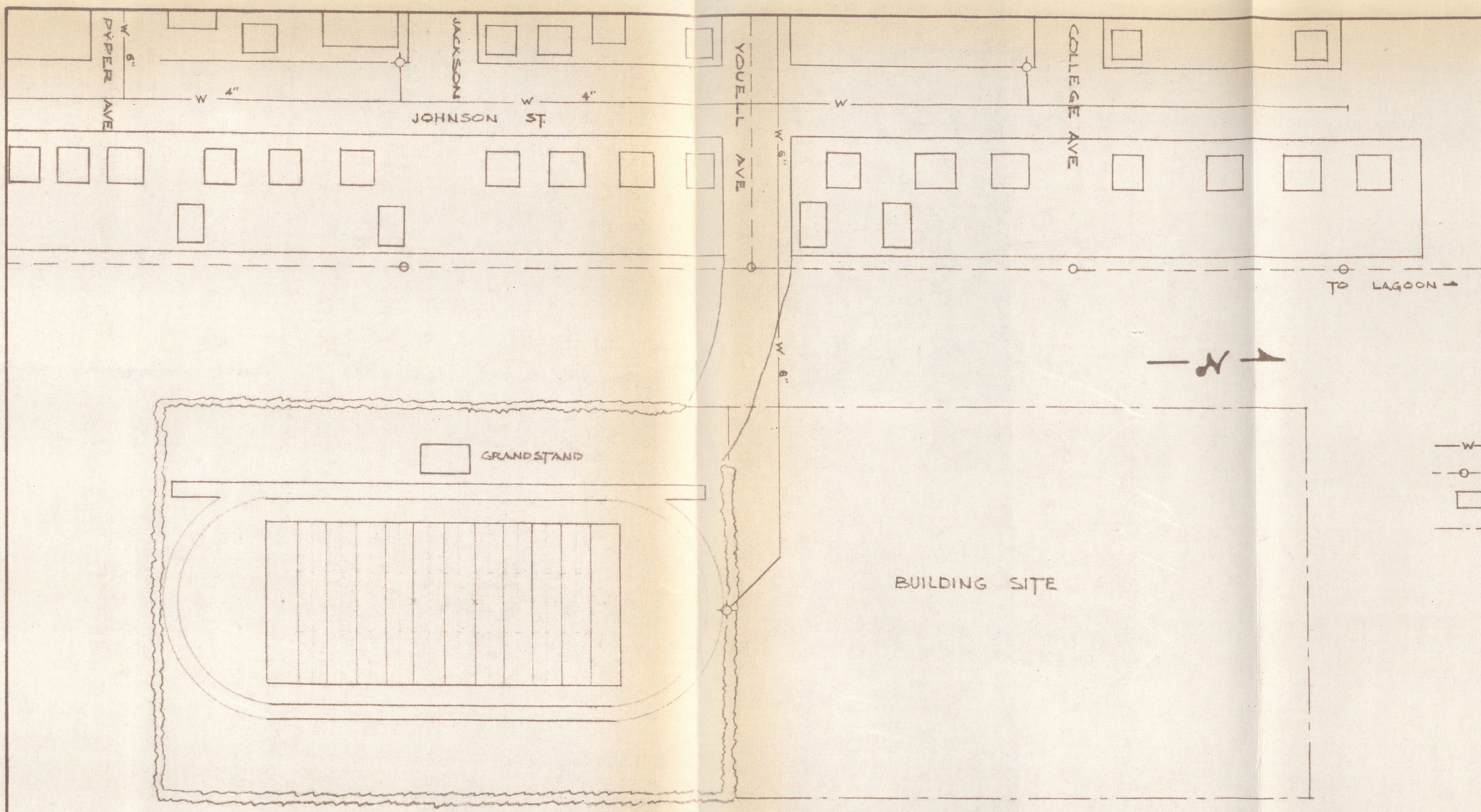
LEGEND

- SCHOOL FACILITIES
- BUSINESSES

0 200 400
SCALE IN FEET

N

FIG. 10



SITE

SCALE 1" = 100'

LEGEND

—W— WATER MAIN

—o— SEWER & MANHOLE

EXISTING BUILDINGS

—·— PROPERTY LINE

FIG. 11


SITE
SCALE 1" = 40'
CONTOURS = 6"
N
6" WATER LINE
HYDRANT
3011
3010
3009
3008
3007
3006
3008
3009
3010
3007
3006

FIG. 12

TABLE #1

AREA OPINIONS:

The following are selected results of an opinion poll of the residents of the school districts involved in study. The poll was done by Northern Montana College Consulting Service at the request of the administrators of the local schools. The results given here are given as a basis for decision in the design of the project.

If you feel that your present schools are inadequate in certain ways, which level of education needs the greatest improvement in you opinion?

Elementary Schools	16%
Secondary Schools	84%

What is present attitude about the level of school costs in your community?

Costs are relatively too high	61%
Costs are about right	37%
Costs are relatively too low	2%

If you are dissatisfied with the cost of education in your community, are you interested in looking seriously at possible "consolidation" or "reorganization" of schools as a possible way to offset rising school costs?

Yes	63%
No	28%
Other	9%

Do you believe that the small Hi-Line schools, as they are presently organized, will be able to offer acceptable educational programs in the face of declining enrollments?

Yes	40%
No	60%

Do you believe some form of school "consolidation" or "reorganization" should be considered in dealing with declining enrollment programs?

Yes	81%
No	19%

If you feel that it is time to look seriously at school "consolidation" or "reorganization", which of the following statements are most pertinent?

We need to find ways of reducing school costs.
We need to find ways of dealing with decreasing enrollments.
We need more comprehensive educational programs for our youth.
We need to provide a more complete staff of professional educators.
We need more specialized staff members to deal with special programs.
(List is given in order of priority)

If you are opposed to looking at "consolidation" or "reorganization" which of the following statements are most pertinent?
(Listed in order of priority)

We feel that transportation of students needs to be kept as close to home as possible.

We feel that our present small schools promote individual attention to our children and that this advantage would be lost.

We feel that "consolidation" and "reorganization" would result in the loss of community-school loyalty and identity.

We feel that people are willing to absorb the necessary costs associated with maintaining our present organization of schools.

We feel that the economic loss to our community would be too great.

If your present system were "consolidated" or "reorganized" into a larger school unit -- resulting in all or part of your present school being located in a different place-- indicate how you feel this development would affect your community-school loyalty.

A certain amount of community-school loyalty, "spirit", and "identity" would be lost. 54%

If better educational opportunities for children could be provided, people would subordinate their personal feelings and make the necessary adjustments. 45%

A severe economic loss to our community would result 43%

People would adjust to the "new school" concept. 37%

People would not like to give-up the school activities that bring people together in social and recreational functions. 35%

A new-larger community-- would develope around the consolidated school; offering people an opportunity to develope broader base for community activities and loyalties. 17%

DESIGN CONSIDERATIONS:

The most important design consideration in this project is the building of a physical plant that will allow and encourage adaptation to a declining student population. This will have to be accomplished by the multi-use of spaces and a flexiblity of spaces to allow adaptation of spaces to other uses in the future. First consideration of future use would of course be for additional space for the education of the student population. If the spaces are not needed for the education of the normal student population, the next logical use could well be area to further adult or continuing educational programs which have just begun in the area schools. Another logical use for the spaces may well be some form of community meeting space, where social functions designed to bring the people together could take place. Included in the community center concept of use would be a use of the plant as a recreational facility. Almost any other use than for the total public use would be highly complicated by the legal factors of the use of public facilities for private purposes. All the mentioned possible uses of the spaces should the spaces not be needed for the education of the students, may well be incorporated into the design for after hours use to increase the total utilization of the plant.

The initial uses of the multi-use spaces will be a compromise situation at best since the crowding of related function will be neccessary so that when the final expected student population is reached large portions of the school will not be left unused or wasted.

A second desire in the design is to deinstitutionalize the project. The normal image produced by the mention of a school includes corridors,

lined by metal lockers, hard (supposedly indestructible) materials, enclosed spaces for instruction. It has been suggested by educators and psychologists that this "institutionalization" can and does create a disorientation that produces a resentment of the system, or at least enough of a disorientation outside the normal home that can be harmful to the educational proccess. If the school could bgin to develope a vocabulary more closely associable with the normal home or at least more comfortable to the human scale, the belief is that the relaxation of the students could produce increase learning potential. To this end the design will come from materials and spaces, as much as possible, that provide a more informal and relaxed atmosphere than the normal school.

One attempt toward this end is that every attempt will be made to reduce purely circulation space to an absolute minimum and in cases where circulation spaces prove neccessary additional uses for the space will be looked for so these spaces will not become so much waste in none peak traffic periods.

In any institution of instruction the core is the library. In response to this situation the library should become the architectural core of the institution as well. This is normally carried off in a multi-building complex such as a campus, but is normally overlooked in a single building unit.

One of the most wanted additions to the curriculum in the view of the area residents was a drama and speech program, followed closely in popularity by an improvement in the music program. Both of these programs to be successful could well use an auditorium space for

performances. Yet the utilization of an auditorium by just these two programs in this size of an institution would be weak justification for the expense. The only way a space of this sort could be afforded is if the utilization of the space could be increased to near the level of the rest of the school. The normal function capable of being incorporated into the auditorium would be a lecture space. But the size of the space would have to be much smaller to be practical. The division of the space would have to be accomplished visually, and more difficultly acoustically, and provide all necessary teaching aids in each of the spaces created. Acoustical separation of the spaces is a difficult and expensive proposition, but the additional expense could be covered easily by the savings in the number of lecture spaces required in the remainder of the school.

The true cost of any project must include the total operational cost attributable to any design changes as well as the initial construction costs. So with this in mind, every attempt should be made to keep operational costs to a minimum, including cleaning costs, repair costs, and costs for fuel and electricity.

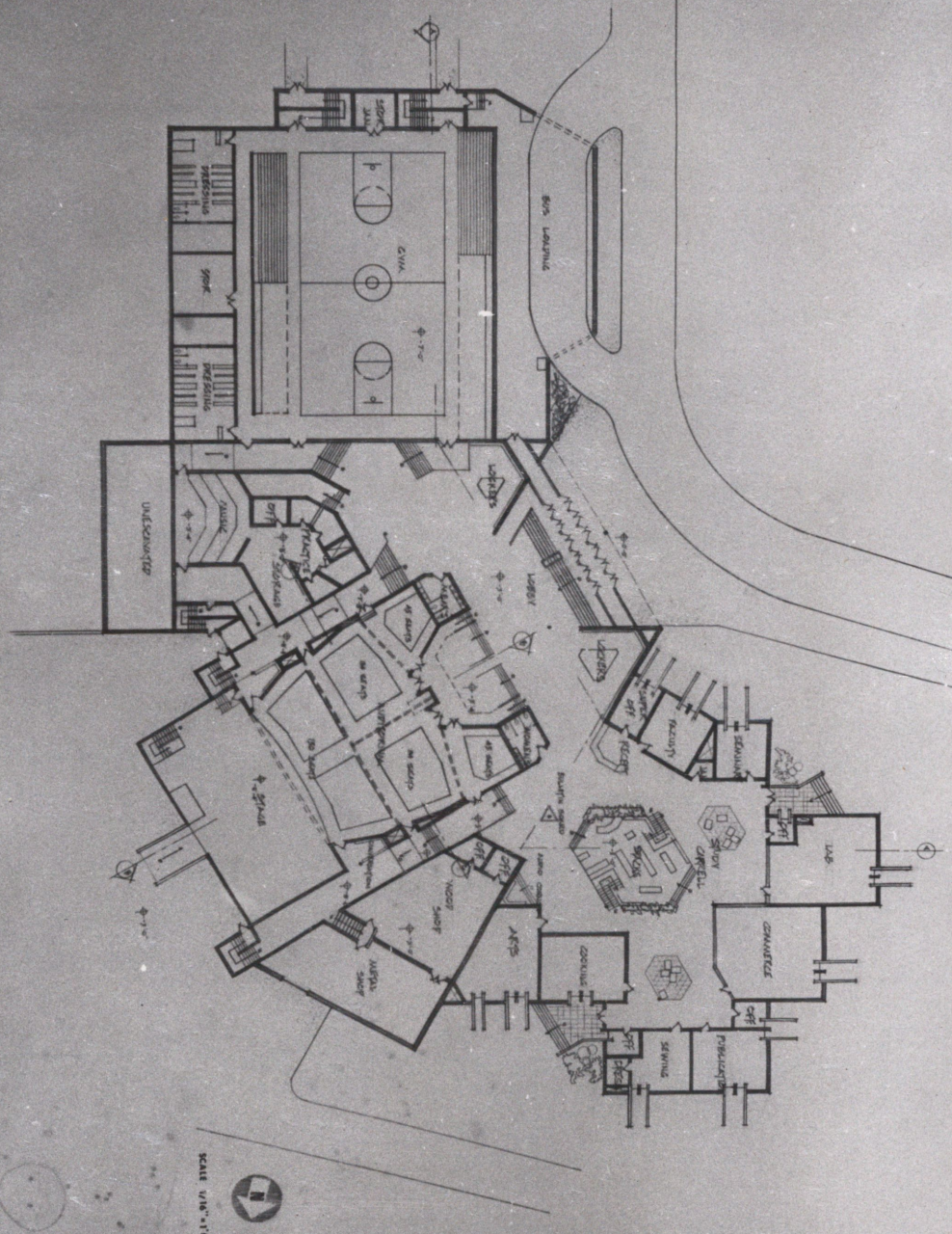
With the climatic conditions as severe as they are in the area, windows especially large expanses of glass, can create drastic heat loss, producing uncomfortable conditions for the people near it as well as greatly increasing heating costs. Also since external views are much less than interesting, glass area can be cut to a minimum necessary to allow orientation to the exterior and turn the main attention to the interior. With this in mind the interior will have to remain as open as possible to keep down any feelings of confinment on the part of the users.

Research into the educational phylosophies of the administrators of the present schools pointed up one fact more drastically than any other, that very few administrators agree totally if at all on the correct means of operating a school or educating students. Any school plant in order to operate successfully over a number of years will have to be able to adjust to each new administrator's idea of educational policy without especially cramping it with architectural features. Interior partitions or separations must not be of a non-structural nature so that adjustments can be accomplished without affecting the structural integrity of the building. This would allow adjustment to be accomplished over a period of several weeks, but if day to day adjustments were possible with some means of easily moveable or adjustable separation even more flexiblity would be possible.

Since external openings will be minimal in reaction to the weather and view, artificial lighting will have to be used to provide sufficient lighting level for the functions necessary. This allows a maximum of light control both in terms of intensities and quality.

Also in reaction to the specific climatic condition of the low humidity levels in the winter months, any climate control system must include means of increasing the humidity level to a comfort range.

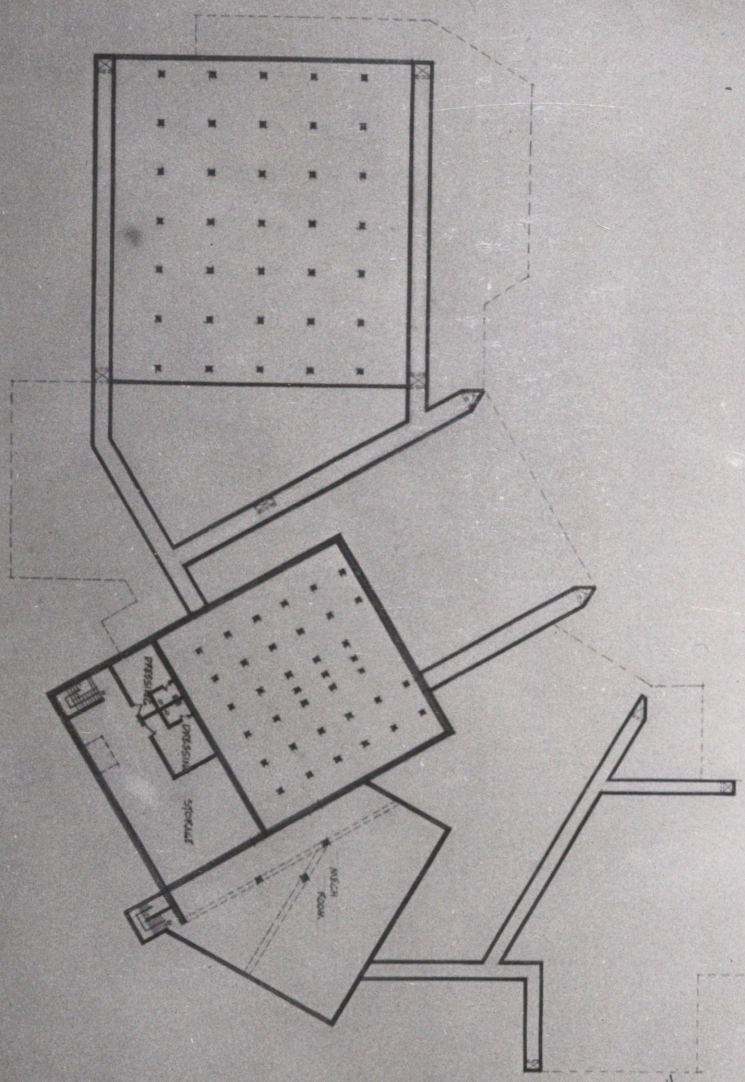
These will be the design considerations for the project of the school plant.



HI-LINE CONSOLODATED SCHOOL

HILL COUNTY, MONTANA

first floor



SCALE 1/16"=1'0"

HI-LINE CONSOLODATED SCHOOL

HILL COUNTY, MONTANA

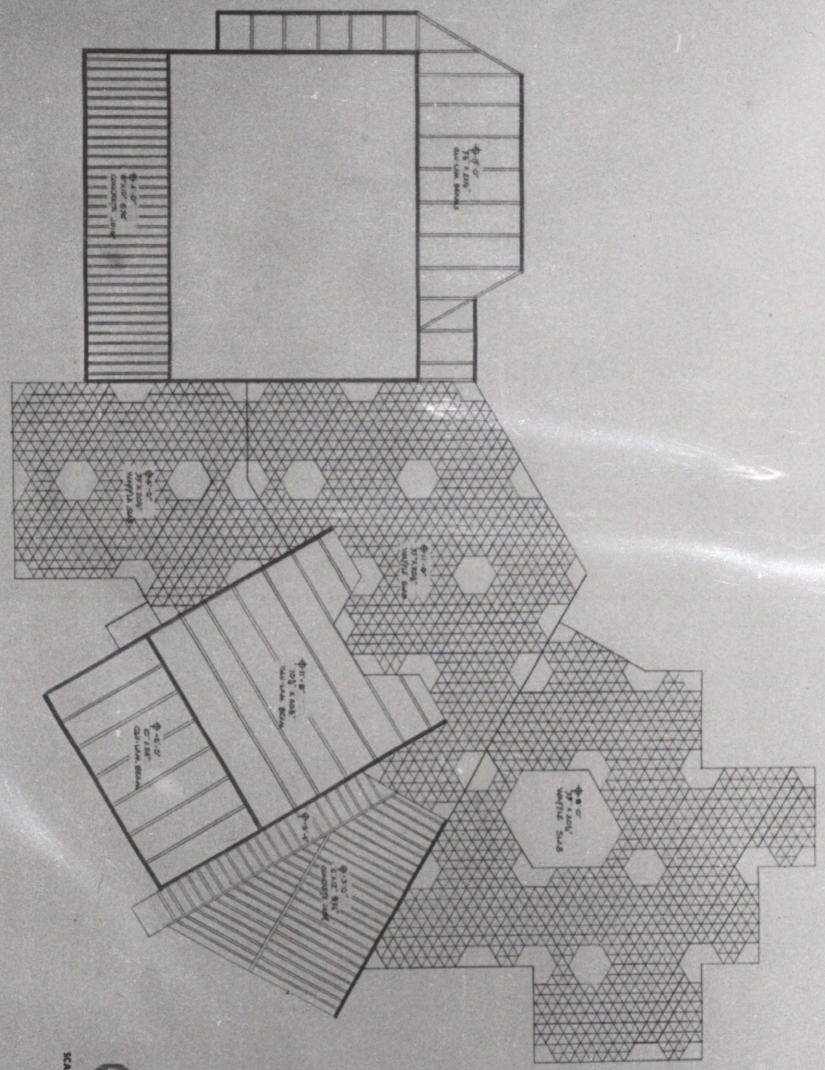
lower floor mechanical

HI-LINE CONSOLODATED SCHOOL

HILL COUNTY, MONTANA

second floor

SCALE 1/16"=1'0"



SCALE 1/16"-1'0"

HI-LINE CONSOLODATED SCHOOL

HILL COUNTY, MONTANA

structural
first level

HI-LINE CONSOLODATED SCHOOL

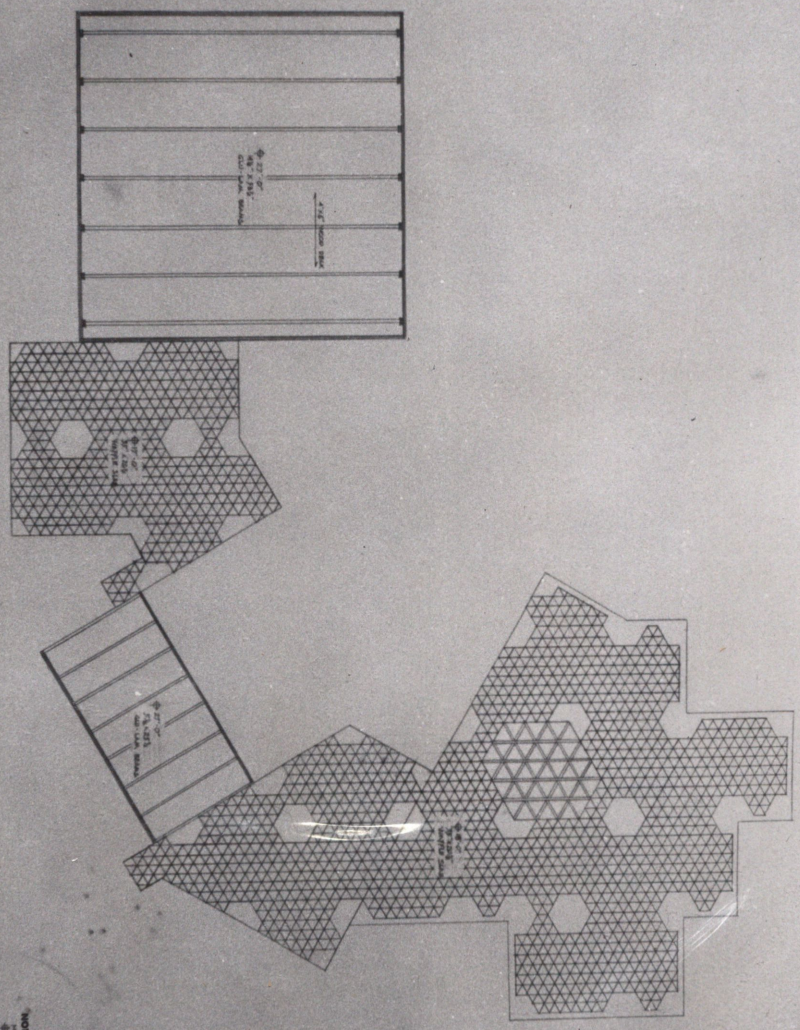
HILL COUNTY, MONTANA

sections

Section A-A
SCALE 1/16"-1'0"

Section C-C
SCALE 1/8"-1'0"

Section B-B
SCALE 1/8"-1'0"

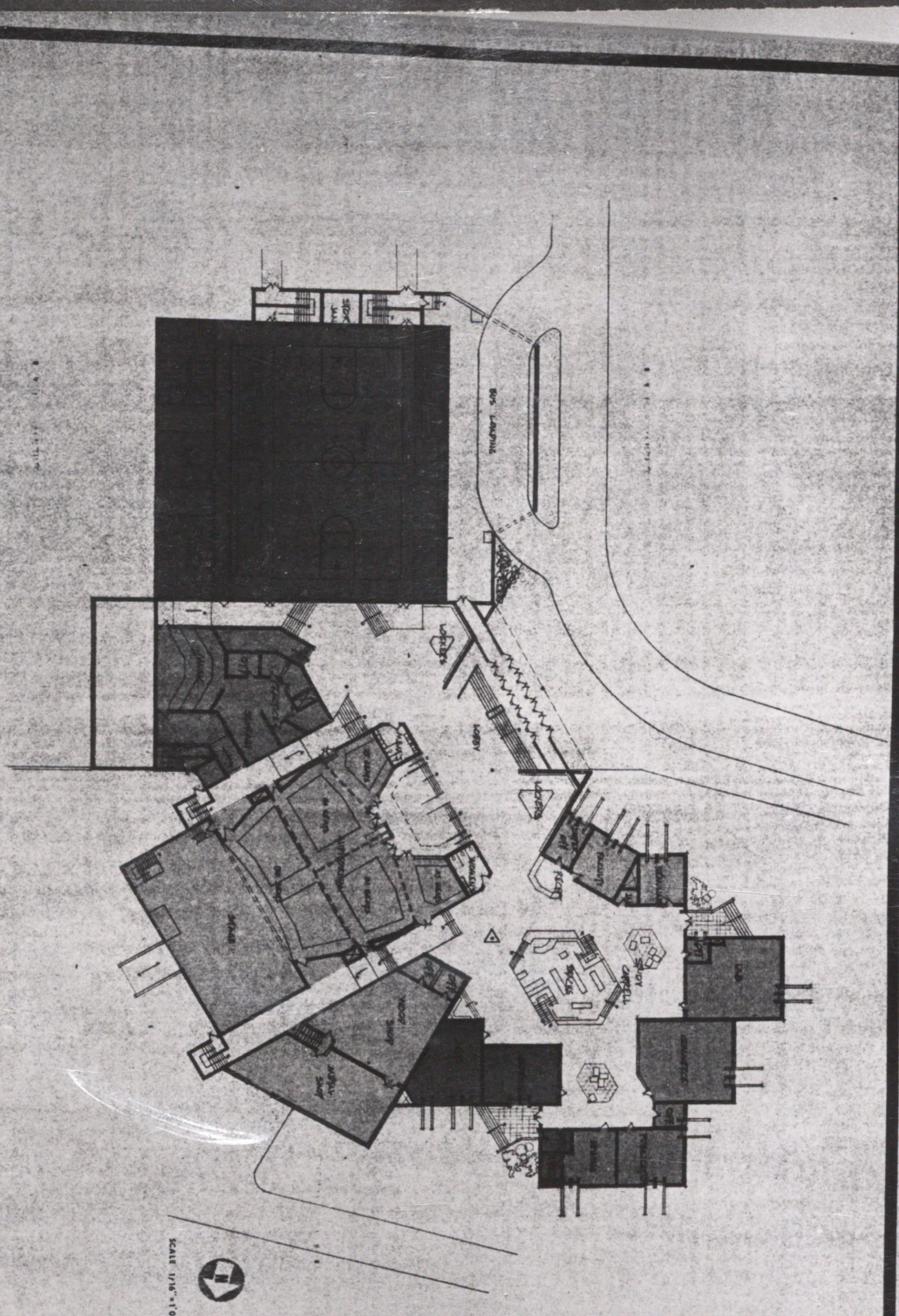


SCALE 1/16"=1'0"

HI-LINE CONSOLODATED SCHOOL

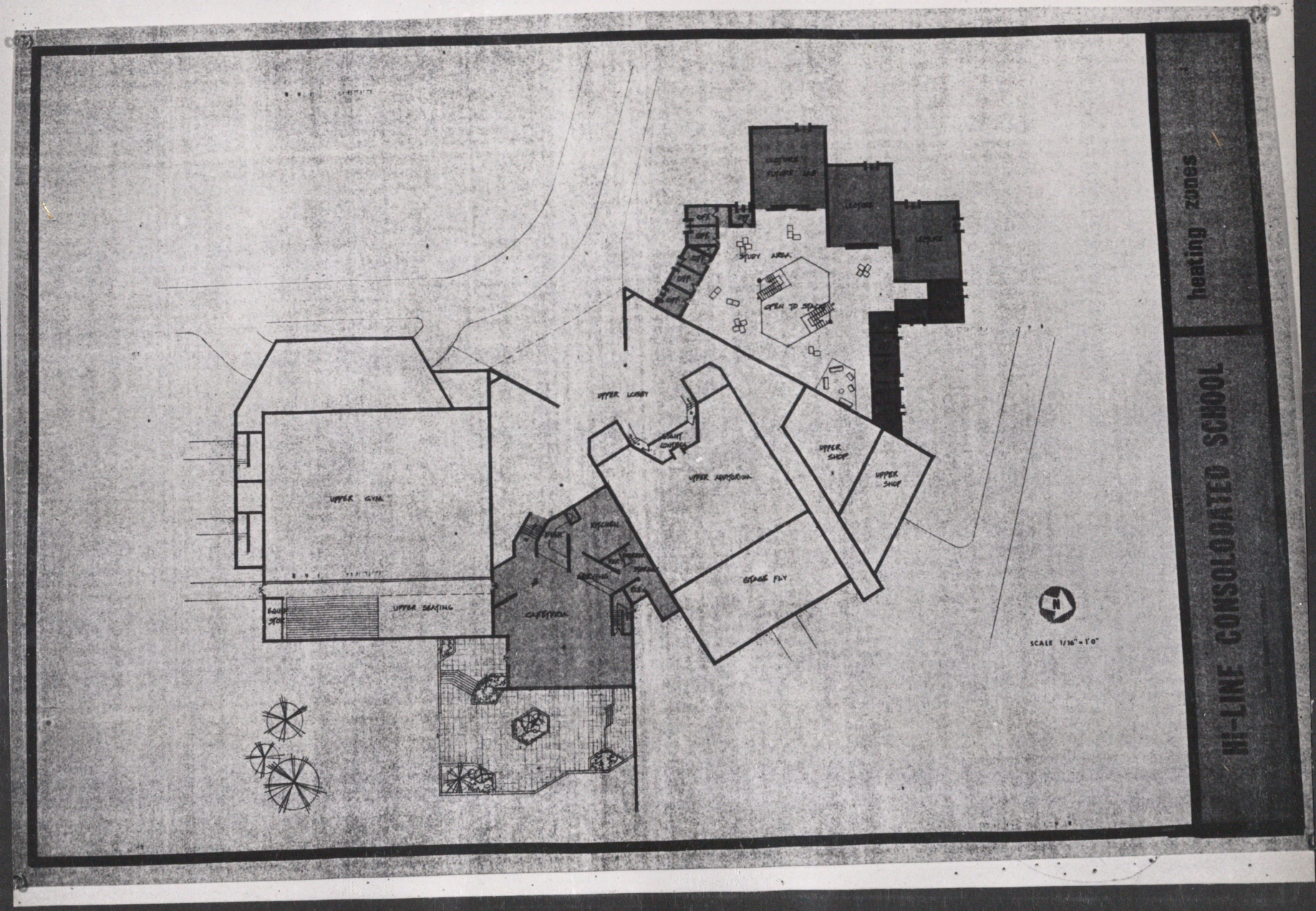
HILL COUNTY, MONTANA

structural
second level



HI-LINE CONSOLODATED SCHOOL

heating zones


HI-LINE CONSOLIDATED SCHOOL
heating zones
UPPER GYM
UPPER SEATING
UPPER LOBBY
UPPER AUDITORIUM
STAGE FLY
UPPER SHOP
UPPER SHOP
STUDY AREA
SCALE 1/16"=1'0"

HI-LINE CONSOLODATED SCHOOL

HILL COUNTY, MONTANA

interior and details

ENTRY LOBBY

Window Details

SCALE 1/8"=1'0"

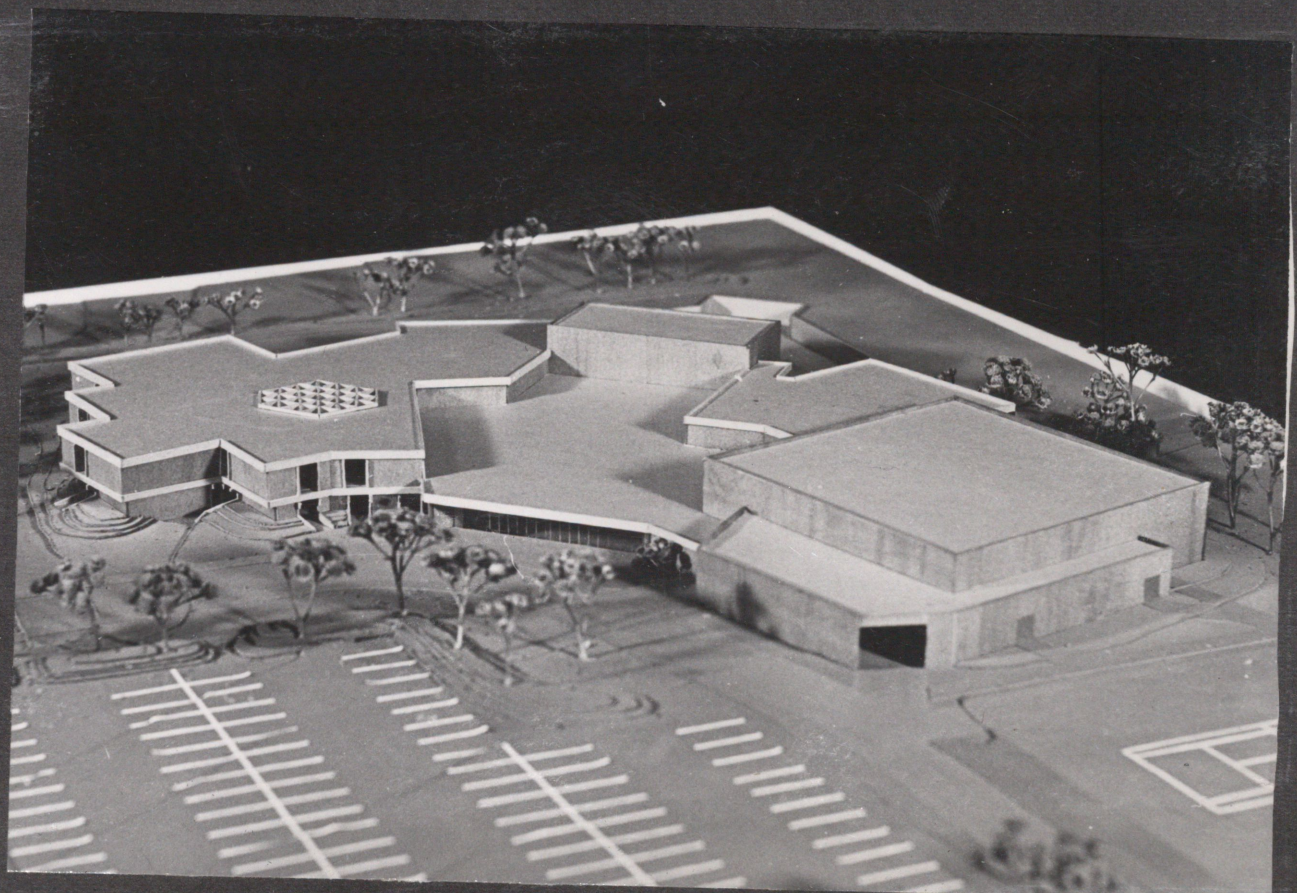
interior

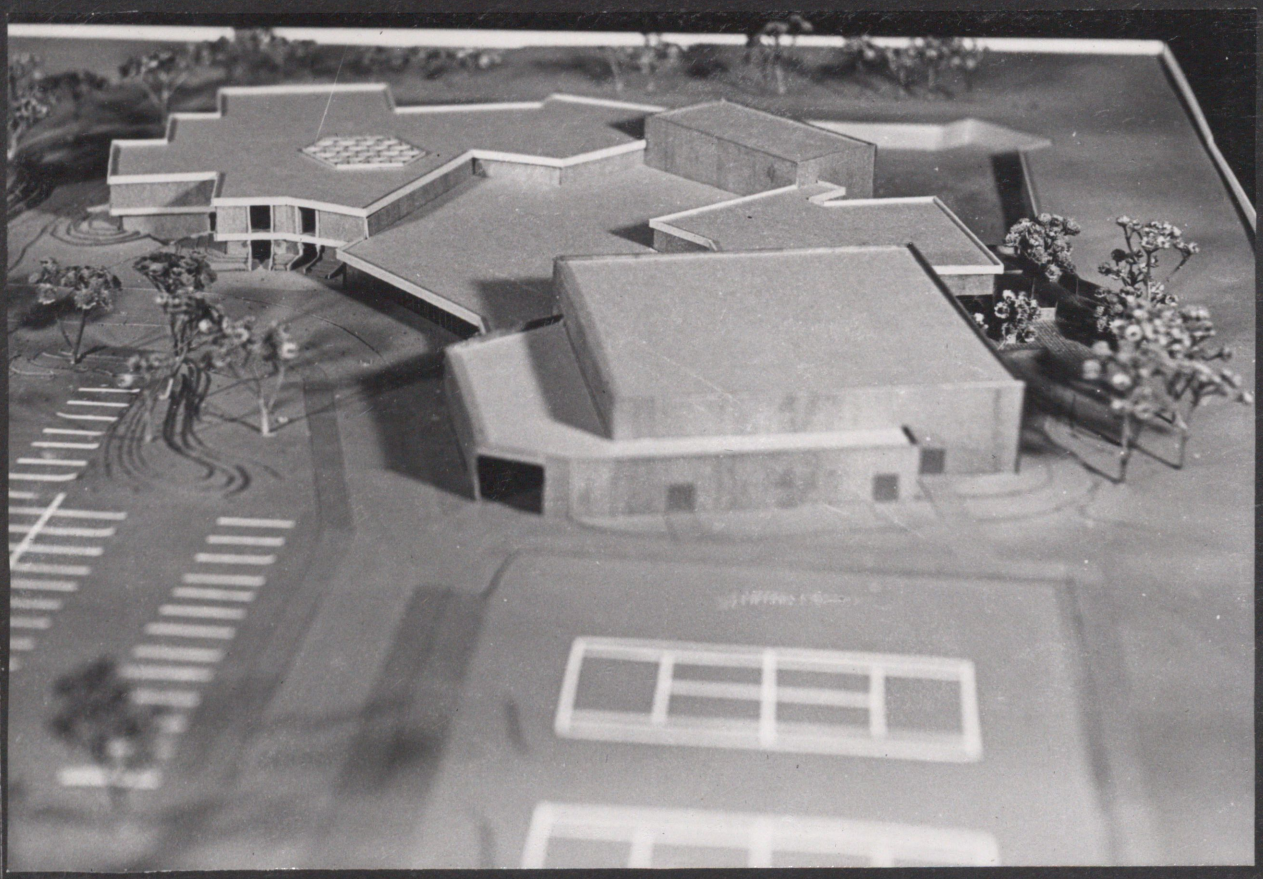
HI-LINE CONSOLODATED SCHOOL

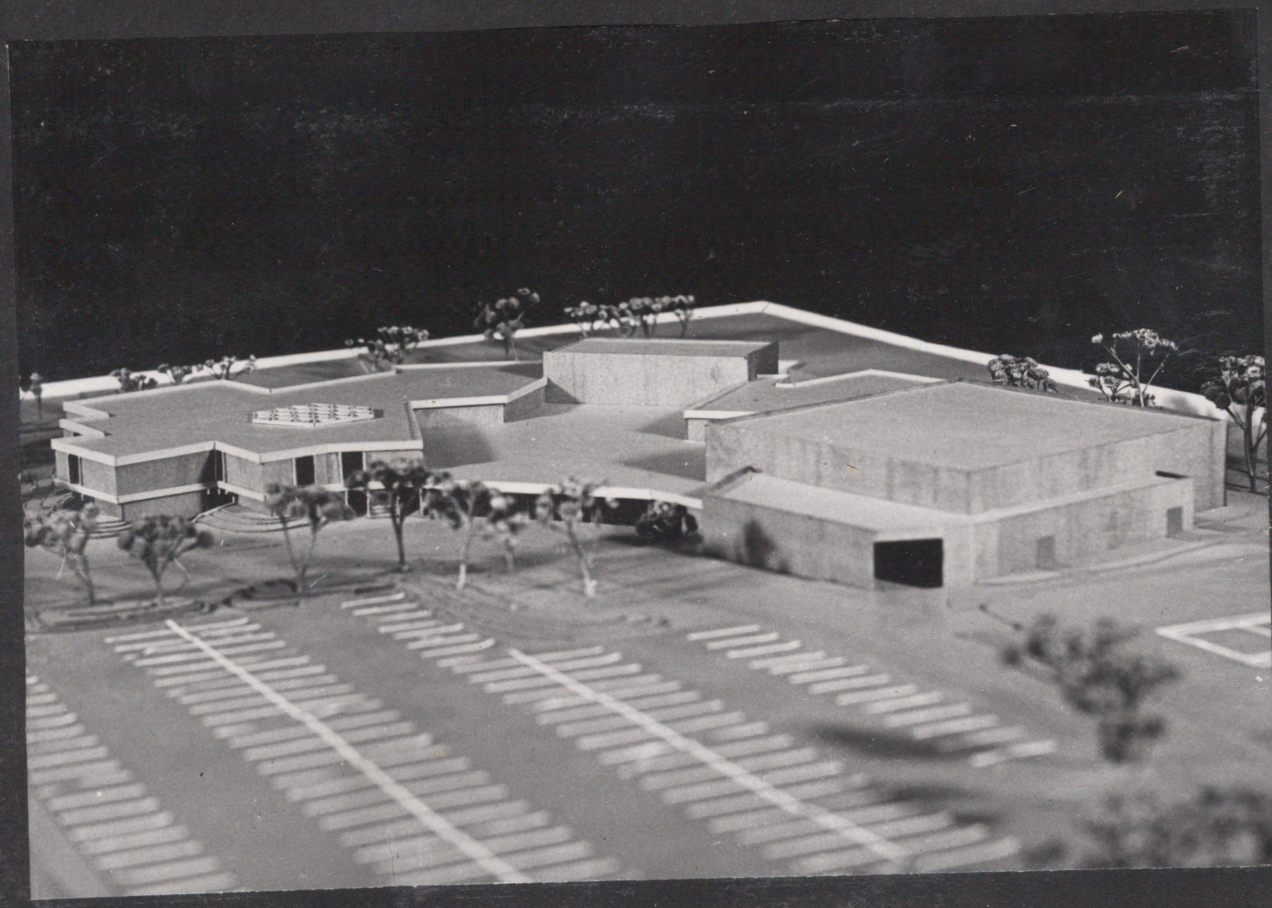
HILL COUNTY, MONTANA

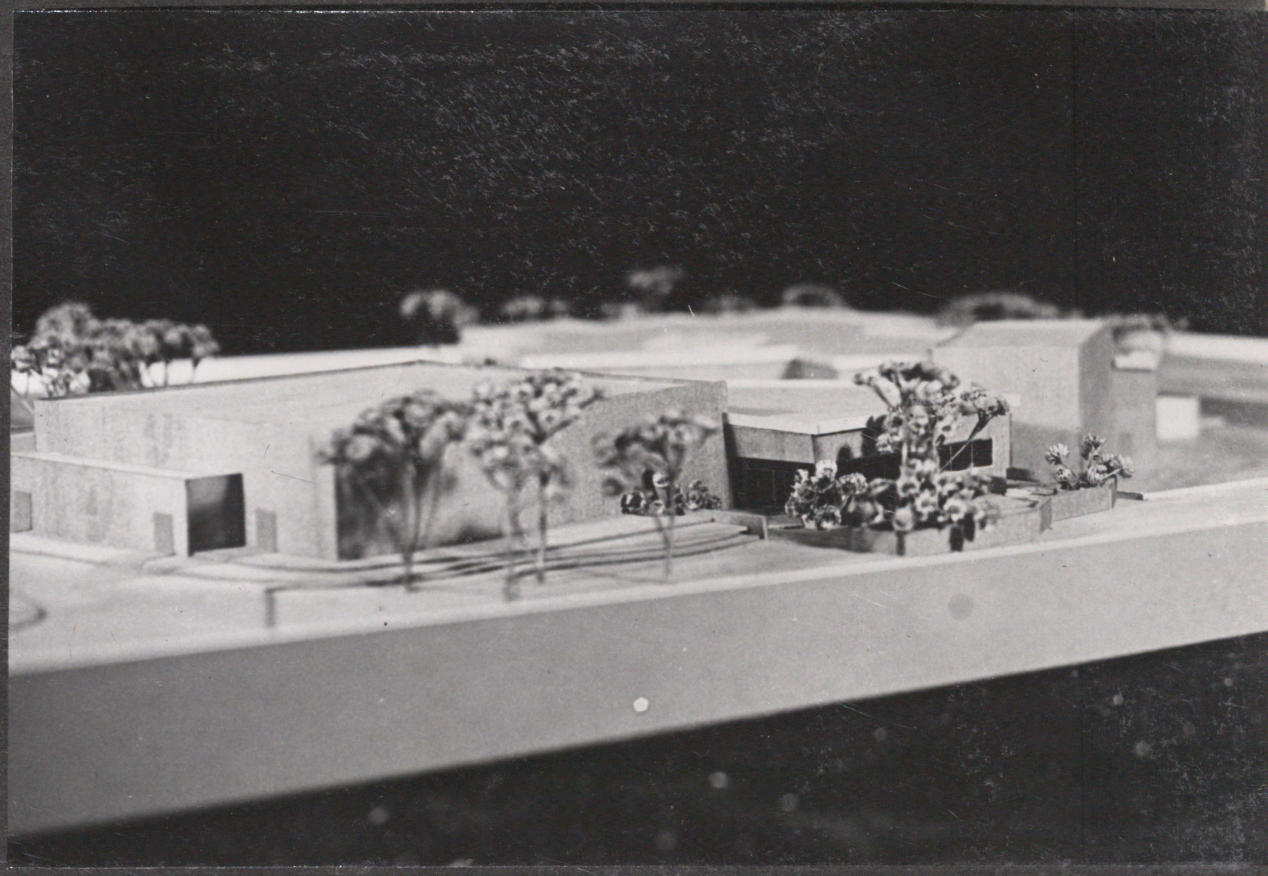
LIBRARY COURT

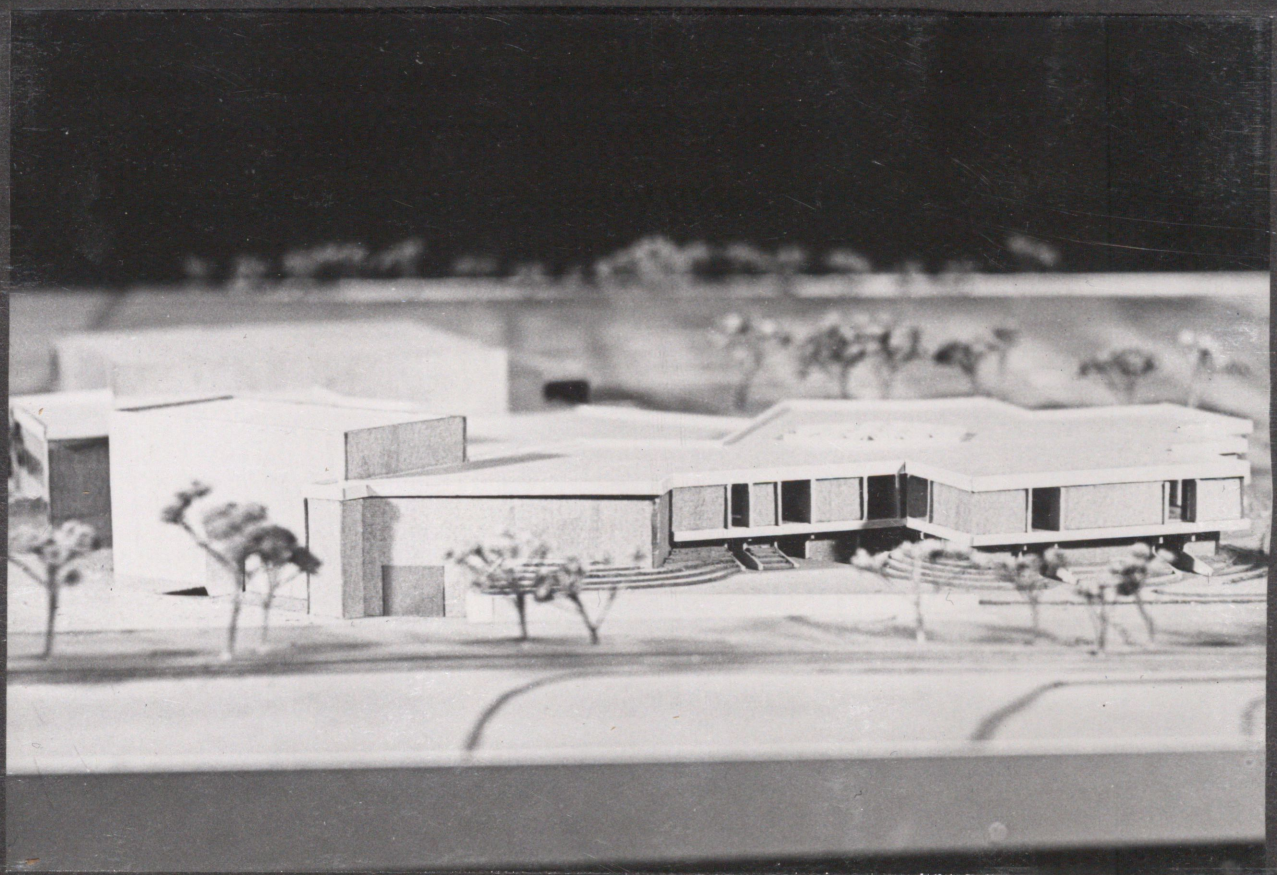


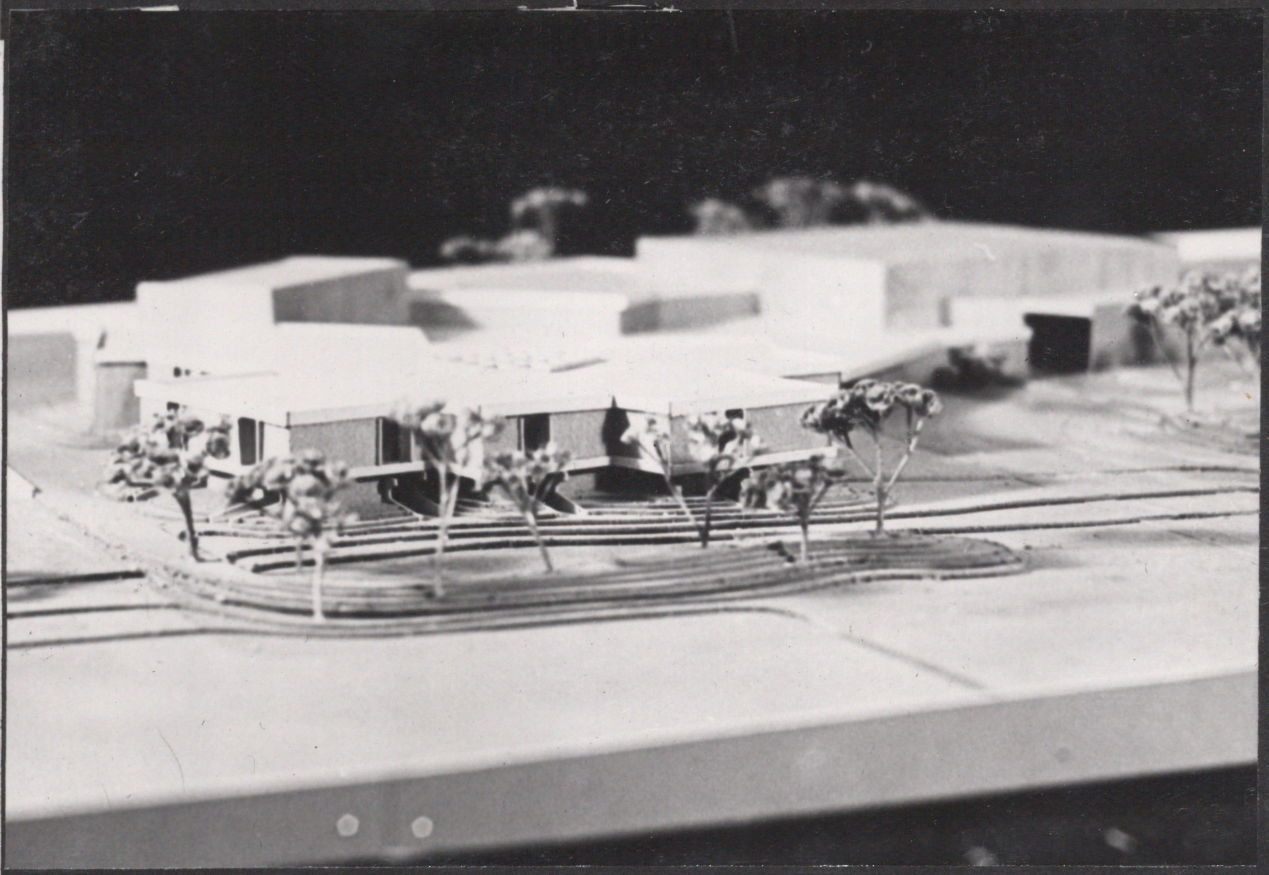


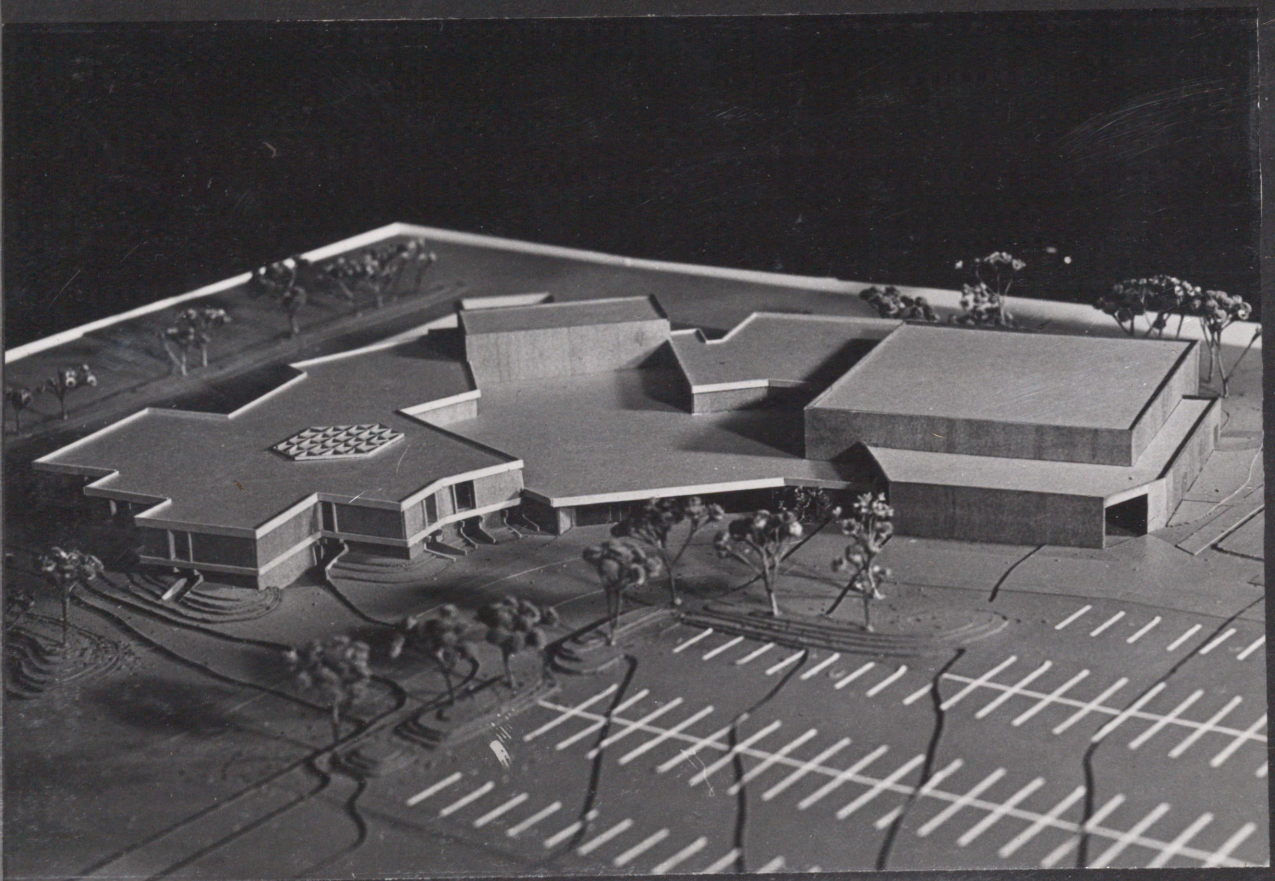












CONCLUSION:

In the analysis of the completed design, I felt and the committee concurred that the interior of the school was a scheme of workable as well as interesting spaces. It produced the stated design intentions of creating an interior focal point while wasting very little space.

I feel all the major design considerations set forth at the beginning of the design sequence of the project have been accomplished. Although nowhere near a working drawing stage, the project was covered substantually in the areas of materials, types of construction, structural systems and rough sizing, mechanical syatems and lighting systems. If there is a system that would lack of those mentioned, it would be the lighting system. Due to time factorsm I was unable to study the exact lighting levels necessary and the pattern of lighting fixtures and how this pattern would effect the design of the interior ceiling.

The interior maintained a flexiblity, or was non-specific enough in nature that it could accomidate a wide range of acedemic phylosophies from a very stiff formal arrangement to almost a complete open school plan. The change can be accomplished by means of moveable panels that are used as closing devices to cut off or open up most instructional spaces.

In the design of a school, the architect in essence works for two clients, the users being the students and teachers are concerned with the interior and how it functions, and the taxpayer who on the other hand seems to be much more concerned with the exterior appearance and of course the expense. The expense need not be actual expense but more the impression of expense, since nearly any architect who has

worked on a public project will confess, the barest image of extra expense on a project will quickly defeat a bonding issue. So although the exterior image may well not be as affective an interpretation of a new image for a school in this project, I feel the defense lies heavily in the thought that the exterior image of the school may well be the major if not the only factor effecting any approval of the project by the public.

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College
Place
Bindery
College Place, Wa.