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MONTANA SCHOOL FOR THE DEAF AND BLIND

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by 441

W. Bruce Scott

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Bozeman, Montana

December, 1965



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## NEED

### Establishment

The Montana State School for the Deaf and Blind was legally established by the state legislature in 1893. At that time it was located in Boulder and known as the School for the Deaf and Dumb. Later, state law changed the school's name to Montana School for the Deaf and Blind. The school was relocated in Great Falls in 1937 at which time it moved into the main building of the present school. In the 1947 Revised Montana Codes, under Title 80, Articles 100-120, will be found the most current legal document regarding the school's establishment.

### Classrooms

The present building does meet certain requirements. It provides a shelter for sleeping, eating, and going to class. Beyond fulfilling these very basic needs, it accomplishes little.

The classrooms — and for that matter nearly all the rooms in the building — are 16 feet by 16 feet square. The optimum number of students per classroom ranges between five and eight.<sup>(12:363)</sup> Using fifty square feet per student as a minimum space requirement, simple arithmetic shows that a 16 by 16 foot square classroom is barely sufficient for five children. Continuing, one finds that the smaller classes (five children) will consist of the youngest students who need extra room for rhythm games, rest facilities and play areas; thus, increasing the space per student required. The classroom space inadequacies do not stop here. Any classroom for the deaf or blind needs a good deal of storage area. The deaf children's classroom should contain storage space for special sound devices such as



amplifiers, earphones, and hearing aids, besides the usual classroom aids such as books, maps, charts and models. Classrooms for the blind must have storage for the very large braille books (As an example, the World Book Encyclopedia requires forty-three linear feet of shelving space<sup>(9:91)</sup>) and many large scale models that are used to show the blind child through tactile sensations what other children could learn visually. It should be clear that a sixteen by sixteen feet square classroom is not large enough.

No special considerations were given to acoustics in classrooms for the deaf. The reduction of echoes and reverberation is very important in such a space.

Lighting, both natural and artificial, is poor throughout the building.

### Library

Both the library for the deaf and the library for the blind are crammed with books, leaving no room for increasing the collection. In neither library is provision made for sound equipment or private study areas. (See photograph.)

### Auditorium

There exists no auditorium in which the total student body might be assembled for special programs of value to all students or for performances such as a Christmas program for parents and the public.

### Dormitory

The third floor dormitory sections provide only the bare necessities — shelter, heat, beds, bath and toilet facilities. They are crowded



with five or six students to a room. There are no lounge, study, or play areas handy to them. All recreation rooms are on the first floor, as is the dining room. Studying is done in the second floor libraries. Toilet and bath facilities are hardly adequate. Presently, in one area there are two bathtubs serving nineteen girls. Last year (1964-65) those two tubs served twenty-six girls. With over one hundred handicapped children sleeping on the third floor of a building nearly thirty years old, there is not one fire escape or adequate fire stair.

### Recreation

Figuring time spent studying, eating and sleeping, then subtracting these figures from the total hours in a day, it is found that the average child at the school will have approximately one-third of each twenty-four hours free. Facilities for leisure time activities are practically nonexistent. There is a good deal of adjacent outdoor space, but it is undeveloped and relatively unused as a play area. Indoors there are a few dingy, small, ground floor rooms labeled recreation rooms. Their value as places for organized or unorganized, stimulating, or restful recreation is highly questionable. More than any other children, handicapped youngsters need physical recreation. Facilities for this are very poor at the present school.

### Planning

The planning of the present building is poor. The deaf and the blind students, who have little social contact or means of communication, are too close together. The boys and girls with the same handicap are particularly well-segregated. This latter situation is unfortunate. The proper



and healthy development of any youth requires natural social contact between the sexes.

That the building was not designed with youngsters in mind is illustrated by an incident related by the school superintendent, Mr. McDowell. One bleak winter day, Mr. McDowell discovered at the front door a small girl beside herself with tears. She had been trying to enter the building but the large, heavy door proved to be more than she could physically manage. No one knows how long she had been there. An incident like this could be serious on a sub-zero winter day.

#### Enrollment Projections

The present enrollment at the school is 76 deaf children and 36 blind children, a total of 112 students. Even now there are four or five handicapped children on the waiting list. It is interesting to note that neighboring Idaho with approximately the same total state population has 115 deaf students in its school, while Wyoming with approximately half the population of Montana has 68 deaf students. It is not an unlikely assumption that there are many children in Montana who should be in the School for the Deaf and Blind who are not. A proportionate increase in enrollment at the Montana School (compared to Idaho and Wyoming) would give a total enrollment of 169 students, or 115 deaf and 54 blind children. The number of students attending will also increase as the state population grows. The United States Census Bureau provides four figures of projected Montana population growth.<sup>(17)</sup> These are based on varying degrees and combinations of projected migration and fertility. The average of these four figures for the year 1985 gives a projected total state population



of 919,200. Using the above figures, the following calculations were made to arrive at a projected 1985 enrollment for the school:

$$\frac{X_1 \text{ (Projected Enrollment)}}{112 \text{ (Present School Enrollment)}} = \frac{919,000 \text{ (1985 Projected State Pop.)}}{701,000 \text{ (Present State Population)}}$$

$$X_1 = 147$$

$$\frac{X_2 \text{ (Projected 1985 Enrollment)}}{169 \text{ (Possible Present School Enrollment)}} =$$

$$\frac{919,000 \text{ (1985 Projected State Population)}}{701,000 \text{ (Present State Population)}}$$

$$X_2 = 222$$

Average:

$$\frac{X_1 + X_2}{2} = 185$$

As pointed out earlier, the present facilities are inadequate for the current student body. Certainly they would be inadequate for 185 students.

In general, the atmosphere of the school, as it now stands, is bleak, cramped and depressing. Long, narrow, dimly lit corridors give an impression of anything but a home and school for youngsters. Such a depressing atmosphere as is found here is certainly not conducive to the creation of exciting, imaginative, happy attitudes.

It must be pointed out that the present administration and staff of the school are doing excellent work in making the school as pleasant as possible. It is clean and brightly painted, but the inherent bleakness of such a building cannot be overcome entirely with a fresh coat of paint.

### Summary

The need for a school for the deaf and blind has been recognized by the state. This recognition has resulted in the legal and physical



establishing of the school. The practical needs for increased classroom and living space and the inadequacies of planning have been pointed out. Only through a visit to the school and a tour of its facilities — seeing handicapped children in an almost prison-like atmosphere — would one realize the extent to which the psychological needs are neglected. Plato once said:

"The well-matured youth would see most clearly whatever was amiss in ill made works of man or ill-grown works of nature, and with a just distaste would hate the ugly even from his earliest years and would give delighted praise to beauty, receiving it into his soul and being nourished by it, so that he becomes a man of gentle heart." (12:267)

Is it proper that these handicapped children should be further deprived of the beautiful by living in an oppressive, dismal surrounding? In these formative years should they not associate with a pleasant environment, rather than a physical atmosphere which would fill them with distaste and bitterness? Is this present facility the best that the state of Montana can offer its children?





1. Typical Long, Narrow, Dim Interior Corridor (second floor)



2. Typical Crowded, Dimly Lit Classroom (second floor)





3. Typical Crowded, Dimly Lit Classroom (second floor)



4. Typical Crowded Dormitory Room (third floor)





5. A Toilet and Bath Facility in Dormitory (third floor)



6. Dining Room (ground floor)





7. . Braille Library



8. . Braille Library



## LOCAL CONDITIONS

### Introduction

There are three strong reasons why the Montana State School for the Deaf and Blind should be located in Great Falls. First is Great Falls' relatively central location in the state and its accessibility to all parts of the state. Second, being Montana's largest city, it offers many advantages not to be found in smaller cities or towns. Yet it is not so large as to be subject to crime, violence and perversion so often — whether truth or fiction — associated with very large cities. Third, the school and its personnel are presently located in Great Falls. The present physical plant is located on land owned by the state and designated to be used by the School for the Deaf and Blind.

### Transportation

Looking at any Montana road map will show that no other major Montana city is more centrally located than Great Falls. Further observation discloses several highways radiating from the city, these being Interstate 15, U.S. 87 and 89 and State 20. Parents driving students to school or visiting would have a reasonably direct route to travel from anywhere in the state. For more advanced students who can and do travel by themselves there are four scheduled airlines, four bus lines and one railroad with passenger service. This also means that transportation is available for the school should a large group have a purpose for traveling in transportation other than the state owned vehicles at the school.



### Medical

Great Falls offers the services, educational opportunities and general amenities of a small city. Good medical facilities are available should they be needed. There are three hospitals in the city — Columbus, Deaconess and Malmstrom, the last being at the Air Force Base. There are also several clinics and a medical rehabilitation center. The city houses many physicians, dentists and medical technicians should a student need their services.

### Education

Unfortunately, there is as yet no working academic relationship between the School for the Deaf and Blind and the city school system. Nevertheless, Great Falls has a very good school system should such a relationship ever develop. Both the high school and grade school students have done well in national testing. The city has twenty-one elementary schools (plus seven elementary parochial schools), three junior high and two high schools (plus one parochial high school). Located in the city are several religious affiliated schools besides those already mentioned. The high quality of the local schools as an indication that the citizens have an interest in good education for their children. Even if no working relationship develops between state and local schools, the good local attitude and interest in education should be a boon to the School for the Deaf and Blind.

On a higher level of education one finds the four-year liberal arts college, the College of Great Falls, operated by the Sisters of Charity of Providence under the auspices of the Catholic Bishop of Great Falls. Here again one finds no direct connection between the College and the School



for the Deaf and Blind. Nevertheless, the thoughts and new ideas brought to the College campus will affect the city and in turn the School for the Deaf and Blind.

### Culture, Communication, Recreation

From a cultural point of view there is the Charles M. Russell Art Gallery, as well as a 60-member symphony orchestra and a 50-member symphonic choir. Recently started by a group of townspeople is a live theater. Communication-wise there are four radio stations, two television stations and one daily newspaper. For entertainment there are three movie theaters. Recreation facilities include a 9-hole municipal golf course; an outdoor swimming pool; archery, tennis and skating (both ice and roller) facilities.

### Shopping

Being in a city that is the wholesale center for a large portion of Montana means that supplies and needs of both school and students are as readily available as anywhere in the state. Generally speaking, most of the students' needs are provided by small stores relatively close to the school. A trip downtown is not a frequent need.

### Service Clubs

A city usually has a number of service organizations. Of particular interest is the Lions Club which directs many efforts toward helping the visually handicapped. In Great Falls, the Lions and other service organizations have definitely shown an interest in the School for the Deaf and Blind.



## Industry

The industry of a city can also be a great asset to a school such as the one under consideration. Tours of plants, factories, and offices, plus lectures by industrialists, engineers, and tradesmen, are of great benefit to the students. Found in Great Falls are such plants as the Anaconda Company Electrolyte Plant (copper refinery), the Anaconda Wire and Cable Company (manufacturer of copper and aluminum wire), two large flour mills, the Phillips Petroleum Company Refinery, the Division offices of Union Oil Company, five hydroelectric power plants, Agricultural exchanges (stockyards and grain elevators), plus other smaller shops typical of the urban area. Besides these, there are nearby farms and ranches which students may visit to learn first-hand of farm life. This is especially important for the blind child could hardly conceive a cow unless he was able to actually touch one. With industry and commerce handy there is always the possibility of the creation of a job training program.

## Weather

The following are facts about Great Falls weather<sup>(18)</sup>:

|                                        |        |
|----------------------------------------|--------|
| Mean Yearly Maximum Temperature        | 56.3°  |
| Mean Yearly Minimum Temperature        | 33.9°  |
| Maximum Recorded Temperature           | 104°   |
| Minimum Recorded Temperature           | -35°   |
| Number of days 32° or below            | 142    |
| Number of days 0° or below             | 22     |
| Mean Yearly Precipitation              | 14.03" |
| Maximum Precipitation per month        | 8.13"  |
| Minimum Precipitation per month        | T      |
| Mean Total Snow and Sleet              | 54.0"  |
| Maximum Monthly Snow and Sleet         | 26.1"  |
| Maximum Two-Hour Snow and Sleet        | 11.0"  |
| Number of Days Precipitation Over .01" | 28     |



|                                        |             |
|----------------------------------------|-------------|
| Percent of Possible Sunshine . . . . . | 64%         |
| Mean Wind Speed . . . . .              | 13.9 m.p.h. |
| Fasted Wind Recorded . . . . .         | 82.0 m.p.h. |
| Prevailing Wind Direction . . . . .    | S.W.        |

This area is subject to very rapid temperature changes. From mid-December to March it is not unusual to experience sharp temperature drops caused by moving masses of cold air. The temperature may drop from above freezing to below zero in twenty-four hours. The opposite may also occur. "Chinook" winds, not uncommon in this area, may precipitate a 40° temperature rise in twenty-four hours. As a result of the "chinook" the ground is usually bare in the winter.

The weather record indicates a cool, dry climate. Winds play an important part in Great Falls' weather and they should receive due consideration in the design of the school. Of particular interest would be the protection of outdoor play areas. The general cool to cold temperatures (especially during the nine school months) means that youngsters should be wearing coats and jackets a large part of the time they are outdoors.

The 14.03 inches of precipitation occurs, to a large degree, in late fall, winter and early spring, in other words during the school year. Although the city receives 64% of the possible sunshine per year, short winter days give the students little time for play in the sunshine after school. These facts indicate the need for a considerable amount of indoor recreation space to be used both during and after school. This does not mean there should be a reduction of outdoor play areas. These should be protected from wind, designed for maximum use of the sun's warmth, and paved.



## SITE CONDITIONS

By many standards the site under consideration is far from beautiful. There are no majestic, snow capped peaks rising in the background. There is no thick, green, lush forest surrounding the site. There is no moody seascape or rushing river. But in its own very subtle way the flat, bleak terrain definitely asserts itself. The works of man thrown up in this environment seem very ephemeral. Even the few small trees brought onto the plain and planted by man seem to be nervous trespassers. There is an air of timelessness about the plans. The vastness and emptiness can make one feel very insignificant if a person should for a moment escape the callous business of everyday city life and become mentally absorbed with the plain. The site in its own way is very powerful.

The surrounding architectural features are quite insignificant. To the north is a gas station and a restaurant and bar. To the west across a vacant lot (which is school property) is the outer edge of a Great Falls residential district. Most of the houses visible from the school are middle to lower-middle class. The schools to the south, although fairly new and well kept, are typical school buildings with much red brick and little imagination. A mile and a half to the east Malmstrom Air Force Base sits atop a low butte.

The most impressive view from the site is toward the east and relatively wide open spaces.

The site is basically flat, sloping slightly towards the northeast corner. The following data on the subsurface conditions at the site was obtained from Mr. Lee Walker at Northern Testing Laboratories in Great Falls. Having no definite information on the immediate area, Mr. Walker



made an estimate based on his experiences in and around Great Falls. His comments were:

" . . . . . would expect to find bedrock at a depth of five to eight feet below present ground surface. The overburden soils will probably be a poorly-consolidated silty sand (blowsand) for two or three feet, and the remainder a very plastic glacial clay. The sand is usually very compressible, and the clay is expansive — that is, it will swell when the natural moisture content increases. Neither of these soils is a recommended bearing layer.

"The bedrock is probably a shale (claystone), very compact, with some layers of jointed sandstone throughout. We would recommend that footings be carried to this bedrock layer. An allowable bearing capacity of 8000 pounds per square foot should be used for design calculations.

"For slabs on grade, sidewalks, driveways, etc., you should provide compaction of the top six inches of subgrade, and for at least six, four and eight inches respectively of compacted gravel base course.

"You should also provide for positive, rapid drainage of surface and roof runoff away from the buildings."

That part of the site east of 38th Street is outside the city limits while the remainder of the 17-1/2 acre site is in Great Falls. All buildings drawn on the map are property of the school. It would be reasonable to assume the removal of any or all of them for this project.

Thirty-eighth Street between Central Avenue and Second Avenue was vacated by the city in 1943, as was one block of First Avenue North extending west from 38th Street. These streets could be closed and the site considered as one large unit. Also the property at the northeast corner of Central Avenue and 38th Street can be assumed to be part of the site as the school would someday like to acquire it.

There are numerous water lines in the vicinity. Three water mains, a ten-inch, an eight-inch, and a sixteen-inch, run down the center line of



38th Street. A twelve-inch water main can be found at the center line of Central Avenue. A twelve-inch water main parallel to and fifteen feet north of the center line runs down Second Avenue North. A sewer is located at the intersection of 38th Street and First Avenue North alley. Its inverted elevation is 3437.12 from the city datum.

The following information gives an idea as to the variation of sun angle above the horizontal and the variation of the daylight hours.

| <u>Date</u> | Noon<br><u>Sun Angle</u> | <u>Sunrise</u> | <u>Sunset</u> |
|-------------|--------------------------|----------------|---------------|
| June 22     | 66°                      | 4:10           | 7:55          |
| December 22 | 18°                      | 7:45           | 4:15          |

In the appendix will be found a fairly complete list of plants suitable for landscaping in this area.





9. The Present School From the Corner of Second Avenue and 38th Street



10. The Walk Along Front of School



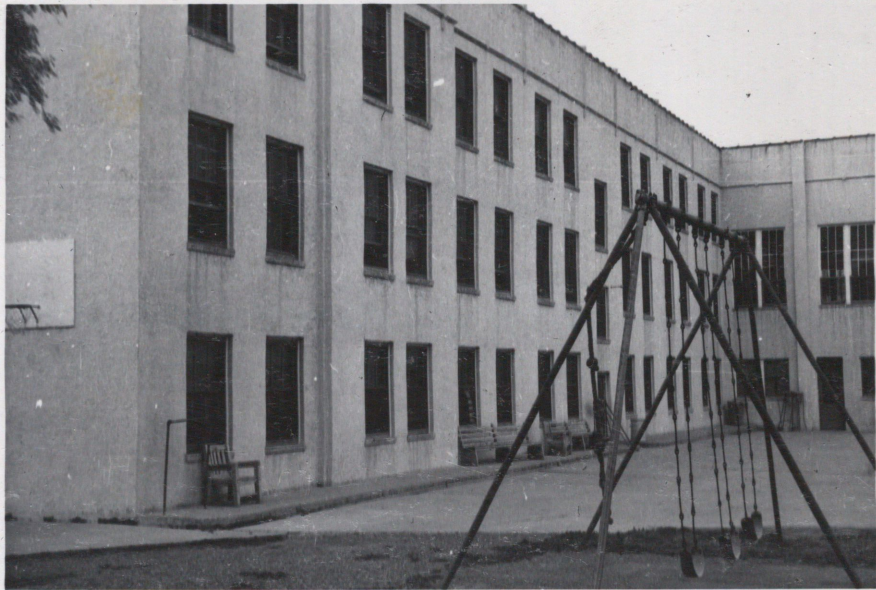


11. Looking from main entrance of present school west down First Avenue — the surrounding architecture is hardly impressive.



12. An attempt has been made to counteract the barrenness of the landscape by the planting of trees in the present front lawn. But . . . .





13. The rear is barren and prison-like.



14. The rear is barren and prison-like.





15. The intersection of 38th Street and Second Avenue — a rather drab, ugly surrounding for youngsters.





16. Lewis and Clark Grade School



17. East Junior High School Note the flat, barren landscape and the nondescript architecture.

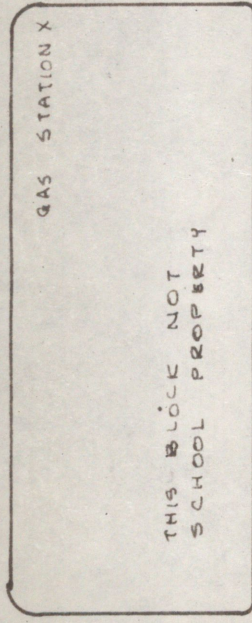


18. Site Map



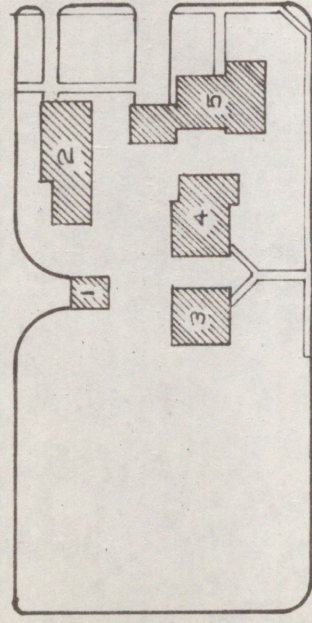
EDDIES RESTAURANT & BAR

2ND AVENUE NORTH



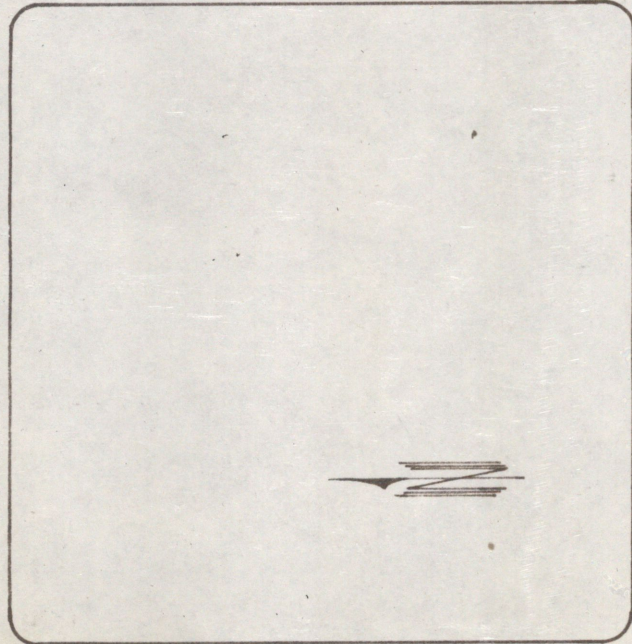
THIS BLOCK NOT  
SCHOOL PROPERTY

GAS STATION X



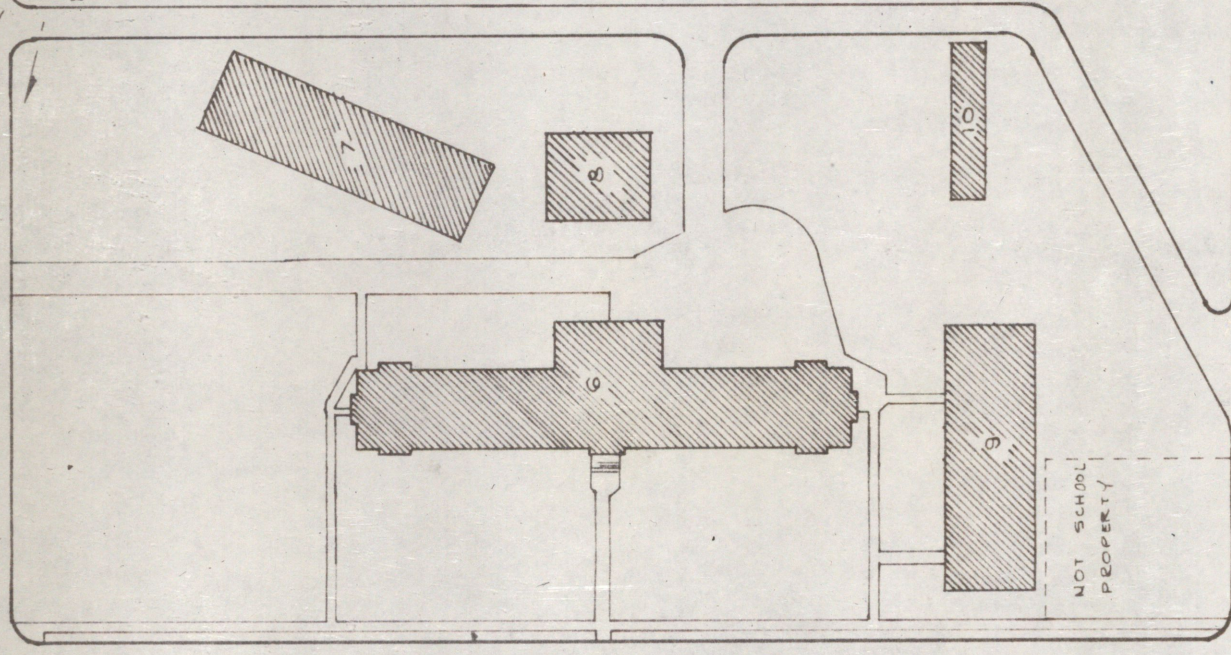
1ST AVENUE NORTH

38TH STREET NORTH



TO DOWNTOWN G.F.

CENTRAL AVENUE

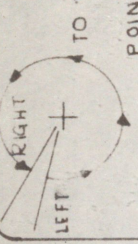


NOT SCHOOL  
PROPERTY

CENTRAL AVENUE

LEWIS & CLARK  
GRADE SCHOOL

EAST JUNIOR  
HIGH SCHOOL



POINT FROM WHICH  
PANORAMIC PICTURES  
WERE TAKEN

1. GARAGE
2. TEACHER'S HOUSE
3. " "
4. " "
5. SUPERINTENDENT'S HOUSE
6. MAIN BUILDING
7. CLASSROOMS
8. BOILER
9. VOCATIONAL SHOPS
10. STORAGE SHED

PROPERTY LINE

MALMSTROM AFB.  
IN DISTANCE

SCALE: 1" = 120'











## FUNCTION

### Introduction

Briefly stated, the purpose of the School for the Deaf and Blind is to provide a total environment for approximately 61 blind students of ages 4 to 14 years and 124 deaf students aged 4 to 21 (these are projected figures for 1985). Within this school the student will perform all the functions of living: learning, sleeping, eating, playing, laughing, crying, growing, loving, hating, and any other aspect of life one might consider. The classrooms are an important part of the project — but only a part. Dormitory and recreation space are equally important. Carrying the idea of total environment to its extreme one can visualize a physical plant not segregated into teaching, sleeping, playing and dining but an integrated whole in which no visible demarcation exists between playing and learning. But for practical reasons the functions have been subdivided into five categories: administration, teaching, dormitories, service and recreation.

### Administration

The school's superintendent, the blind school principal and the deaf school principal are the chief administrators of the school. Each has his own office in which he performs such desk work and conferences as are required. These offices should be in close proximity to one another. The principals' offices should be handy to their respective schools, as well as easily accessible to the superintendent's office. The superintendent's office should be located close to the main entrance foyer. It should adjoin an area for the secretary and the bookkeeper, plus a waiting area. Provisions should be made for another secretary who would work with the



two principals. Also under administration might be listed a teachers' room where the teachers could eat and hold meetings. Primary consideration is the relation of the teachers' room to the kitchen and the classrooms. Secondary consideration would be given to its relation to the principals' and superintendent's area. Also holding an administrative post, but mentioned later, is the household director.

### Dormitories

In dormitories, recreation areas, and classrooms the deaf and the blind should be separated, as there is little possibility of any interaction between the two groups. Listed below are eight dormitory areas needed to house the student body with the proper degree of segregation. They are:

| <u>Age</u>    | <u>Handicap</u> | <u>Sex</u>      | <u>Number (1985 Est.)</u> |
|---------------|-----------------|-----------------|---------------------------|
| 4-8           | Blind           | Male and Female | 30                        |
| 4-8           | Deaf            | Male and Female | 36                        |
| 9-14          | Blind           | Male            | 16                        |
| 9-14          | Blind           | Female          | 16                        |
| 9-14          | Deaf            | Male            | 27                        |
| 9-14          | Deaf            | Female          | 27                        |
| 14-18 (or 21) | Deaf            | Male            | 18                        |
| 14-18 (or 21) | Deaf            | Female          | 18                        |

In this listing, there is no accommodation for the blind of the 14-18 year old age group. The hope is that in the future the older blind student will return to his home town and local high school to finish his education.

Also of note is the fact that boys and girls of the 4-8 year old group live together. This is quite natural. At this age children are hardly aware of the differences and meaning of sex. Separation of the sexes would only create an undue and premature awareness of sexual differences. It is much better for the children to live together and develop a natural



social attitude towards the opposite sex. The older students should be able to continue a healthy social relationship with the opposite sex in lounges, recreation areas, classrooms and dining facilities. Again the idea of the school's being a total environment is emphasized. The students must learn, besides the three R's, correct social relationships and attitudes toward the opposite sex.

Sleeping accommodations for the 4-8 year old age group should be more or less "dormitory" style — that is, five or six beds to a room. All older age groups should have only two beds per room. Each room, whether six or two beds, should have sufficient storage for clothes, books and toys. Toilet and bath facilities should be shared by only two rooms (wherever an even number of rooms permits this). Besides sleeping and bathing facilities there should be an area for lounging, studying and playing. This can be a rather flexible space as far as its final treatment in the design is concerned. These spaces could be incorporated in the sleeping rooms, designed as separate rooms for suites of two or three sleeping rooms, or they could be a larger lounge connecting the sleeping areas of boys and girls of the same age and handicap. Into each of the eight groupings of living quarters should be incorporated a small kitchenette where the youngsters might keep midnight snacks.

The idea of using proctors would be an innovation for the Montana school, which presently has resident house mothers. Between the time school is dismissed and bedtime there is one proctor on duty in each living unit. After the students retire and throughout the night there is a total of four proctors on duty for the entire school. These proctors are available in case a youngster needs them during the night. Most of the proctor's



time is spent sewing, mending and doing other "household chores" for the children.

There would be one proctor for the blind 4-8 year old age group, one for the deaf 4-9 year olds, one for the deaf children from 9 to 18 and one for the blind from 9-14. Each would have his or her own headquarters consisting of a general room or office for lounging, sewing or whatever else might need to be done, a kitchenette and toilet facilities. Provisions should be made in each living unit for the part-time proctor's comfort and convenience.

### Dining Facilities

Dining facilities presently consist of one large dining hall adjacent to the kitchen. Meals are served family style. The optimum situation would be a small dining room for each age group with a different handicap. The final solution might be a compromise between these two extremes. Dining rooms need not be adjacent to the dormitory, but they should relate well circulation-wise to both dormitories and classrooms. They should, of course, be adjacent to the kitchen.

### Teaching Facilities

The necessary classroom facilities include:

| <u>Age Group</u>   | <u>Handicap</u> | <u>Students per Classroom</u> | <u>Students In Group</u> | <u>Number of Classrooms</u> |
|--------------------|-----------------|-------------------------------|--------------------------|-----------------------------|
| 4-8                | Blind           | 6                             | 30                       | 5                           |
| 9-14               | Blind           | 8                             | 32                       | 4                           |
| 4-8                | Deaf            | 6                             | 36                       | 6                           |
| 9-14               | Deaf            | 8                             | 54                       | 7                           |
| 14-18              | Deaf            | 8                             | 36                       | 5                           |
| Total Classrooms = |                 |                               |                          | 27                          |



### Music Rooms

Other teaching areas include music rooms, vocational shops, libraries, and a home economics room. Music facilities should include a large practice room capable of accommodating at least 25 students assembled for choral practice, one instruction room for private or small group lessons, and three individual practice rooms.

### Vocational Shops

The vocational shops serve more to teach manual dexterity than to train individuals for a trade. Required shops and their equipment are as follows:

| <u>Shop</u>                | <u>Equipment</u>                                                                                                                              |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Printing and Graphic Arts  | Printing press, linotype, layout tables and a dark room.                                                                                      |
| Woodworking and Upholstery | A table saw, a band saw, a jointer, a drill press, two lathes, two jig saws, plus benches, and room for upholstering, hand tools and storage. |
| Simple Mechanics           | Auto hoist, work benches, tire changing equipment, engine tune-up equipment, hand tools and storage.                                          |

### Libraries

There should be two libraries in the school — one for the deaf and one for the blind. They should have storage for books (at least 5000 regular volumes in the deaf library and 2500 books in the braille library at five volumes per foot and shelves two feet high), areas for small study groups (six students) and areas for individual study. The blind school library should have provisions for record storage (talking books) and machines on



which to play them. These machines should be equipped with earphones so as not to disturb other students in the library. In an area adjacent to the libraries or within them should be provisions for a micro-film machine, two teaching machines and language lab facilities. This area would also provide storage for visual aid equipment and films.

The preceding description of the library should not eliminate the possibility of having within the dormitory units book shelves stocked with the appropriate books for that particular group of students. Carrying this concept one step further, it is possible to envision a "living unit" consisting of sleeping, bathing, lounging, studying and teaching facilities with the central library and "block" of classrooms being eliminated. Such "living units" could cluster around central facilities such as dining, administration, and recreation areas.

### Home Economics

The home economics room should have a complete kitchen. An ideal situation would be to have the home economics facilities adjacent to a dining room in which the girls could actually serve meals and practice setting a table. Provisions should be made for at least one sewing machine.

### Science Laboratory

The school must have a science laboratory equipped for use by any science class: chemistry, physics or biology. There should be accommodations for eight people at standard science lab tables, each provided with hot and cold water, gas, and storage space. As this one room will be used



for several types of science classes, a good deal of storage must be provided for each science.

### Special Items

A number of special features differentiate the School for the Deaf and Blind from an ordinary school. Acoustics is a serious problem in a classroom for the deaf. Echoes and reverberations should be kept to a minimum. The elimination of any major parallel surfaces and the introduction of more than the ordinary (acoustical ceiling) sound absorbing material would be a boon to teachers and students alike. A classroom for the blind needs much storage space for the extremely bulky braille books and for models and maps used to show blind students, through tactile sensations, things they could see in no other way. Throughout the school years, handicapped students must receive much individual help. This is particularly true of the youngest students. Herein lies the explanation of the small number of students per classroom (6-8). No less than 50 square feet per student should be allowed per classroom. (12:363) Any storage, rest or play areas incorporated should be added to this minimum. Each of the eleven primary classrooms should be provided with its own toilet facilities and lavatory plus an observation room from which visitors, parents, or faculty members can view the classroom activities without being seen by the class. Also related to the classroom complex should be an auditorium with a 300-person seating capacity. It should be readily accessible to the public as well as to the classrooms. One special feature would be to electrically connect seats in a certain section to a common amplifier system, providing at each seat a plug into which a deaf student could plug a



headset. Each seat would have its own volume control. A stage is a must but only a small amount of machinery for moving scenery need be incorporated.

### Recreation

As has been stressed elsewhere in this report, recreation is a major consideration. A gymnasium is a must. It should have the usual basketball court, plus a balcony running track, and provisions for gymnastics, wrestling, and weight lifting, and seating for 300 spectators. Two dressing rooms with a capacity of 30 students each should be directly related to both the gymnasium and the much needed, medium-sized swimming pool. Bowling is stimulating for both the deaf and the blind. At least two standard bowling lanes are needed.

Other indoor recreational activities would take place in a large, highly versatile general purpose area. Although this would be one large space, it should be easily divisible either immediately (screens and sliding partitions) or semi-permanently (movable partitions or curtain walls). One major division would be to establish an area for the deaf and an area for the blind. A partial list of activities that might take place in such an area includes: ping pong, billiards, model building, model railroading, slot racing and dances. Clubs such as Boy Scouts, Girl Scouts, F.H.A., Y-Teens, Junior Red Cross or the Student Council might meet here. These clubs would need storage area for their materials. Operating in conjunction with this general purpose recreation room would be a student-run snack bar. Not only would this provide snacks but it would teach students



how to handle money and give them some insight to merchandising. Possibly an area could be reserved for an amateur radio station.

Outdoor play areas as mentioned earlier should be protected from the wind and exposed to the sun. There should be provided small, paved enclosed areas for the younger children. A larger paved area that could be used for roller skating in warm weather, and flooded for ice skating in the winter would be useful. For blind children a paved area about the size of a tennis court surrounded by a high fence (15 feet) would provide space for playing ball while not losing the ball. Mounds of earth, sculptural shapes to climb on, things to hide behind or jump over — there is no limit to what could be provided on a playground. Much of this could be provided by local service organizations such as the Lions Club or the Jaycees.

### Service and Miscellaneous

#### Infirmary

Records show that on the average the infirmary deals with six bed patients per month, but this ranges to an upper limit of 25 per month. Out patients will average 425 per month.<sup>(15:10)</sup> To handle a projected enrollment of 185 students three nurses on eight-hour shifts will be needed. Space requirements will be at least two boys' and two girls' wards with four beds per ward. A large examining room is needed. It must be large in order to rapidly accommodate checkups of all students in the event of an epidemic scare. Provisions must be made for the nurses' comfort. Again a kitchenette and some type of lounge-office facilities would be appropriate.



### Kitchen

Adequate space and equipment to prepare three meals a day, seven days a week for students, faculty, and administrative staff should be provided. At the mid-day meal 225 people could be expected. The kitchen should be readily accessible to and from delivery areas, as well as the dining rooms. Provisions, including toilets and coat-hanging space (possibly lockers) should be made for six kitchen employees. The dietician needs a small office in the kitchen area.

### Laundry

As the school's laundry is sent out, the only facilities required at the school would be for individual use. Two laundromat-type washers and dryers should be sufficient to fill all needs.

### Heating Plant

A heating plant is an obvious necessity in this climate. No definite decision has been reached as to the best type of heat to use. No specific space allotment can be given. In conjunction with the heating plant space should be an office for use by the night watchman and the janitors. Throughout the building there should be janitors' closets as required.

### Garage and Warehouse

At the school are two state-owned automobiles and a truck for which a garage should be provided. In the same area the grounds-keeping equipment, snow-removal machines, power mowers, and hand tools could be stored. Spare beds, desks, tables, chairs, lamps, old books, seasonal



equipment, and office supplies only begin a list of items possibly stored in the school's warehouse. At least 3000-4000 square feet should be provided for warehouse storage.

### Special Features

It is not uncommon for one to desire to build into a building specifically for the handicapped many safety devices and conveniences not found in ordinary buildings. This is not a particularly good practice. If the handicapped individual receives all his training in a building designed specifically for his safety and convenience, he will be at a loss upon leaving his school and returning to the non-handicapped world. It is the school's purpose to train handicapped children for as nearly a normal life in the normal society of their day as is possible. Therefore, a building that acquaints the student with the everyday hazards of architecture would provide the better solution. This is not to say that reasonable precautions should not be taken. Radiators should be either recessed into walls or covered to prevent accidental contact. For the very young, an extra hand-rail on the stairs at a lower height is a good safety device. Also for youngsters, but not the older children, a change of texture at the head of a stairway prevents many falls. The older child must learn to be alert for stairs. Doors present a problem. A door left open and obstructing a traffic lane is a definite hazard to a blind person. Again a change in floor texture could act as a warning or the recessing of doors opening onto corridors could prevent many bumped heads. Here the question of teaching the student to get along in the outside world comes into play. It seems that it would be more valuable to train the student than to prevent a bumped head.



Vertical circulation becomes a problem in any building over one story high. The question is whether to use elevators, ramps, stairs or a combination of all three. It should be noted that there is a definite possibility of a paraplegic attending the school. In fact, this year (1965-66) there is enrolled at the school a young girl who must travel by wheel chair. Either the deaf or the blind can negotiate stairs without trouble. But what can be done for the paraplegic or even the temporarily injured? Elevators would be a good solution if they were 100 percent dependable. Unfortunately, in case of fire when they would be most urgently needed, they might fail. If a person has not learned to travel vertically by means other than an elevator, he might well be trapped in an emergency. Climbing stairs or climbing anything for that matter, is good exercise, and these youngsters need all the exercise they can get. Therefore, elevators, with the exception of service elevators, should not be used for vertical transportation in this school.

Wheel chairs can negotiate ramps with relative ease (compared to a stairway). But walking on an inclined plane is quite uncomfortable and awkward. Another disadvantage of a ramp is the greater space required to ascend the same vertical distance as a set of stairs.

There are two possible solutions. One would be the use of stairways throughout the school with at least one ramp that would act as a fire exit but not be a major means of vertical circulation. The second possibility would be to design the school so that certain areas of the upper levels are directly accessible to the outside and to the ground.



### Superintendent's House

The school's superintendent is required to live on the school's premises. As mentioned in the section titled "Site Conditions," the present superintendent's house is dispensable. Should the final design utilize the ground on which this house sits, another housing facility must be provided for the superintendent and his family. It should be separate from the school complex proper and allow its occupants the privacy of a typical urban home.

### Household Director's Apartment

The household director is required to live in the school. Her job is to supervise the school, particularly the dormitories, during the superintendent's absence. She is considered a member of the administrative staff. An apartment should be provided for her in the proximity of the sleeping areas. Her apartment should be more readily accessible to the after-hour activity areas than to the teaching areas.



## AESTHETIC CONSIDERATIONS

No longer should the School for the Deaf and Blind be the typical state custodial institution which is insufficient to fill the needs of the state's handicapped youngsters. The new school should be as non-institutional as possible. In other words, the spotlessly clean, antiseptic, mechanical, regimented character of the typical new public school should be avoided in favor of a warm, more home-like atmosphere. A feeling of optimism should prevail — optimism brought about by awareness of the school's purpose: to prepare students to be responsible well-balanced individuals in society. According to educator N. L. Englehardt, a school "... is built around the people's desires, needs and hopes for their children." (7:38) The school must strive to develop youngsters socially, emotionally, physically and morally by coordinating the roles of home and school. No effort should be spared in trying to counteract the emotional strain encountered by the very young who must leave their parents and live in a state institution.

Today the frontiers of education are rapidly expanding. Exciting new concepts are being brought forth. No longer should the child learn by rote and memorization. In the process of learning the student should now be encouraged to approach each new problem as does the top man in that particular field. Instead of learning facts and techniques, today's student delves into the "structure" (1:14) of an idea. Educators have found that children are able intuitively to grasp advanced concepts and use basic ideas even though they are not able to abstract these ideas and put them into formal language as do adults. Catch words for one school of today's educational leaders are intuitive thinking, training of hunches, shrewd guessing, fertile hypothesizing, courageous leaping to tentative



conclusions. The mere consideration of all that these words imply gives one an idea of the excitement and expanding horizons of today's education. The effort is to stimulate the student's imagination; to create within him a desire to learn, a thirst for knowledge and new experience. Such new aids as teaching machines, talking books, visual aids, television and the many other means of collecting and disseminating information all help make this high calibre of education possible. If architecture is more than a mere technology, if it is truly an art, it should portray in the creation of a new school all the excitement of the acquisition of knowledge.

A residential school is an exciting place for an additional reason, it is nearly a total environment. It houses all of a child's many moods. It serves young people in groups learning to act as a part of society. It serves them as individuals learning about themselves. It serves them in play, exercise, study, eating, sleeping and all other aspects of life. This is what the hypothetical new School for the Deaf and Blind should be. This is what it should express aesthetically. This is what it should serve — all the psychological, sociological, physical needs of a young person. As the project takes shape on the drawing board, these are considerations as important as those of structure, function or physical details of the school.

Scale is an important factor in any architecture and particularly so in a project such as the residential school. As pointed out earlier, there are many moods and functions to be housed. Public areas should be of a grand scale. They should be impressive. Classrooms should be of moderate scale but spacious. Sleeping, recreation, eating and studying areas should be a combination of large areas for group activity and small, intimate areas for those times when one desires to be by himself. Thus, it



may be seen that the proper scale of this project is not a matter of one well-defined pattern but a combination of many spatial sensations. This poses a considerable challenge to the designer, but successfully accomplished, the contrast in scale from section to section should create an exciting design solution. Judicious use of building materials and careful control of the general character of the building could help solve the aesthetic problem of tying together such a diverse group of functions yet maintaining the identity of the parts.

It must be kept in mind that the school is for children. The implications here are many. The emotional and physical requirements of the child are not necessarily identical to those of the adult. Proper scale, color, texture and physical relationship must work together to produce a desirable atmosphere for child and adolescent.

Aesthetic consideration must also be given the exterior relationships of the building. Involved here are such things as the surrounding area, natural phenomena such as sun, wind, rain and snow, and the site itself. As is shown in the photographs in the section titled "Site Conditions," the immediate surroundings are far from being inspiring or overpowering. There exist no dominant buildings or dominant architectural character to which the proposed school need be subordinated. In fact, properly executed, the school would enhance its neighborhood. Although it could be the strongest architectural expression in the area, this by no means indicates that it should dominate the surrounding schools, homes or businesses. It must handsomely take its place in the community.

Due consideration of natural phenomena can add much to a building, not only from a functional point of view — such as good lighting, wind protection and the like — but also from the aesthetic standpoint. The play



of shadows across a surface can add much to any structure. Planning with regard to light and wind direction could possibly give rise to very interesting spaces such as courts, patios, or clear stories. The spaces created by the juxtaposition of architectural spaces with regard to optimum use of sun and maximum protection from the elements could yield very interesting results.

The site is probably the dominant factor in regulating the exterior expression of the school. The surrounding terrain is a flat, barren, harsh, windswept plain. There are buildings near the site but these seem to be insignificant encroachments on the plain. All indications suggest a low, earth hugging, organic structure — huddling low in the face of strong winds and harsh winters. An alternative would be a robust building obviously standing forward to defy all of nature.

The aesthetic considerations of architecture are not an impersonal thing. A true architect becomes very personally involved in his creation. The building, whether purposely or inadvertently, expresses the personality of its designer. Therefore, I feel it is only proper that in concluding a section on aesthetic considerations I briefly outline my personal feelings toward aesthetics in architecture. Three key words for me are simplicity, space and fun.

From the building's function to the last detail, the beauty of simplicity should be expressed. Every aspect of a building should appear to be so natural and gracefully done that there seems no other way it could be executed. This is the opposite of forcing interest or covering up errors by the use of decoration or "tricky" devices, but it, by no means, excludes the judicious use of good art.



What is architecture more than manipulated space? Rather than thinking of architecture as a roof, walls, lights, plumbing, heating, I prefer to consider it as space in which certain activities are to take place. Each activity requires its own degree of protection from the elements and its portion of physical comforts. More subtle than these is the requirement of a psychological atmosphere created by manipulation of space. Careful arrangement of space can make the difference between a structure that fills a functional need only and an environment that is an exciting place to live.

Fun is closely related to the concept of spatial manipulation. Wherever possible the architect should go beyond mere necessity and create exciting experiences for the structure's inhabitants. Unique, or surprising visual, aural and physical experiences add zest to life. The entire school could be thought of as a jungle-gym to live in with things to climb, slides to slide down, places to jump from or over, places to hide, and any other playful thing the designer can imagine or create. He should reflect back to his own youth and recall the fun and excitement of the tree-house, the swings, the clubhouse made of cardboard boxes, the imaginary airplane or racing car and everything he created and imagined in that fantastic world of youth. With these in mind and pencil in hand he may be able to create a building that is fun.

The architect must go beyond the mere builder. Every bit of his imagination should come into play. The fullness of human existence should be brought to the fore. This doesn't mean that the building as a thing in itself should be exciting. On the contrary, the building should merely be the means to the end — the end being the realization that each individual is a vibrant, living entity.



## ECONOMIC CONSIDERATIONS

As an example of a general price range for this project the Marshall Valuation Service was consulted. No building of this particular type was given extensive consideration. Therefore, an investigation into two types of buildings, dormitories and schools, was undertaken. The "school" figure included the entire plant exclusive of exterior site work. These two divisions of buildings should give a fair idea of possible costs for conventional construction.

A dormitory of excellent quality, constructed of concrete with an exterior of face brick or stone, carpeting and vinyl tile on the floor, a good lounge, many built-ins, tiled showers, good electric and hot-water heat was priced at \$19.62 per square foot.

An average quality dormitory of bearing wall construction (either brick or concrete block), asphalt floor tile, some carpeting, enameled shower rooms, and hot water heat was estimated to cost \$12.81 per square foot.

An average fireproofed steel or concrete school with brick, limestone, concrete, metal panels, or formed concrete for exterior surface and an interior finish of plaster, acoustic tile, hardwood or vinyl asbestos plaster, adequate lighting, and plumbing was given a price tag of \$18.91 per square foot.

A good quality non-fireproof school with steel or glue laminated frame and joists with brick veneer, glass or stucco for exterior finish plus plaster acoustic tile, vinyl asbestos or hardwood in the interior plus good fluorescent fixtures, good plumbing and extra facilities was priced at \$16.13 per square foot.



## Schools

|                      |                              |
|----------------------|------------------------------|
| 1 . . . . .          | \$18.91 per square foot      |
| 2 . . . . .          | <u>16.13</u> per square foot |
| Difference . . . . . | \$ 2.18 per square foot      |

## Dormitories

|                      |                              |
|----------------------|------------------------------|
| 1 . . . . .          | \$19.62 per square foot      |
| 2 . . . . .          | <u>12.81</u> per square foot |
| Difference . . . . . | \$ 6.81 per square foot      |

These figures are presented only to give an idea of the price range being considered in this type of project. No square footage estimate has been given because it is hoped more freedom will be experienced in the design stage through working with the activities of a building as opposed to the usual juxtaposition of square foot areas. The above figures are based on particular types of standard construction methods and materials. To accept one of these at such an early stage would severely limit the potentialities of the project.

The site presents no difficult problems cost-wise. The only factor might be the necessity of going down eight feet for solid soil bearing. Basements might solve this problem. The developing of play areas and planting trees need not be in the original contract. This work could be performed by service clubs and enthusiastic students.

Slightly higher costs might very well be justified through lower maintenance costs and better psychological atmosphere.

The usual method in Montana for procuring funds for buildings such as this is to levy against property taxes. Another method would be to increase the state income tax. A third method would involve a bond issue, pledging a part of the income tax as security. Probably the most promising source of money would be from a cigarette tax. In 1964 the 8% cigarette



tax amounted to \$6,059,000. In the past this money has gone to pay off Korean War benefits which at this time are nearly paid. It would seem that this money could be directed to no better field than education.

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23. J. William Lenth, Principal, School of the Deaf, Montana School for the Deaf and Blind.
24. Floyd J. McDowell, Superintendent, Montana State School for the Deaf and Blind.
25. Dr. Layton S. Thompson, Professor of Economics, Montana State University, Bozeman, Montana.
26. Leland J. Walker, Owner, Northern Testing Laboratories, Inc.



## Plant Materials Suitable for Landscape Designing

Large to very Dwarfing - 10 ft. minimum spacing from building, etc.

1. Large Trees - 80 to 120 ft. tall

Concolor Fir - (*Abies concolor*) - foliage bluish-green  
Norway Spruce - (*Picea abies*) - nearly as fast growing as Larch & White Pine, also  
White Spruce - (*Picea glauca*) some slow growing varieties  
Black Hill Spruce - (*Picea glauca densata*)  
Engelmann Spruce - (*Picea engelmannii*)  
Colorado Spruce - (*Picea pungens*)  
Swiss Stone Pine - (*Pinus cembra*)  
Larch Pine - (*Pinus flexilis*)  
Austrian Pine - (*Pinus nigra*)  
Ponderosa Pine - (*Pinus ponderosa*)  
Eastern White Pine - (*Pinus strobus*) - fine texture, light green, fastest growing  
Scotch Pine - (*Pinus sylvestris*) in this group  
Douglas Fir - (*Pseudotsuga menziesii*)

2. Medium Dwarfing Trees - 5 ft. minimum spacing from buildings, etc. (15-18 ft. tall)

Chinese Pyramidal Juniper - (*Juniperus chinensis pyramidalis*)  
Keteleeri Juniper - (*Juniperus chinensis Keteleerii*)  
Rocky Mountain Juniper - (*Juniperus scopulorum*)

Other Mountain Juniper varieties:

Patula

Moenchii

Montana No. 1

Sutherland

Silver Beauty

Blue Haven

Veitchii

### APPENDIX

very good blue

Eastern Red Cedar - (*Juniperus virginiana*)

Eastern Red Cedar varieties:

compressa - green, pyramidal

glauca - pyramidal, silvery blue

pyramidalis hillii

Keteleerii - pyramidal, dark green

pyramidiformis - pyramidal, green in summer, purple in fall

Murkii - pyramidal, steel blue

American Arborvitae - (*Thuja occidentalis*) - upright forms, shade tolerant

American Arborvitae varieties:

doylei pyramidalis - broad, columnar

doylei aurea - yellow tipped foliage

robusta - (various) - coarser foliage, darker green than many

pyramidalis - narrow, upright

3. Low Spreading Forms - 4 ft. minimum from buildings, etc. (3 ft. tall)

Plummer Juniper - (*Juniperus media plummeriana*)

Plummer Juniper varieties:

aurea - yellow tips

compacta - much juvenile foliage

glauca - bluish foliage

reticulata - bluish foliage, slightly more upright



Plant Materials Suitable for Landscape Designing

Narrow-Leaved Evergreens - 10 ft. minimum spacing from building, etc.

I. Large Trees - 80 to 120 ft. tall

Concolor Fir - (*Abies concolor*) - foliage bluish-green  
Norway Spruce - (*Picea abies*) - nearly as fast growing as Larch & White Pine, also  
White Spruce - (*Picea glauca*) some slow growing varieties.  
Black Hill Spruce - (*Picea glauca densata*)  
Engelmann Spruce - (*Picea engelmannii*)  
Colorado Spruce - (*Picea pungens*)  
Swiss Stone Pine - (*Pinus cembra*)  
Limber Pine - (*Pinus flexilis*)  
Austrian Pine - (*Pinus nigra*)  
Ponderosa Pine - (*Pinus ponderosa*)  
Eastern White Pine - (*Pinus strobus*) - fine texture, light green, fastest growing  
Scotch Pine - (*Pinus sylvestris*) in this group  
Douglas Fir - (*Pseudotsuga menziesii*)

II. Medium, Upright forms - 5 ft. minimum spacing from buildings, etc. (15-18 ft. tall)

Chinese Pyramidal Juniper - (*Juniperus chinensis pyramidalis*)  
Keteleer Juniper - (*Juniperus chinensis keteleerii*)  
Rocky Mountain Juniper - (*Juniperus scopulorum*)

Rocky Mountain Juniper varieties:

|               |   |                |
|---------------|---|----------------|
| Pathfinder    | } | Blue forms     |
| Moffettii     |   |                |
| Montana No. 1 |   |                |
| Sutherland    |   |                |
| Silver Beauty | } | very good blue |
| Blue Haven    |   |                |
| Welchii       |   |                |

Eastern Red Cedar - (*Juniperus virginiana*)

Eastern Red Cedar varieties:

canaertii - green, pyramidal  
glauca - pyramidal, silvery blue  
pyramidalis hillii  
Keteleerii - pyramidal, dark green  
pyramidiformis - pyramidal, green in summer, purple in fall  
Burkii - pyramidal, steel blue

American Arborvitae - (*Thuja occidentalis*) - upright forms, shade tolerant

American Arborvitae varieties:

douglasii pyramidalis - broad, columnar  
douglasii aurea - yellow tipped foliage  
robusta - (wareana) - coarser foliage, darker green than many  
pyramidalis - narrow, upright

III. Low, Spreading Forms - 4 ft. minimum from buildings, etc. ( 3 ft. tall)

Pfitzer Juniper - (*Juniperus media pfitzeriana*)

Pfitzer Juniper varieties:

aurea - yellow tips  
compacta - much juvenile foliage  
glauca - bluish foliage  
Hetzii - bluish foliage, slightly more upright



Common Juniper - (*Juniperus communis*) - vase shaped

Savin Juniper - (*Juniperus sabina*) - vase shaped

Savin Juniper varieties:

Tamariscifolia - compact, mound-like, juvenile foliage

Von Ehron - very loose vase shape

#### IV. Globe Forms - 3 ft. minimum space from building, etc. ( 6 ft. tall)

Globe Eastern Red Cedar - (*Juniperus virginiana globosa*) - light green, globe form

Weeping Eastern Red Cedar - (*Juniperus virginiana pendula*) (grafted form) - ball

Bird's Nest Norway Spruce - (*Picea abies nidiformis*) - light green, shaped

Dwarf Alberta Spruce - (*Picea glauca conica*) - plant 3 ft. tall, 5 ft. wide.

Mugo Pine - (*Pinus mugho mughus*)

Globe Arborvitae - (*Thuja occidentalis globosa*) - shade tolerant

Woodward Globe Arborvitae - (*Thuja occidentalis woodwardii*) - for shade

#### V. Creeping Forms - ( 1 ft. max. height, except for *Thuja* sp.) can be planted 2-3 ft. from building, etc. and trained.

Common Juniper - (*Juniperus communis depressa*)

Creeping Juniper - (*Juniperus horizontalis*)

Creeping Juniper varieties:

lividus - steel blue

douglassi - (Waukegan juniper) - steel blue

Andorra Juniper - (*plumosa*) - green in summer, purple in fall

Waukegan Juniper - steel blue foliage

*Juniperus procumbens*

*Juniperus procumbens nana*

*Thuja occidentalis* 'Little Gem'

#### Deciduous Trees

##### Large Trees - 30 ft. or more - 12 ft. minimum from buildings, etc.

Boxelder - (*Acer negundo*)

Silver Leaf Boxelder - (*Acer negundo variegatum*) - silver margins

Golddedge Boxelder - (*Acer negundo aurea-marginatum*) - yellowish margins

Norway Maple - (*Acer platanoides*) - slow grower

Schwedler Maple - (*Acer platanoides schwedleri*) - slow grower

Upright Norway Maple - (*Acer plantanoides erectum*)

Globe Norway Maple - (*Acer platanoides globosum*)

Faassens Black Norway Maple - (*Acer platanoides* 'Faassen's Black')

Silver or Soft Maple - (*Acer saccharinum*) - fast growing

Horse Chestnut - (*Aesculus hippocastanum*)

Ohio Buckeye - (*Aesculus glabra*)

Cut-leaf Weeping Birch - (*Betula pendula gracilis*) - moist sites

Paper or Canoe Birch - (*Betula papyrifera*) - moist sites

Hackberry - (*Celtis occidentalis*)

White Ash - (*Fraxinus americana*)

European Ash - (*Fraxinus excelsior*)

Green Ash - (*Fraxinus pennsylvanica*)

Seedless Green Ash - (*Fraxinus pennsylvanica* 'Marshall Seedless') - fast growing

Blue Ash - (*Fraxinus quadrangulata*)

Thornless Honeylocust - (*Gleditsia tricanthos inermis*) - fast growing as soft maple

Burr Oak - (*Quercus macrocarpa*)

Redstem White Willow - (*Salix alba chermesina*) moist situation



Silky White Willow - (*Salix alba sericea*) - moist situation  
 Yellow Weeping Willow (Niobe) - (*Salix alba tristis*)  
 European Mountain Ash - (*Sorbus aucuparia*)  
 American Linden - (*Tilia americana*) - taller than broad  
 European Linden - (*Tilia cordata*) - pyramid shape  
 Redmond Linden - (*Til 'Redmond'*) - often pyramida shaped, red buds and twigs  
 American Elm - (*Ulmus americana*)  
 Augustine Ascending Elm - (*Ulmus americana 'Augustine'*) - arching, upright habit  
 Moline Elm - (*Ulmus americana 'Moline'*) fairly fast growing

Small Trees - 15 to 30 ft. tall - 8 ft. minimum from buildings, etc.

Black or River Birch - (*Betula nigra*) - native  
 Paul's Scarlet Hawthorn - (*Crataegus oxyxantha 'Pauli'*)  
 Russian Olive - (*Elaeagnus angustifolia*)  
 Flowering Crabapples - (*Malus sp. 'Hopa, 'Red Silver', etc.*)  
 Quaking Aspen - (*Populus tremuloides*)  
 European Bird Cherry - (*Prunus padus*)  
 Newport Plum - (*Prunus blireiana 'Newport'*) - red-leaved  
 Pussy Willow - (*Salix discolor*)  
 Greene's Mountain Ash - (*Sorbus scopulina*) - native, shrub-like  
 Siberian Elm - (*Ulmus pumila*) - fast growing  
 Chinese Elm - (*Ulmus japonica*)  
 Dropmore Elm - (*Ulmus pumila 'Dropmore'*)

Very Large Shrubs - 12 to 15 ft. tall - 5 ft. minimum from buildings, etc.

Amur Maple - (*Acer ginnala*) - fall color very good  
 Mountain Maple - (*Acer glabrum*)  
 Serviceberry or Saskatoon - (*Amelanchier alnifolia*)  
 Common Caragana - (*Caragana arborescens*)  
 Lorberg Caragana - (*Caragana arborescens lorbergii*)  
 Weeping Caragana - (*Caragana arborescens pendula*)  
 Sea-Buckthorn - (*Hippophae rhamnoides*)  
 American Plum - (*Plumus americana*) - native  
 Amur Chokecherry - (*Prunus maacki*) - brownish yellow flaky bark, very hardy  
 Shining Sumac - (*Rhus copallina*)  
 Staghorn Sumac - (*Rhus typhina*) } Brilliant fall color, specimen suckers  
 Common Buckthorn - (*Rhamnus cathartica*)  
 Dahurian Buckthorn - (*Rhumnus davorica*) - spiny, best for hedge use, limited as  
 Alder Buckthorn - (*Rhamus frangula*) individual shrubs

Large Shrubs - 8 to 12 ft. tall - 4 ft. minimum from buildings, etc.

Hawthorns - (*Crataegus sp.*) - colorful fruit, thorny, use sparingly were they  
 Silverberry - (*Elaeagnus commutata*) - native will be cared for  
 Tatarian Honeysuckle - (*Lonicera tatarica*) - good flowering plant, pink flowers  
 (*Lonicera tatarica alba*) - white flowers  
 (*Lonicera tatarica xanthocarpa*) - yellow fruit  
 Zabel Honeysuckle - (*Lonicera korolkowii zabelii*) - bright red flowers  
 (*Lonicera demissa*) - yellow-white flowers, scarlet fruit  
 Smooth Sumac - (*Rhus glabra*) - valued for fall color  
 European Red Elderberry - (*Sambucus racemosa*) - red fruited, brittle wood  
 Buffaloberry - (*Shepherdia argentea*) - native, thorny  
 Canadian Buffaloberry - (*Shepherdia canadensis*) - native, thornless  
 Late Lilac - (*Syringa villosa*) - upright habit, very hardy, white flowers, flower  
 French Hybrid Lilac - (*Syringa vulgaris*) - budded clones after others  
 Wayfaring-Tree Viburnum - (*Viburnum lantana*) does well in dry soil



Nannyberry Viburnum - (*Viburnum lentago*) - Black fruit  
American Cranberrybush Viburnum - (*Viburnum trilobum*) - fruit red, valued for fall color

Medium Shrubs - 6 to 8 ft. tall - 3 ft. minimum from buildings, etc.

Butterfly-bush - (*Buddleia* sp.) herbaceous, red, white, & blue flowers  
Russian Caragana - (*Caragana frutex*)  
Dwarf Russian Caragana - (*Caragana frutex globosa*) - loose dwarf form  
Peking Cotoneaster - (*Cotoneaster acutifolia*) - shade, hedge, glossy leaves  
Siberian Dogwood - (*Cornus alba siberica*) - red bark, shade  
Red Osier Dogwood - (*Cornus stolonifera*) - red bark, shade  
Yellow Twig Dogwood - (*Cornus stolonifera flaviramea*) - yellow bark  
Siberian Salt-Tree - (*Halimodendron halodendron*) - dry salty conditions  
Morrow Honeysuckle - (*Lonicera morrowi*) colorful blue-black fruit, hedges  
Dwarf Tatarian Honeysuckle - (*Lonicera tatarica nana*)  
Sweet Mockorange - (*Philadelphus coronarius*) - white fruit, some shade  
Virginal Mockorange - (*philadelphus virginalis*) - double flowers, some shade  
Lewis Mockorange - (*Philadelphus lewisi*) - native  
Eastern Ninebark - (*Physocarpus opulifolius*) - mostly filler plant, some shade  
Purple-leaved plum - (*Prunus cistena*) - red leaves  
Nanking Cherry - (*Prunus tomentosa*) - filler plant, tomentose leaves  
Golden Current - (*Ribes aureum*) - yellow flowers, sping, some shade  
Blue Arctic Willow - (*Salix purpurea gracilis*) - clipped hedges  
Van Houtte Spirea - (*Spiraea vanhouttei*) - white flowers, filler  
Thunberg Spirea - (*Spiraea thunbergii*) - fine textured foliage, white flowers  
Persian Lilac - (*Syringa persica*) - hedges and flowering shrubs  
Five Stamen Tamarix - (*Tamarix pentandra*) - extremely fine texture  
Arrow-wood Viburnum - (*Viburnum dentatum*)  
European Cranberrybush - (*Viburnum opulus*)  
Common Snowball - (*Viburnum opulus roseum*) } good fall color

Small Shrubs - 3 to 5 ft. tall - 2 ft. minimum from buildings, etc.

Oldman - (*Artemesia abrotanum*) - grow as perennial  
Japanese Barberry - (*Berberis thunbergii*) - brilliant fall color  
Red-leaved Jap. Barberry - (*Berberis thunbergii atropurpurea*) - deep purple all year  
Tru hedge Columnberry - (*Berberis thunbergii erecta*) - upright  
Dwarf Caragana - (*Caragana pygmaea*) - globe, some shade  
Blue Mist Spirea - (*Caryopteris incana*) - grows as perennial, blue flowers  
Hills of Snow Hydrangea - (*Hydrangea arborescens grandiflora*) } shade, white flowers  
Pee Gee Hydrangea - (*Hydrangea paniculata grandiflora*)  
Dwarf Ninebark - (*Physocarpus opulifolius nana*)  
Russian Almond - (*Prunus tenella*) - Native, ground cover, spreads, pink blossoms  
Shunkbush Sumac - (*Rhus trilobata*) - native, dry conditions  
Alpine Currant - (*Ribes alpinum*) - light green, disease and pest resistant  
Rugosa Rose - (*Rosa rugosa*) - extremely hardy, shade, low clipping

Dwarf Shrubs - under 3 ft. 2 ft. minimum from buildings, etc.

Pygmaea Redleaf Barberry - (*Berberis thunbergii atropurpurea minor*) - very dwarf  
February Daphne - (*Daphne merereum*) - Flowers pink ( March and April) compact  
Clavey's Dwarf Honeysuckle - (*Lonicera claveyi nana*) cream colored flowers  
Shrubby Cinquefoil - (*Potentilla fruticosa*) - native }  
Goldrop Potentilla - (*Potentilla fruticosa 'Goldrop'*) } - yellow flowers entire summer  
Anthony Waterer Spirea - (*Spiraea bumalda 'Anthony Waterer'*) }  
Froebel spiraea - (*Spiraea bumalda 'Froebeli'*) } Red-flowers  
(*Spiraea 'Rosabelle'*) }



Snowberry - (*Symphoricarpos albus*) - white fruit, shade plants  
 Western Snowberry - (*Symphoricarpos occidentalis*) - native, white fruit  
 Scotch Rosa - (*Rosa spinosissima*) - very spiny, white, pink, yellow flowers  
 Scotch Altai Rosa - (*Rosa spinosissima altaica*) - white flowers  
 Ural False-spirea - (*Sorbaria sorbifolia*) - only for roadside or conservation  
 Garland Spirea - (*Spiraea arguta*)  
 Billiard Spirea - (*Spiraea billiardi*) } - white flowers, in spring.

## Vines -

Dutchman's Pipe Vine - (*Aristolochia durior*) - large leaves- fast cover  
 European Bittersweet - (*Celastrus orbiculata*)  
 American Bittersweet - (*Celastrus scandens*) } orange fruit  
 Jackman Clematis - (*Clematis jackmani*) - blue flowers  
 Ningpo Clematis - (*Clematis lanuginosa*) - flowers blue & bright red, (Hybrids)  
 Western Virgin's Bower - (*Clematis ligusticifolia*) - white flowers, native  
 Traveler's Joy - (*Clematis vitalba*) - white flowers  
 Italian Clematis - (*Clematis viticella*) - any blue to bright red color  
 Trumpet Honeysuckle - (*Lonicera sempervirens*) - orange to scarlet flowers  
 Halls Honeysuckle - (*Lonicera japonica halliana*) white flowers  
 Common Moonseed - (*Menispermum canadense*) - good ground cover  
 Virginia Creeper - (*Parthenocissus quinquefolia*)  
 Engelman Creeper - (*Parthenocissus quinquefolia Engelmanni*) - smaller leaves  
 Silver Fleece Vine - (*Polygonum auberti*) - woody, white flowers in August  
 Climbing Rose - (*Rosa sp.*) - winter protection needed  
 Riverbank Grape - (*Vitis riparia*) - native to Billings area, edible fruit, woody

## Ground Covers - most maximum, 1 ft. high

Bearberry - (*Arctostaphylos uva-ursi*) evergreen, glossy leaves, red fruit  
 Rose Daphne - (*Daphne cneorum*) - flowers pink, (early spring) evergreen  
 Creeping Mahonia - (*Mahonia repens*) native, red fall color, evergreen  
 Candy Pachistima - (*Pachistima canbyi*) - evergreen, dark green color  
 Western Pachistima - (*Pachistima myrsinites*) - larger leaves, taller than Canbyi  
 Japanese Spurge - (*Pachysandra terminalis*) - needs protection here, good for shade  
 Himalayan Fleece-flower - (*Polygonum affine*) - red flowers (autumn) perennial  
 Reynoutria Fleece-Flower - (*Polygonum Reynoutria*) - flowers pink, perennial  
 Lambs-ear - (*Stachys lanata*) - grey-green woolly appearance, perennial  
 Coralberry Indian Current - (*Symphoricarpos orbiculatus*) red fruit, to 18" high  
 Periwinkle, Myrtle - (*Vinca minor*) - dark green, evergreen  
 Creeping Juniper - (*Juniperus horizontalis*) - lividus, plumosa, douglassi  
 Prostrate Common Juniper - (*Juniperus communis depressa*)

## Trees for Special Purposes

### Upright Forms - to 75 ft. tall - 8 ft. minimum from buildings, etc., closer for juniper

Acer plantanoides ascendens  
 Acer plantanoides columnare  
 Acer platanoide erectum  
 Acer platanoide Olmsted  
 Betula pendula fastigiata - pendulous habit, upright branching  
 Juniperus chinensis columnaris  
 Juniperus chinensis mas  
 Juniperus virginiana pyramidalis  
 Juniperus virginiana schottii } pyramidal Eastern Red Cedar  
 Malus baccata columnaris (Columnar Siberian Crab) - white flowers  
 Picea abies columnaris  
 Pinus cembra (Swiss Stone Pine) - pyramidal form of Norway spruce  
 Picea abies pyramidalis - not round headed until maturity



*Pinus strobus fastigiata* - upright Eastern White Pine  
*Populus alba pyramidalis* - (*Populus alba Bolleana*) Bollean Poplar - short lived  
*Populus nigra italica* - Lombardy Poplar canker, borers  
*Robinia pseudoacacia rectissima* - Upright Black Locust  
*Sorbus aucuparia fastigiata* - } upright European Mountain Ash  
*Sorbus aucuparia 'Wilson'* - }  
*Sorbus scopulina* - broadly upright, shrubby form  
*Thuja occidentalis*  
*Thuja occidentalis 'douglas pyramidalis'* } - Upright American Arborvitae  
*Thuja occidentalis fastigiata*  
*Tilia americana fastigiata* - Upright American Linden  
*Tilia cordata pyramidalis* - Upright European Linden  
*Ulmus americana ascendens*  
*Ulmus americana 'Augustine'* - Augustine Ascending Elm  
*Ulmus americana columnaris*  
*Ulmus americana 'Lake City'* - Lake City Elm } all upright selections of American  
*Ulmus americana 'Moline'* - Moline Elm Elm  
*Ulmus americana 'Princeton'* - Princeton Elm

Weeping Forms - to 100 ft. tall - spacing (see previous section)

*Betula pendula* - Cutleaf Weeping Birch  
*Fraxinus excelsior pendula* - Weeping Ash  
*Juniperus virginiana pendula* - Weeping Eastern Red Cedar  
*Malus 'Exzellenz Thiel'*  
*Malus 'Oekonomierat Echtermeyer'* } weeping forms of Flowering Crabapples  
*Picea breweriana* - Brewer's Spruce  
*Picea pungens Kosteriana* - Koster's Blue Spruce  
*Pinus strobus pendula* - Pendulous Eastern White Pine  
*Pseudotsuga menziesii pendula* - Weeping Douglas Fir  
*Salix alba tristis* - Golden Weeping Willow  
*Sorbus aucuparia pendula* - Weeping European Mountain Ash  
*Ulmus americana pendula* - Weeping American Elm

Globe Forms - 20 to 30 ft. tall - minimum of 15ft. from buildings, etc., except *Malus* sp. (8 ft.)

*Acer platanoides globosum* - } Globe forms of Norway Maple  
*Acer platanoides 'Almira'* - }  
*Fraxinus excelsior globosa* - Globe Ash  
*Malus arnoldiana* - } upright forms of flowering crabapples  
*Malus floribunda* - }  
*Robinia pseudoacacia umbraculifera* - Globe Locust



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