BETHEL SCHOOL FOR THE DEAF

Muncie, Indiana
Edward G. Soots

May 1980
Prof. Paul Laseau
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Project Statement

This thesis project will suly and produce a residential elementary school for the deaf. It is located in Muncie, Indiana on Bethel Avenue, one-quarter mile east of Tillotson, and it works in conjunction with Ball State University for purposes of training teachers and studying teaching techniques for the deaf.

I chose this project for two basic reasons, the first being that it would give my wife, who is studying to become an educator of the deaf, and myself a chance to learn more about each other's field. Secondly, problems to challenge my design skills.

The project will also explore passive solar energy systems and hopefully produce a system that is economically feasible and realistic in performance.

GOALS

- To use architecture to shape as much as possible the social, learning and living patterns of the deaf children.
- To develop a better understanding for the education of the deaf.
- To explore and learn more about passive solar systems and to be able to produce a workable system.
Introduction
Problem Background

Providing education for the multiply handicapped deaf child is a very complex problem, especially with the unique limitations that they have. Deafness is considered by many, to be the most severe of all handicaps, because it effects the basic element of human interaction: communication by speech and hearing. To provide a learning environment for those who are not able to use the usual elements of sound, not to mention the multitude of complications, provides the designer with a very challenging task. Maladaptation is another major problem. Because the child is not only unable to communicate normally, but he is also often multiply handicapped, away from home, and socially misplaced, the problem becomes even more magnified.

Ideally, the education of the deaf child will prepare him for normal interaction in society. This requires not only mental development, but it also makes social development and a sense of independence essential; especially, to operate effectively in a bureaucratic and hearing world. Building up the self-concept makes for a healthy medium for learning and interacting. Educators are recognizing this problem already in many ways; particularly, by allowing the child to develop at his own rate and by giving him individual attention. Small groups, therefore, become an important element in the deaf school so that individual needs can be concentrated upon more effectively.

Because of the relatively small number of deaf and facilities for them in the state, many students are forced to live at school. This creates a new set of complexities. The school must not simply house and feed the children, but must also provide a surrogate home where nearly normal physical, social, and mental growth can occur. It should teach the child skills that would hopefully be learned if he were at home, such as, self grooming, taking responsibility for daily duties, and selecting roles essential to become an active part of society, in later life.

Education does not stop at school with the deaf child. Because of his unusual circumstances of being the parent of a deaf child, parenting becomes very difficult. The mother and father need to be actively participate in their child's development and their knowledge is acquired in cooperation with the school. Therefore, clinics for parents as well as for the children, are needed.

The task of providing a rich and stimulating environment which must educate as well as provide a home for the multiply-handicapped deaf child, is a challenging problem for the designer. This requires close cooperation with client consultants and a full knowledge of the philosophy of educating and housing deaf children. This thesis project will utilize both, to effectively yeild a project that will provide the best possible environment for the users.
Client Background

The proposal for the Bethel School for the Deaf, has come about as a result of a decision made by the department of Public Instruction of the State of Indiana, to expand the facilities of the Indiana School for the Deaf, to the Muncie area. Here, it will work in conjunction with Ball State University, for the purpose of studying and developing teaching methods for the education of the deaf.

User Description

This project is a residential elementary school for the deaf and therefore, has a wider range of users than does an ordinary elementary school. Besides the usual administrative, teaching and service staff, there are deaf students, therapists, a psychologist, house parents, and Ball State University Students. It is possible that other schools in the community, or children from the surrounding neighborhood, may also come to visit the site.

Users

Administration Staff
• Principal
• Vice Principal
• Dean of Boys
• Dean of Girls
• Nurse and visiting Doctors
• Secretaries

Education Staff
• Teachers
• Therapists
• Psychologist

Residence Staff
• House Parents
• Cooks

Maintenance Staff

Students
• Deaf Children Ages 3-12 (multiply-handicapped)
• Ball State Students

Parents of the Deaf Children

Visitors
• Community Schools
• Neighborhood Children
Project Goals

- Integrate deaf school with hearing neighborhood
- Provide a facility that can be used by outside groups.
- Neighborhood identity
- Sensitivity to the environment.
- Safe and creative play areas
- Connection with Ball State University.

User Goals

PHYSICAL
- Accessibility for handicapped
- Manual and sensual richness

MENTAL
- Stimulating learning environment
- Facilitate cognitive development
- Feeling of usefullness

SOCIAL
- Feeling of usefullness
- Variety of social interaction
- Development of independance
- Individual Attention
- Develop family units
- Personalization
- Community atmosphere

GENERAL
- Provide a "participating" passive energy system
- Provide a "home" for students
- Provide a "home" for staff parents
Space Requirements
Organization

State of Indiana
State Board
Administrators

Teachers
Therapists
Psychologist
Librarian
House Parents
Cooks
Custodians

Students

Space

Gym
Ext. Play
Housing

Public
Commons
Library
Classrooms
Staff

Administration

B.S.U.
## Summary

### ADMINISTRATION
- Principal: 144
- Vice Principal: 117
- Dean of Boys: 117
- Dean of Girls: 117
- Reception/Secretary: 425
- Infirmary: 520
- **Total:** 1440

### STAFF
- Teacher's Office: 918
- Psychologist: 144
- Librarian: 203
- Custodian: 164
- Staff Lounge: 376
- Supplies Room: 264
- **Total:** 2069

### EDUCATION
- Classrooms: 12 @ 513 = 6156
- Nursery: 740
- Therapy Rooms: 168
- Library: 4000
- Gymnasium: 5000
- Commons: 4000
- **Total:** 20,054

### RESIDENCE
- House Parents: 4 @ 943 = 3772
- Recreation/Social: 4 @ 700 = 2800
- Student Sleeping: 72 @ 80 = 5760
- Dining: 4 @ 256 = 1024
- Kitchen: 4 @ 224 = 896
- Visiting Parents: 4 @ 198 = 792
- **Total:** 15,044

**Total Net:** 38,617 S.F.

### UNASSIGNABLE
- Circulation: 7725
- Mechanical: 2125
- Public Toilets: 580
- Storage: 200
- Walls: 2700
- **Total:** 13,330

**Total Gross:** 52,000 S.F.
Criteria
Building Criteria

SCHOOL

- Provide an environment that will stimulate development of motor and communication skills.
- Provide an environment which will stimulate development of self-reliance and environmental awareness. Stray noise must be kept to an absolute minimum.

HOUSING

- Easy maintenance
- Feeling of identity
- Provide an independent space for house parents with incentive to make them want to stay.
- Energy efficiency
- Provide an environment which will stimulate development of self-reliance and environmental awareness.

Exterior Criteria

- Access to the site is basically by automobile by staff, living in town, and parents from out-of-town.
- Possibility of pedestrians from south of the site.
- Provide 100 parking spaces and 1 sheltered space for each house-parent unit.
- Service access is primarily trash pick-up.
- Provide a variety of play areas including adventure play and innovative or creative play.
- Provide simple circulation system that will accommodate the physically handicapped.
- Circulation should be such that a student can orient himself easily.
- The landscape should not only be aesthetic, but also part of the learning environment, a space definer, and an element used for obtaining energy efficiency.
Muncie Context

The Bethel School for the Deaf, is located one-quarter mile west of Tillotson Avenue, on Bethel Avenue. This site was selected for three reasons.

1. It is easily accessible to Ball State University, which is important because of the cooperative operations between the two schools.
2. It is easily accessible to those people coming from out-of-town. Major access comes from I-69, 32, 67, 35, 28, and Freeman Field.
3. About three quarters of a mile east of the site on Bethel, are Northside High School and Anthony Elementary School. This is particularly important because both schools "main-stream" deaf students.
The site surroundings are of two basic land uses. They consist of residences to the east, west, and south. The growing commerce is to the north. Access to the site is good, being fed from two sides, McGalliard Road and access from the Airport.
Topography, Views, Access
# Climate

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<thead>
<tr>
<th>Month</th>
<th>Temperature</th>
<th>Precip.</th>
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<tbody>
<tr>
<td></td>
<td>Average daily maximum</td>
<td>Average daily minimum</td>
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<tr>
<td>JAN.</td>
<td>37°F</td>
<td>20°F</td>
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<tr>
<td>FEB.</td>
<td>40°F</td>
<td>22°F</td>
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<tr>
<td>MARCH</td>
<td>49°F</td>
<td>30°F</td>
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<tr>
<td>APRIL</td>
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<td>40°F</td>
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<tr>
<td>MAY</td>
<td>74°F</td>
<td>50°F</td>
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<tr>
<td>JUNE</td>
<td>83°F</td>
<td>59°F</td>
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<td>JULY</td>
<td>86°F</td>
<td>62°F</td>
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<td>AUG.</td>
<td>85°F</td>
<td>60°F</td>
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<td>SEPT.</td>
<td>78°F</td>
<td>53°F</td>
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<tr>
<td>OCT.</td>
<td>68°F</td>
<td>43°F</td>
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<tr>
<td>NOV.</td>
<td>51°F</td>
<td>32°F</td>
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<tr>
<td>DEC.</td>
<td>39°F</td>
<td>23°F</td>
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<tr>
<td>YEAR</td>
<td>63°F</td>
<td>41°F</td>
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Max. Northerly angle winter winds - wind break needed

Mean wind direction

Max. Southerly Angle summer sinds - good for natural ventilation
Soils

BIA - BIB
Belmont silt loam 0-2% & 2-4% slope
Drains slowly
Seasonal High water table
Well suited for openland wildlife

MUB
Morley silt loam 2-6% slope
Slow run off
Slightly eroded
Poorly suited to grasses
Well Drained
Subject to erosion

PE
Pewamo silty clay loam
Poorly drained
Slow run off
Seasonal high water table
Subject to ponding in spring & winter
Well suited to hardwoods
Summary

In studying the site, certain conditions have been revealed which have a definite effect on the development of the design. The following categories are affecting elements.

NOISE

Directly north of the site is Bethel Avenue and possible future commercial development. The east, west, and south sides are not noise producing areas.

VEGETATION

There is no substantial vegetation on the site. To the west are mature hardwoods which would be a logical place for a more naturalized landscape for nature areas.

SOIL

Because of the nature of the soil conditions, a seasonal high water table is anticipated. Therefore there are areas which are less suitable for building.

ACCESS

Access is only possible from Bethel and is uniform the entire length of the site.

CLIMATE

Solar exposure is ideal for winter conditions although summer shading will have to be provided. Seasonal high water table will have to be considered. There are presently no wind breaks.

SITE CONTOUR

The site is relatively flat with drainage to the south. The design will have to make the most of this condition.

IMAGE

The site is presently agricultural with residences creeping up from the east, west, and south and commercial from the north. Bethel is the boundary between the commercial and the residences. It is possible that this project would be most successful in a residential scale and acting as a link between all of the existing housing.
DESCRIPTION

This project houses and educates boys who are homeless and slow learners.

PARTI

The parti of this design is fragmented, taking advantage of the contour of the land. (1)

IMAGE

Urban scale to buildings
"Non-authoritarian"
"Non-institutional" (1,2)

SPECIAL FEATURES

The fragmentation of the design allows for development of independence and the building character relates to the boys background. (1,2)

STRUCTURE

Structure consists of cast-in-place concrete beams and columns with precast concrete panels and glass infill. (3)
CORRELATION

The school, clinic and gym, act as the focal point of the plan and separate the housing of the staff and the boys.

CIRCULATION

The circulation consists of the paths and drives which meander through the wooded site, following the contour of the relatively hilly site.

FACADE

The facade is very modular, following the order set up by the structure and concrete infill panels.
DESCRIPTION

Technological University for the Deaf

PARTI

The parti is a court plan which is fragment-
ed into a dining hall, residence, and educa-
tional building.

IMAGE

Institutionalized and technical.

SPECIAL FEATURES

The classrooms have no windows to lessen
distractions. Circulation is therefore
given the view. The theater also provides
an important "acting out" facility.

STRUCTURE

The structure is a simple steel post and beam
construction with brick and glass curtain walls.
CORRELATION

The court is the hub off of which everything else is places. The high-rise dormitory, the commons/dining building and the academic building are separate but adjacent to the court.

CIRCULATION

Again, the court is the hub off of which everything stems. All of the corridors are double loaded for maximum efficiency.

FAÇADE

The façade of the dormitory sets up a playful pattern to avoid a monotonous grid of windows.
DESCRIPTION

This project houses and educates young deaf children.

PARTI

The housing which is illustrated, is a planer parti with separate education units. (1)

IMAGE

The low profile of the housing unit and the gable roofs, give the complex a residential character. (2)

SPECIAL FEATURES

The housing unit is zoned such that the staff and the children are separated by the dining room, which acts as a buffer. (3)

STRUCTURE

The structure is a simple wood frame structure with a flat, simple span roof. (4)
CORRELATION

The hub of the plan is the waiting room, off of which everything else stems. The waiting and dining rooms set up a barrier between the staff and student housing. The education units are separate from the housing units.

CIRCULATION

The circulation is linear with the waiting room as the source. A separate circulation system exists for the staff apartments.

FACADE

The facades are low profile reflecting a residential character.
Design Development
Concept Development

The developing of a concept is a very critical matter and yet there are several alternatives within any set of variables that will yield a successful design. Because of this wide variety of approaches to a problem, certain constraints must be employed to give the designer a basis for his decisions and which will hopefully lead to a more successful solution. Constraints come from several places such as the site, its surroundings, user needs, and environmental influences. The constraints for this particular project stemmed basically from the need to provide a stimulating environment for the deaf children that would give the maximum opportunity for learning, particularly in a hearing world. Specifically, these include integration with hearing individuals, personal identity, neighborhood identity, stimulating learning and playing environment, and maximum use of passive energy systems.

The development of the overall concept was manipulated by several site constraints. The first of which was the site boundaries but it was the surroundings which had the most effect. To the north was developing commercial which had no relation to the school so it was decided to use the existing barn, farm house, and fields as a buffer. This was quite convenient because it created a place where animals could be kept and thus provided an experience for the deaf students as well as other children from the city schools. To the east and west was only scattered houses and little relation was possible there. It was from the south that the major influence came. A large developing residential area there provided potential for mixture of deaf and hearing children. Therefore, a large area of neutral ground was allotted to facilitate a variety of play activities. It stretched across the entire south side and much of the west.

With further development, the barn and farm house became an entry to the school used to produce a de-institutionalizing influence and at the same time create an axis. This axis, and a second perpendicular axis from the residences, intersected at a focal point in the center of the school. This became an ideal organizational element. A tower at this intersection provided an orienting element as well as a lookout point from which a child could see any part of the school complex. These axes when laid over the solar grid produced a playful tension which was manifested in many ways in the plan.

The concept development was the most important and most difficult part of the design but once the constraints were established and used it became workable. With a basis for decision making a successful product is almost guaranteed.
School

As the site concept became more concrete the development of the school building could commence. The school building developed around a courtyard with the tower as an entry point. The north bank of spaces consisted of classrooms and administration. The south bank became the public spaces such as the commons and library. The separation of these two banks allowed for acoustical separation as well as making the movement from one to the other a special event. At the west end is the gymnasium which terminates that end of the courtyard and at the east end is the tower. This resultant courtyard provides an intimate, small scale outdoor space in the midst of the large site.

The two-story scheme was chosen for maximum solar exposure to all spaces and to minimize site coverage.

A structural grid was desired which would be functional as well as produce rhythm that would provide the facade with some sort of articulation. The "A-B-A" pattern was a result with the "A" being the space and the "B" being the support facility to the space. This became very successful in both plan and elevation.
Court

The courtyard was intended as an organizational element and to provide an intimate outdoor space in the middle of an extremely large site that would dwarf any child. Its use became more intense as it developed. The grid of the building worked well into the design of the court, giving it order. The final result was an adventure playground with a variety of spaces and activities with plenty of opportunity for the use of the imagination. This is an important element in fulfilling the needs of deaf children.
Commons

The most outstanding space, and possibly the most important in the school building is the commons. It is a space for large meetings and indoor recreation. Because of its importance it was set apart from the rest of the building in both scale and appearance. Early schemes twisted the volume to match the axis from the entry to the site but this created too many connection problems. In its place a more simple approach was developed which was more consistent with the vocabulary of the rest of the school although its scale and fenestrations make it unique.

A ramp enters the space from a bridge which connects the north and south banks. The ramp is used for both the handicapped and as an experiential element.
Residences

The needs of the young deaf child are very great, particularly when they are forced to leave their home and parents to live at a school for the deaf. Therefore the design of the residences became a very critical part of the design. The school is the home for the child.

In the past, institutions for the deaf have been very impersonal, resembling in no way the typical family structure and identity. This is totally unacceptable in a contemporary situation, so other alternatives were explored to provide a comfortable pseudo-family structure.

It was decided that there would be four residences, each containing about eighteen kids. This would allow for the experimentation of mixing age groups and sexes. Also, the child would have a particular "family" that he or she could identify with. Security in identification is extremely important for the deaf child away from home. The house parents become important figures in this home and provide a model of a near normal family structure.

The individual residence is centered around a large living room with the house parent's apartment to the west and the kitchen, dining, and sleeping rooms to the east. The house parents are separated from sleeping rooms for privacy but still there is the ability to supervise.

Entry to the residences is provided in two places, on the north side of the living room for visitors and on the south side from the play areas for the children. The student entrance is also located such that a child has the option of social interaction with others in the living room. If social interaction is not desired, the private sleeping areas can be reached directly.
The sleeping rooms hold 4 to 5 children and each child has his own bed, desk, and closet units which are arranged according to the desires of the group. This allows for the development of individuality and identity. This subdivision into small sleeping areas provides another level of intimacy.
Systems

Because of the growing need for low energy designs, a passive system of heating and ventilating was chosen. A water wall was ultimately selected because of its superior efficiency over other materials. The large water tubes also provided an interesting visual element.

At the classroom area, a prefabricated greenhouse was used to enclose the corridor and to allow light to pass back to the water tubes inside the classrooms. The greenhouse was also used to syphon air into the rooms in both summer and winter. A standard Trombe wall was used wherever a greenhouse unit was not possible. Clerestory windows provided light, direct gain heat, and ventilation.

Sun shade was provided by overhangs at the clerestories but at all other places it was done with deciduous trees and manual shading devices. The manual shading devices were chosen because it gave the kids a useful and important task to perform and thus becoming part of the learning experience.
Elevations

To keep the scale of the buildings small and in keeping with residential modes, the structures were limited to two stories and were capped with pitched roofs and veneered in brick. The intent was to provide a non-institutional, residential character.

The facade reflects the "A-B-A" rhythm behind it, making a convenient basis for articulation. The transparency of the south facade became an important element also in that it revealed the undulation of the water tubes and colors of the inner workings.

The facade is also a result of the passive energy systems which heat and ventilate the buildings. The south wall is a glassy Trombe wall where as the north walls are mostly closed to conserve heat. The clerestory windows provide both high natural light and ventilation.
The mid-year presentation was a conceptually solid product, strongly resembling the final design. The basic weakness was the lack of a uniform vocabulary throughout the entire project. Once that was established, a more consistent and refined product resulted.
Process Summary

As was discussed in Concept Development, the first thing that must be done in the design process is to establish constraints in order to have a basis for design decisions. These constraints include such things as site, context, program, environment, and aesthetics.

Once the constraints are established, a tool is necessary to continue, which in the case of this project is graphics. A very small scale diagram of the site was the basic tool for the conceptual design. All general factors could be seen all at once and the design could progress from the general to the specific. The various pieces of the project were used diagrammatically at a rough square footage to allow for easy rearrangement without having to contend with details. This was particularly successful in manipulating such a large site.

As the concept became more and more solid, it was necessary to look with more detail at what was happening with individual pieces of the design on a large scale. At this time, volume became an important element, so the diagrams started to include perspective sketches and axonometrics. This became very important in determining scale and character. With further development, the design became a three dimensional idea which necessitated an order or consistency. Structure, which has many determinants, is useful for establishing an order in both material and three dimensionality. In this particular project the structural bay was determined by the floor plan of the classrooms and the structural system was determined by the passive solar systems. These elements were manifested in the eventual appearance of the buildings.

Though this seems to be a linear process, it became necessary to overlap various phases because of the complexities involved. Reflection to past sketches and ideas was constantly required in order to judge whether current ideas were realistic. Also, ideas that were once now useable may be salvaged later.

This process worked quite well in this situation, particularly because of the large site that had to be developed. It allowed all the pieces to be dealt with at a wide scale as well as individually. This process may not work in every situation, but it follows a logical path that is easy to understand and handle.
Misc. Sketches
commons
Room Schedule

A. Administration
B. Classrooms
C. Gymnasium
D. Custodial
E. Computer Learning
F. Commons
G. Bookstore
H. B.S.U. Classroom
I. Library
J. Faculty Lounge
K. House Parent Apartment
L. Living Room / Recreation
M. Kitchen
N. Dining Room
O. Sleeping Rooms
P. Guest Room
Photographs


9. Design Center For The Deaf Department of Environmental Design R.I.T. College Of Fine And APPLIED ARTS 1 Lomb Memorial Drive Rochester, New York 14623