



A New American High School

Farmington, Minnesota

**Architectural Design Thesis
By:**

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Fargo, North Dakota**

A New American High School

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Abstract

This project is about the design of a secondary school for the community of Farmington, Minnesota and Independent School District 192. The site chosen for this project is near the current school placement so as to share existing amenities reducing impact on the site. As the population of Farmington is on the rise, the need for a secondary school is imminent. This thesis is a response to the challenge of meeting high standards of education with a building that successfully responds to the need for a healthy and supportive environment for its students and staff. The intention is to design a school that is small to mid-sized so that students can retain a sense of community and foster integrated learning.



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Theory & Research

Solid Ground on Which to Stand

When someone says the word *school* it is a challenge to fully define what that word means. Ultimately, it means many different things to many different people. In order to design a successful and responsive school, I wanted to research and become familiar with several different approaches to the concept of how a school is defined. I spoke with several architects, teachers, Farmington community members, and high school aged students to determine what direction my research needed to take. I decided to expand on the idea that school needs to be a place in which connections can be made and a sense of belonging can be achieved. The following pages contain highlighted research that I conducted over the past several months, as well as my personal experience with the educational process.

- The architecture of Erik Asmussen
-Rudolph Steiner
- Psychology of Abraham Maslow
- Rick Oldenburg's "Third Place" theory
- High Schools on a Human Scale book analysis

Erik Asmussen - Architect

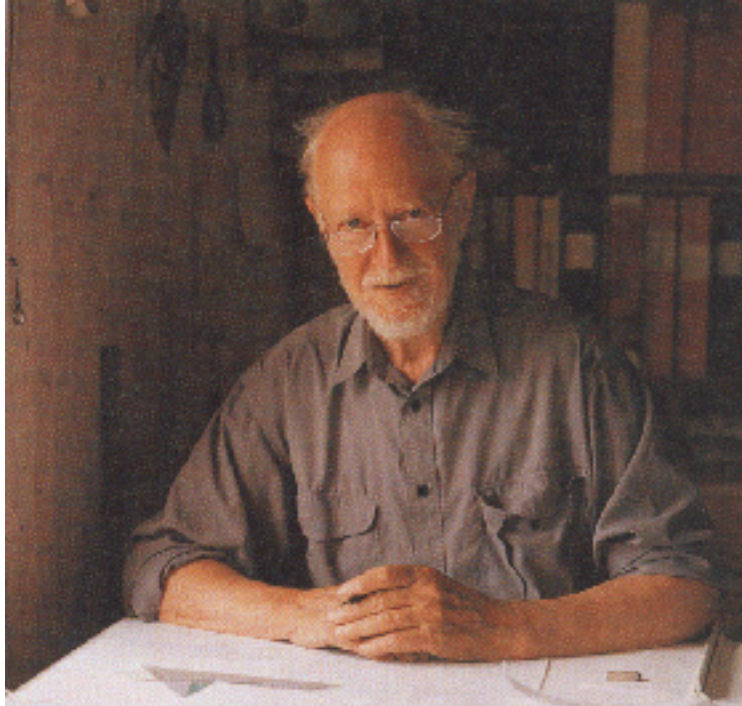


Fig. A1 Architect: Erik Asmussen

The architecture of Erik Asmussen is very closely based on the works of Rudolph Steiner. The most relevant point to Asmussen's inclusion in this thesis research is the way he approaches design in his "design themes

Unity of Form & Function

What goes on in a particular space? The idea is to design elements that respond to and emanate the answers to this particular question. Asmussen spends a great amount of time working with the user groups for his buildings, so that he can be fully immersed in their lives and create a design that fits their needs.

Polarity

The incorporation of polarity into Asmussen's design is recognition of the way the natural world works. It is representative of the fact that without hot we'd have no cold, without chaos we'd have no calm. "Everything in the phenomenal world exists along a continuum of polarized opposites, and all architectural experience is made perceptible, tangible, and real by the contrast of polarities" (Coates, 1997 p. 188)



Fig. A2 Asmussen: Metamorphosis of Space

Metamorphosis

This design theme exists in relation to polarity. Without polarity, metamorphosis could not exist. It is the transformation or movement from one polar entity to its companion. This is realized in many aspects of Asmussen's architecture; volumes, colors, textures, heights, materials, and even the smallest of components such as door handles from the inside out. This theme can reinforce a desired effect...direction of movement, or even intended uses for spaces.

Fig. A3 Asmussen: Polarity of Space



Harmony with Nature & Site

"Asmussen's buildings reflect the topographical order of their environments" (Coates, 1997 p. 194).

The Living Wall

Asmussen's desire to create walls that enliven the spaces they form by being physically expressive of the functions they serve. A living wall is intended to express the way it is physically supported and what it is supporting. Many of Asmussen's walls are involved in a "dialogue between concave and convex, expansion and contraction" (Coates, 1997 p. 196).



Fig. A4 Asmussen, E.
The Auditorium

Color Luminosity & Color Perspective

Color is employed by applying a number of thin layers of paint to create a luminosity that is apparent in nature. Opaque colors do not exist in nature. Asmussen works with other color artists like Arne Klingborg, and Fritz Fuchs. Together they devise ways to reinforce other themes such as the form and function, the polarity, and the metamorphosis inherent in the spaces, to name a few. This goal is achieved by relating color theory to each element.

The Dynamic Equilibrium of Spatial Experience

“If there is only symmetry there is no freedom. And if there is only asymmetry, there is no freedom” said Asmussen. By giving in fully to either extreme there is an expectation or order placed on the users of that space. Allowing asymmetry imparts a sense of movement, variation, and surprise. Asmussen believes that there must be a balance between symmetry and asymmetry for there to be true freedom. They are expressed by the subtleties of polarity, their balance.

Fig. A5 Asmussen, E.
The Dining Room





Fig. A6 Steiner, R. Photo

Rudolph Steiner

(1861-1925)

“Steiner believed that architecture could have a healing and morally beneficial effect on the individual, community, and society as a whole” (Coates, 1997 p. 161).

“spiritual science” - **Anthroposophy**

Defined as: “A vast body of knowledge and disciplines of thinking, feeling, and willing necessary for its attainment” (Coates, 1997 p. 160).

Waldorf Schools

Developed by Rudolph Steiner, they are based on his belief that artistic impulses should be integrated into all courses, even those in the sciences. Ultimately, the basis for the design in building and curriculum are based on anthroposophy. Generally, this means “wisdom or knowledge of man” (www.waldorfanswers.org). There are 870 Waldorf Schools worldwide, the first of which was designed by Rudolph Steiner in 1919.

What’s Valuable to this Thesis?

Through research of Erik Asmussen and Rudolph Steiner I can begin to see how others approach the design of an educational facility. The process used by Asmussen and the philosophical components of Steiner are very applicable in the creative development of a school.

Ray Oldenburg; Sociologist

“Enlarging and re-inforcing public space is an important element in strengthening civil society”

After having found several references to the theory of third places I found a concise article discussion of the book called *The Great Good Place* by Ray Oldenburg. This article is largely a discussion and analysis of the need for social capital in U.S society. The first and second places are the home and the workplace, the third place is generally a public space. Unlike the characteristic third places of other countries, such as the beer gardens of Germany, cafes of France, the piazzas of Italy, and the pubs of England and Ireland, the U.S. suburbs have created a difficult situation for places like these to develop. Many places that appear to initially be “third places” become highly commercialized, while emphasis is placed on financial revenue by rapid customer turnover, rather than the cultivation of cultural and social capital.

Oldenburg’s theory promotes environments that will foster the individual, making them feel like they are welcome, they are accepted, and that they are integral to the structures of society. “People who feel a sense of ownership of a place tend to act more responsibly and they monitor what is happening. Third places help the village raise the child” (Barber,)

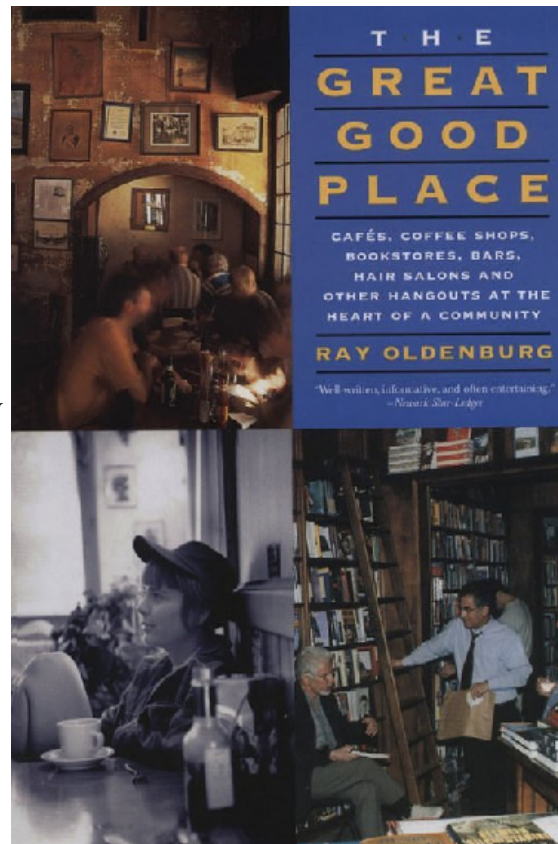


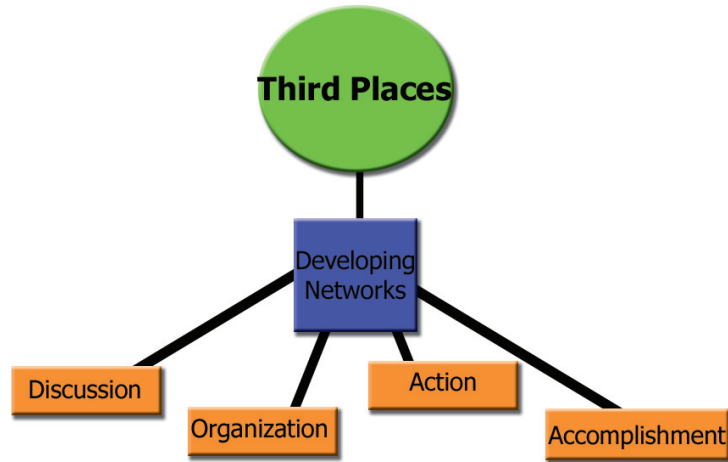
Fig. A7 The Great Good Place

Positive Functions of Third Places

(Oldenburg, 1999)

- 1.** Third places provide a place for people to get to know each other.
- 2.** Third places can serve as a neutral ground which provides an ease of association.
- 3.** They provide a sorting area where one can meet people with similar interests.
- 4.** They bring together people for the first time who may later fo on to develop other forms of association.
- 5.** They provide a staging area. It times of local crisis people can assemble and arrange ways of helping each other.
- 6.** Third places help create “public characters” - people who seem to now everybody in the neighborhood. They keep an eye on things, they alert parents about their child;s behavior before things reach a critical point, they welcome others to the neighborhood.
- 7.** They bring youths and adults together.
- 8.** They provide a place for the elderly to meet and interact with eachother as well as those who are younger than they.
- 9.** They unite the neighborhood.
- 10.** They provide a place for exchanging information.
- 11.** Third places serve as politicl forums.
- 12.** They serve as offices for those who don’t have them or as neutral ground for those that do.

Fig. A8 Third Places Diagram



This diagram demonstrates the direct benefits of Third Places in that they instigate other things in a person's life and society. (see fig. x)

What's Valuable to this Thesis?

Community, students, teachers, professionals, and family members need to be represented at all times for use in this facility.

The school should become a Third Place for the community of Farmington.

Development of a Third Place is a way to enhance and recall the once strong community ties of this rural farming town

HIGH SCHOOLS ON A HUMAN SCALE: HOW SMALL SCHOOLS CAN TRANSFORM AMERICAN EDUCATION

This book is a commentary on the changing educational structures of American society. Specifically it highlights the need for further change by promoting the creation of smaller schools. Several schools all across the country are exemplified so as to prove the positive effects that this movement is having.

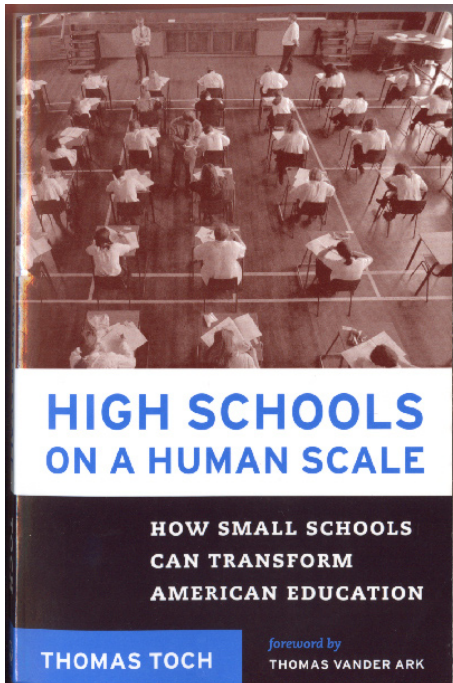


Fig. A9 High Schools on a Human Scale

Schools for the better part of the past century were developed under a factory driven society. Much of the population, at this systems inception, rarely reached high school. It is becoming increasingly apparent that we cannot keep doing the same thing over and over with our education system expecting to get different results. That is precisely the definition of insanity. Students' needs are changing just as fast, if not faster than technology. It is no longer an uncommon thing for a student to seek higher education beyond their secondary institutions. We are

“preparing students way differently for very different roles in the workforce” (p. 3) “...in today's knowledge based economy...only students who are taught to use their minds well have a shot at a middle-class lifestyle” (p.5). The development of a successful school is based on careful attention to the particular community in which the facility is set, and awareness of the resources available.

Exerpts from Text

“High schools are more likely to be successful when they are small and personalized” (Toch, 2003 p.12)

The best schools are focused – the design of their buildings are aligned with their educational aims (Toch, 2003 p. 13).

More than 5000 students drop out of American schools every day (Toch, 2003).

“A national system of new high schools requires the creation of many new high schools and a ‘choice’ system that permits students to select their schools and thus encourages schools to be different in interesting and meaningful ways” (Toch, 2003 p. xi).

“They are small, personal educational settings with a maximum of under a hundred students per grade where the anonymity and incoherence of comprehensive high schools has given way to a powerful sense of community and a strong commitment to academic rigor” (Toch, 2003 p.x).

What’s Valuable to this Thesis?

The development of a smaller sized school (under 100 students) would be the ideal. Creating several smaller population identities is possible and critical for maintaining any sense of identity within such a large student base. It will be crucial to be aware of the size and configuration of both physical structure and student population.

Abraham Maslow

1908-1970

An American psychologist of the early 20th century, Abraham Maslow took the Humanistic Approach to psychology, in line with the ideas of existential philosophy. Much of his work was centered around the basic principles structured by human needs. The philosophy outlines the fact that humankind progresses naturally through these stages or levels of growth and evolution. Once the basic needs are satisfied, other needs emerge. The precise order of progression is still a topic for debate, however each of these needs is a commonality among all human beings.

Fig. A10 Maslow's Hierarchy Pyramid



The key elements of Maslow's psychological premise for the development of a school lie in nearly every stage beyond the basic necessities. However, when you consider the needs that exist for free and reduced meal programs or perhaps even a warm safe environment away from an insufficient home-life, a school may very well fulfill every level of Maslow's hierarchy, at least to some degree. The greatest need to be addressed is the need for belonging and development of self-esteem. A school is where both of these needs can be highly affected either positively or negatively. It is also prudent to design an environment

that responds to the “humanistic” tenets of psychology (listed below).

Humanistic Approach

1. An emphasis on personal responsibility
2. An emphasis on the “here and now”
3. A focus on the phenomenology of the individual
4. An emphasis on personal growth

What’s Valuable to this Thesis?

Create spaces that promote a sense of belonging (materiality choice is important to impart a sense of home or of being welcome)

Make configurations of space that allow interaction and identity to develop (ranging from the individual workstation to the group gathering spaces)

Instill feelings of safety, security, pride, and ownership (choosing materials that embody trust in the users, not expectation of deviant behavior)

Fig. A11 Photo: A. Maslow





Case Studies

It is from others that we draw inspiration. From ourselves that we draw the conclusions.

Setting the Precedence

From the following case studies, there are a multitude of examples both in failure and success. From each of them I have summarized the basics of the project, pulled out both positive and negative features from each (left blank where none could be determined) and closed each study with a brief highlight of its relevance to this particular thesis project. Each case study includes a photographic collection taken from particular sources or by myself, as noted in their captions .

- Heritage High School: New Port News, VA
- Chaska High School: Chaska, MN
- School of Environmental Studies: Apple Valley, MN
- Apple Valley High School: Apple Valley, MN
- Learning Village School Model
- Western Metropolitan Education Project: Minneapolis, MN
- Fine Arts Interdisciplinary Resource School: Crystal, MN
- Ingunnarskoli: Reykjavik, Iceland
- Heinavaara Elementary School: Finland
- Willow Creek Intermediate School: Owatonna, MN
- Farmington Middle School West: Farmington, MN
- Rogers High School: Rogers, MN
- Minot High School: Minot, ND
- Sharm El Sheikh: Egypt

Project Name:**Heritage High School****Location: Newport News, Virginia****Year Opened: 1996****Project Description:**

An example of a large population high school with the intention of creating smaller sub-communities within the larger whole, the school's initial enrollment was 1500, with the final capacity of 1800 students. Designed in 1996 this school is a model for creating a high school that ultimately houses three magnet schools. The three academic programs are: a comprehensive school for excellence; an engineering and technology magnet school; a traditional academic magnet school.



Fig. B1 Heritage High School

Positive Points:

The building is developed at a large scale with successful breakdowns within to foster the sense of community that enhances learning environments.

Negative Points:

Heritage High School did not appear to be architecturally innovative at any point. In this thesis project I aim to provide the community with a facility that both functions and provides a piece that is visually remarkable.

What can my project take from this?

Organizational Methods for Programming and Integration of Curriculum

Project Name:**Chaska High School****Location: Chaska, Minnesota****Year Opened: 1992****Project Description:**

This school was at the beginning of the transition from traditional high school philosophy of teaching in subject areas to teaching in more integrated schedules and experiences. From this case study there is an example of how to address the move towards breaking the larger population into smaller more manageable ones within a large school facility. “Houses” are the hot topic. An important point to make is the step towards the philosophy that promotes an increasingly apparent sense of place or student’s identity.



Fig. B2 Chaska High School Home Ec.

Positive Points:

Chaska High School moves towards the development of individual communities within. This reflects the early attempts of the 90’s to create a sense of place in the school setting.

Negative Points:

The houses are basically just hubs, not individual communities. They are physically distinct, but lack the identity necessary for a sense of place to be instilled.

What can my project take from this?

Organizational programming is the best example to take from this study. Although it was not entirely successful, according to post occupancy reports, the move towards this school organization is both beneficial and necessary when done well.

Fig. B3 Chaska High School Assembly:
Large Population

Project Name:

School of Environmental Studies

Location: Apple Valley, Minnesota

Year Opened: 1995

Project Description:

Out of this example is a means to address the needs of a growing student population, lacking immediate need for a full 2000-student high school. This school is an optional high school within district 196 for 11th and 12th grade students from the 5 existing district high schools. This school is to be one of 5 themed optional high school units for the district, once necessity dictates the need for more space. The theme for this school is the study of environmental sciences. District 196 was experiencing the need for either an additional facility or an addition to be added to an existing facility. The choice to create this school came out of a community partnership developed with a local institution: Minnesota Zoological Gardens.

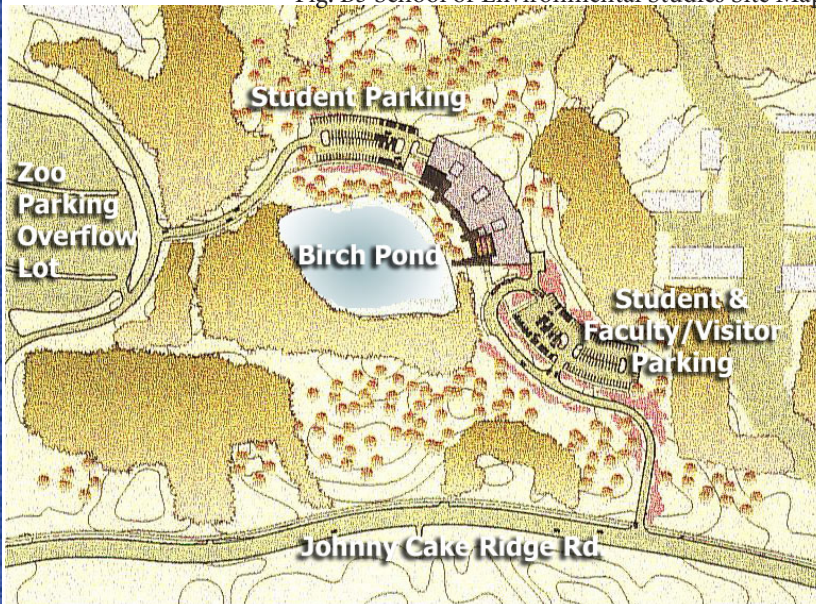
The organization of this school in conjunction with the relevantly themed curriculum creates a positive environment that produces well prepared students for either post secondary education or the workforce. Students are randomly placed in groups of 10 in a unit called a “pod”. Within this group students find a sudofamily that they can begin to identify with. Each student is given a workspace/desk that is their own



Fig. B4 Friendly Environment

The school allows for visitors of all kinds. This environment is made to feel like a home rather than a prison, something to be proud of and comfortable with.

Fig. B5 School of Environmental Studies Site Map



This site plan is indicative of a design that has taken its cues from the existing landscape. Making use of the pond, the school is granted both an aesthetic amenity as well as a teaching resource.



Fig. B6 S.E.S Floor Plan

The floor plan of the school is broken into 2 large groups being the Junior and Senior classes, then is divided into 2 “houses” each, and again is divided into 10 “pods” of students beyond that.

for the year. They work very closely in groups as well as on individual research projects. Teachers are located very near to the students in the building working in similar groups as team teaching units. Allowing close proximity for students and teachers grants the opportunity for stronger relationships to form across the board. When a student is no longer anonymous, they realize their importance and accountability.

Positive Points:

The sense of community and safety fostered by the architectural components lends a great example for new school design.

Negative Points:

The size of the project is smaller in scale than is practical for all schools.

What can my project take from this?

The value of student and faculty groupings within a school. Also, site responsiveness is a key to design success.



S.E.S: Outdoor Classroom Fig. B8



Fig. B7 S.E.S Library

Learning spaces are integrated at all points of the site on the interior and exterior. Classrooms are created in the natural setting outside (see fig. B8) under a structure built of recycled plastic, while on the inside the library (see fig. B7) serves as a classroom, social gathering space, private meeting place, and a research site.

Project Name:

Apple Valley High School

Location: Apple Valley, Minnesota

Year Opened: 1975

Project Description:

This high school was designed in the 1970's when the educational philosophies were indicating the benefits of open classroom design. The flexibility of space and the lightness that permeate the interior of the building are very pleasing. Students are contained in what at times appear to be make-shift classrooms, due in part to the crowding of the school. The original design however called for three walled classrooms that would allow for a greater sense of integration. The organization of the building also allows for portions of the building to be shut down during certain hours of operation to restrict access to particular populations. The school's zoning is such that it is clearly function and department related. The Academic, Athletic, Arts/Performance, and Technical Education wings are clearly defined. The central circulation is focused around the library which is utilized for study, research, classroom space, and social gathering.

Fig. B9 AVHS Exterior



Fig. B10 A.V.H.S Media Center



The openness of the school is evident in the multiple levels of library space and information center. (see fig x.)



Fig. B12
A.V.H.S:
Corridor

Fig. B11
A.V.H.S:
Front Entry
Lobby



Positive Points:

The qualities of interior lighting by natural means is a beneficial strategy both in terms of quality of space and in fiscal responsibility. Zoning the building is successfully done here to meet needs of a large population and limited staff.

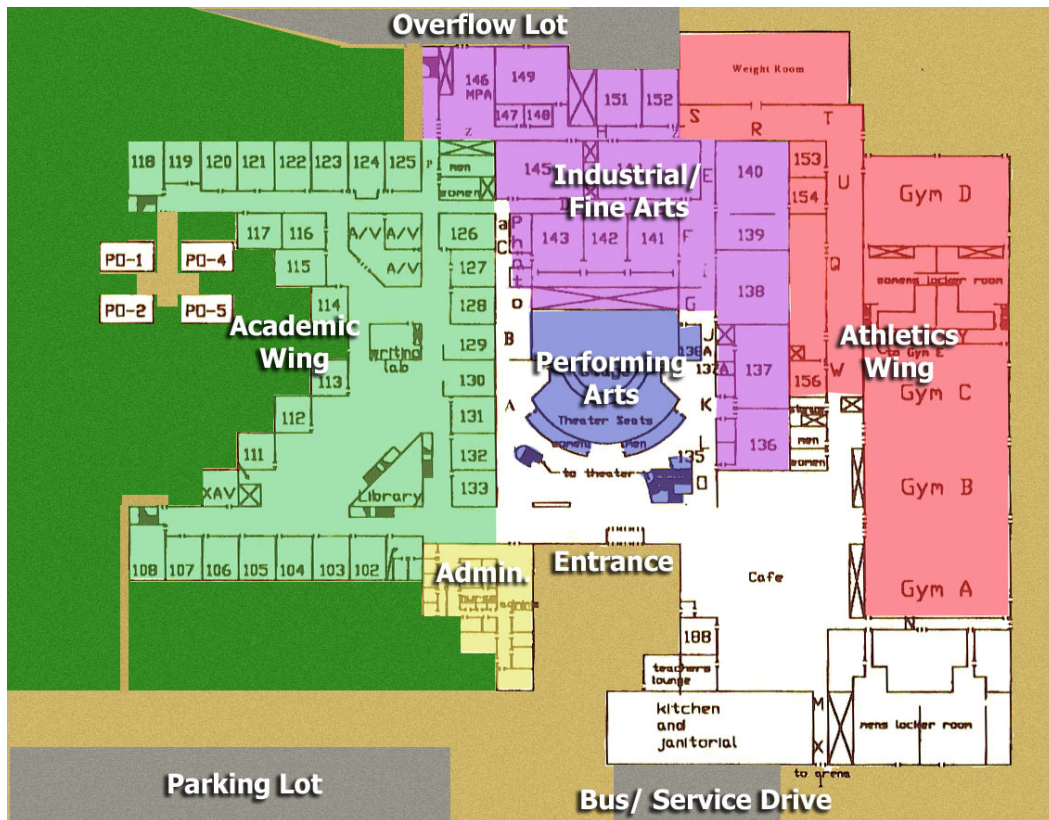


Fig. B13 A.V.H.S: Functional Groupings

The floor plan of this school is very much segregated according to different areas of interest as well as spaces for use. (see fig x.)

Negative Points:

The design of open classrooms goes only so far as to create ambiguous spaces, leaving it hard to define architecturally what is, exactly, the intended use for the spaces.

What can my project take from this?

Zoning of Building Functions and Use of Natural Lighting Strategies.

Project Name: Learning Village School
Location: Theoretical Model
Year Opened: Unbuilt



Fig. B14 Learning Village Site Model

Project Description:

This case study is a strategic plan for integrating the idea of school into the picture of realistic community surroundings. This model involves families and neighborhoods as key components to building a successful, beneficial educational experience. The key focuses of this model are as follows:

- A community of supportive neighborhoods for families
- A “learning community” known for quality as a result of students and adults in a continuous state of learning and improvement.
- Systems driven by the highest performance standards for students and adults.

As an exploration of the interconnectedness of the educational experience, this case study included visual models that drew clear relationships between the individual—the group—the domain—the enterprise—the collaborative—and the network (see fig. x). From this model it becomes clear that the school itself has far more to do with the context than simply site relationships.

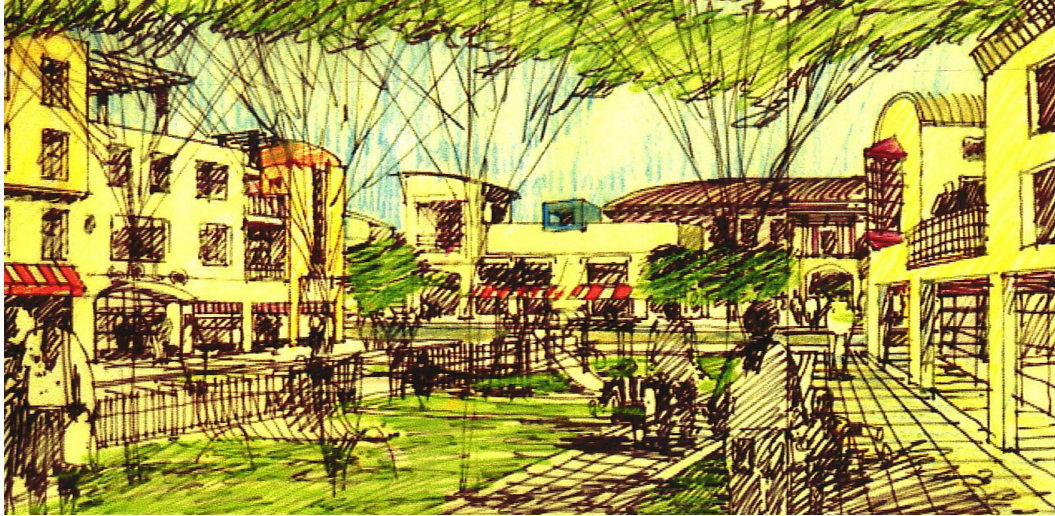


Fig. B15 Learning Village Sketch

Positive Points:

The model addresses the way we perceive the educational experience and introduces a rather new perspective making it more about the involvement all parts of a society.

Negative Points:

It is difficult to create the ideal in a reality based situation.

What can my project take from this?

The development of a design based on community and interconnectedness within the community.

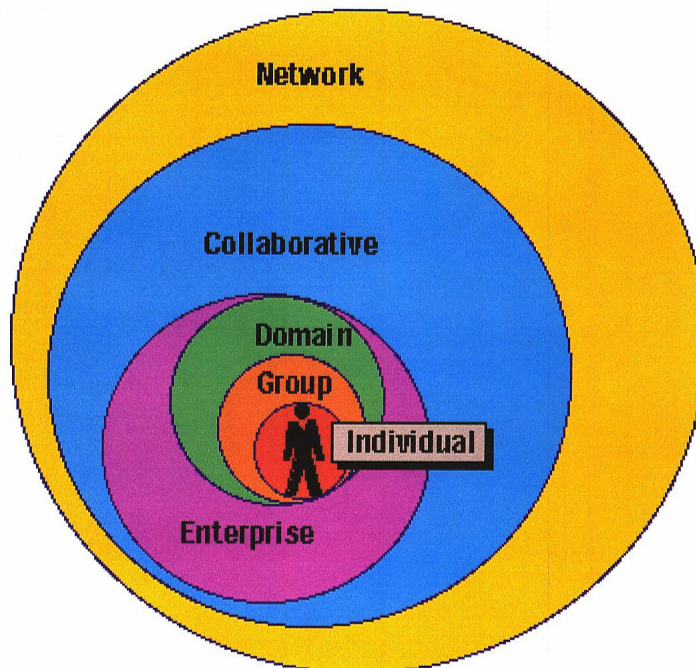


Fig. B16 Learning Village nested hierarchy

The nested hierarchy of the Network down to the Individual can be expressed through the planning of an educational environment.

Project Name:

West Metro Education Program Interdistrict Downtown School

Location: Minneapolis, Minnesota

Year Opened: 1998

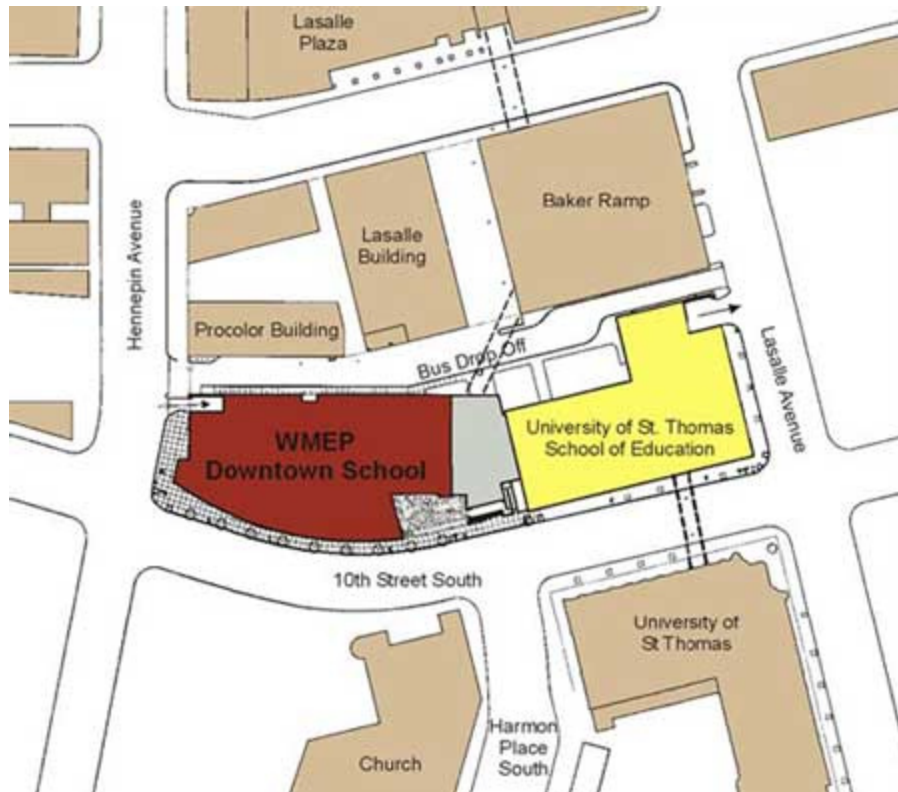


Fig. B17 WMEP Site Plan

Project Description:

A k-12 school located in the heart of the Twin Cities opened in 1998. 10 years of planning between parents, educators, architects and other community planners resulted in a school with a focus on multi-cultural education. The architectural response is manifested in large gathering spaces as well as small spaces to promote both large and small group interaction throughout the school. “It is the result of unprecedented cooperation across district lines, imaginative educational conception, inventive curriculum planning and innovative architectural design” The school makes use of the resources that the city provides such as the proximity of local professionals to cooperate on curricular projects as well as the relationship with the University of St. Thomas. Students are given opportunities for “classrooms” outside of the actual facility.



Fig. B18 WMEP Context Rendering

Positive Points:

This school is a leading design for integrated learning into the community and utilizing the community's amenities to create and enhance the learning experience.

Negative Points:

The school is limited to a small population.

What can my project take from this?

The design of intimate spaces to develop a sense of place.

Fig. B19 WMEP Context Rendering II



Project Name:

F.A.I.R (Fine Arts Interdisciplinary Resource) School

Location: Crystal, Minnesota

Year Opened: 2000



Fig. B20 F.A.I.R Perspective Rendering

Project Description:

This is the second of two schools created by the WMEP (Western Metropolitan Education Project) collaboration is a 4-8 grade school that focuses on the arts with an emphasis on intercultural learning opportunities. Opportunities are provided to the students through local professional organizations such as Stages Theatre Company, which is the artist-in-residence company, as well as the Minnesota Orchestra, the Guthrie Theater, the Walker Art Center, the Iowa Youth Choirs and the Stuart Pimsler Dance Theater Company. Designed by HGA of the Twin Cities in the fall of 2000 the architecture supports the educational philosophy. Daylighting, flexibility of space, and clear yet dynamic circulation drive the building's composition. (photos available at www.hga.com/#home).

Positive Points:

The emphasis on a particular subject matter seems to be beneficial for creating an identity for the students and faculty, as well as the community in which the school is set.

Negative Points:

The selective focus of the school is not for everyone. Architecture is extremely important to the education process, but cannot be successful unless paired with an equally effective curriculum.

What can my project take from this?

Design driven by the desired outcome of the building. What affect do I want the building to have? From this example I can realize the importance of a theme driven education as an asset to both the education and the physical manifestation of the building itself.

Project Name: Ingunnarskoli
Location: Reykjavik, Iceland
Year Opened: In process of design and being constructed

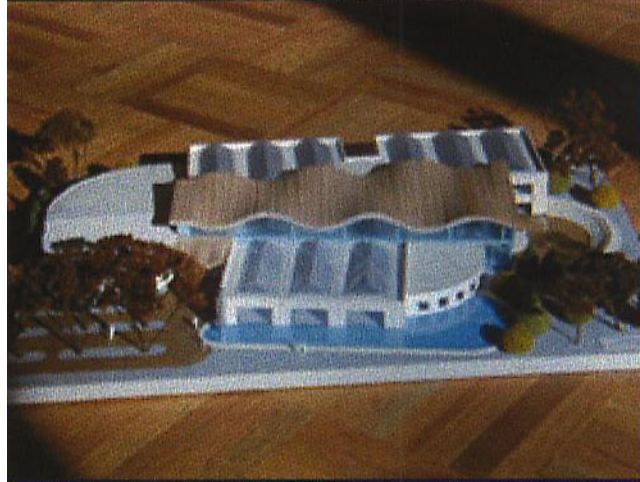


Fig. B21 Design Model

Project Description:

Housing grades 1-10, students numbering 400, this school is the traditional size and compilation with a new design model for Iceland. This study shed light on the process of developing plans and models for successful school design as well as the basis for flexible planning in school environments. Out of the planning and meetings with the committees involved in making decisions for the school (parents, teachers, administrators, students, employers, neighbors, and other concerned citizens) came four themes: community, nature, spirit, and flow. These themes were integrated together and used to develop a “signature” or overall visual concept for the school to begin design (see fig. x).

Below is the signature that the community developed to signify the important elements of the design.

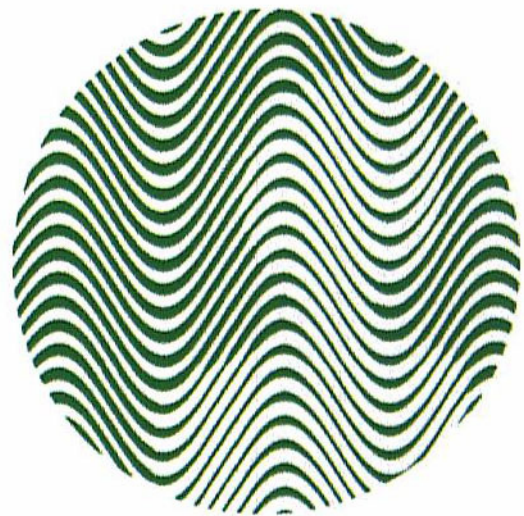


Fig. B22 School Signature

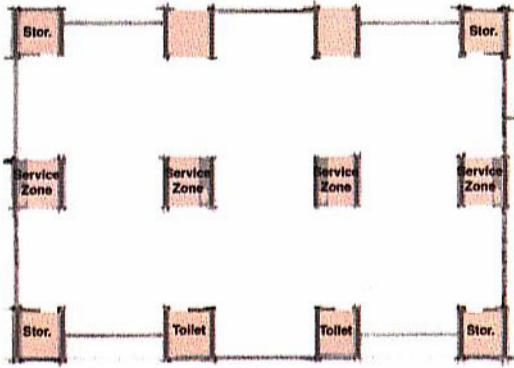


Fig. B23 Building Layout

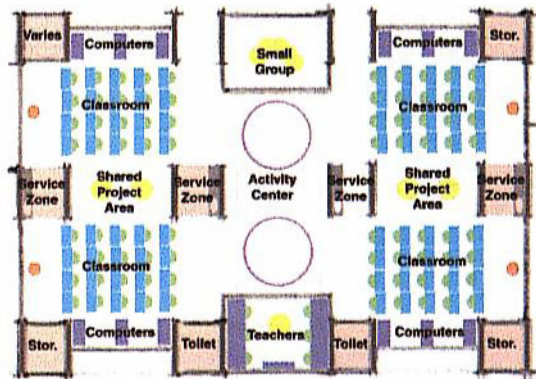


Fig. B24 Traditional Layout

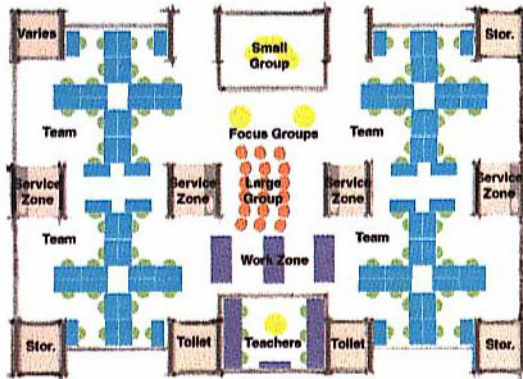


Fig. B25 Team Layout

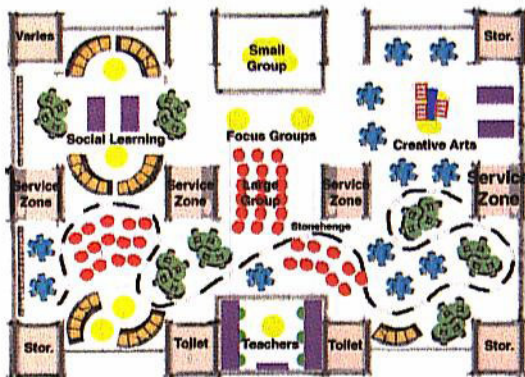


Fig. B26 Organic Layout

The space planning for the interior developed out of an acknowledgement of the students' and faculty's need for freedom and creativity. Fixed versus flexible, service versus serviced spaces are clearly laid out in a grid pattern. Within that grid pattern there is ample room for flexibility and spontaneity for both the staff and students to accommodate and adapt to their needs at any particular time. Students change from year to year, sometimes the staff changes just as often. So, it is in the best interest for longevity of existence to maintain an element of adaptability in the initial design.

Positive Points:

The school is designed with a strong and integrated concept that is supported by all participants within the community. The design requires/allows the user to take an active role in defining the space.

Negative Points:

The only thing I could imagine being a hinderance is the same as what could portntially be a benefit: the need for user initiative to complete the space. If the user does not take an active role in the space it will be un-finished.

What can my project take from this?

Space Planning with flexibility in mind

Project Name:**Heinavaara Elementary School****Location: Finland****Year Opened:**

Fig. B27 Heinavaara Entry Portico

Fig. B28 Heinavaara Multi-Use
"Spine" of building**Project Description:**

This case study discusses the terminology of 'open school' planning and how that is defined. It is not necessarily a drive to have lots of open space, rather it is a recognition of the need for a school to be flexible in its space programming. The designers determined the school should reflect the way in which people (in this case 4-8 graders) learn best. "Children learn best if they are given a rich and diverse setting in which they are taught to observe and study their environment" (Cunningham Group, 2004). Also, a lesson from this case study is the use of native materials in its construction. The most readily available resource for this area was timber, which proved to lend a very pleasing aesthetic (see fig. B28).

Positive Points:

Allowing the users needs to truly dictate the design of a building is a success in this case both functionally and aesthetically. Along with the practical planning and execution was the environmentally responsive material choice of local origin. Reducing the cost and environmental expense of foreign materials is a very positive example.

Negative Points:

This particular school is much smaller in scale than this thesis project. Also, being in a foreign country means that it is not subject to the same codes and regulatory constraints as schools in this country.

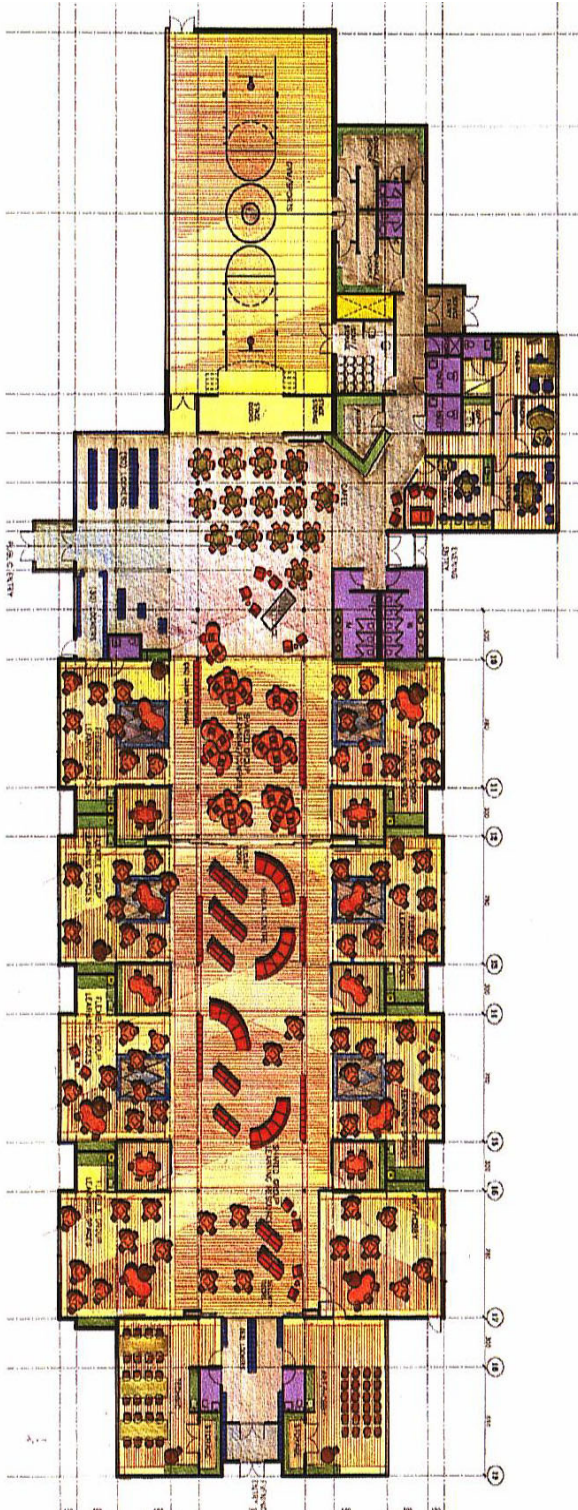


Fig. B29 Floor Plan - Spine Organization

What can my project take from this?

Open Planning Strategies will be most beneficial to my thesis. The organization of space along a central spine allows for many levels of interaction amongst the buildings participants.

Project Name:

Willow Creek Intermediate School

Location: Owatonna, Minnesota

Year Opened: 1990

Fig. B30 Willow Creek Entry



Project Description:

Having capacity for 360 students, this school is for 6th grade students only. Originally intended to be a transition facility for a second high school in the area it is attached to a gymnasium facility for function as high school varsity space and extracurricular and community space. Ultimately the school has remained exclusively for 6th grade students while the community opted to put an addition onto the existing high school several years ago.

Internally, the “classroom” spaces are organized in a team teaching setting...one classroom is actually delineated by permanent partitions for lab space while there is flexibility within the space to create several variable class spaces as needed.

Positive Points:

The design is for a building that incorporates many community functions simultaneously, while planning for future expansion.

Fig. B31 Willow Creek Library/Gathering Space



Negative Points:

The population is limited to a single age group of students. Planning for an addition by segregating a specific population is a risky move because it is dependent upon the certainty of future events falling into place. In this case the community voted down the postponed move to create a high school from this facility, virtually leaving the 6th grade students stranded.

What can my project take from this?

Integrated learning spatial programming. This project, despite its political failures has exemplified another means of creating educational facilities outside the boundaries of the traditional classroom units.

Project Name:

Farmington Middle School West

Location: Farmington, Minnesota

Year Opened: 1993



Fig. B32 Farmington Middle School West Main Corridor

Project Description:

Currently, the city of Farmington has one high school and 2 intermediate school facilities. One houses the 6th and 7th graders (Farmington Middle School East), while the other houses 8th and 9th grade students (Farmington Middle School West). Both schools exist on the same site, and were built merely 6 years apart.

Farmington Middle School West is based on the ideas of houses as the primary unit of space planning. Each house is defined ultimately by a spatial relationship with other spaces within the building. The house is simply several classrooms grouped together in which a certain group of students matriculate on a daily basis.

Strategies to create a safer environment for students are well employed. Large open hallways, no dark secluded areas, automatic motion triggered lighting systems, while the entry is highly visible to many parts of the building. Also, a strategic

rumor started by the faculty has the students believing there are cameras in the large mirrors that line the main corridor.

Positive Points:

Means of creating a safe environment without high cost or instilling fear.

Negative Points:

The house system is a rather dissociative physical attempt to create a sense of place, it segregates rather than differentiates.

What can my project take from this?

An example of safety methods built into the design.

Fig. B33 Farmington Middle School West Entry



Project Name: Rogers High School**Location: Rogers, Minnesota****Year Opened: 2003**

Fig. 34 Rogers High School Front Entry

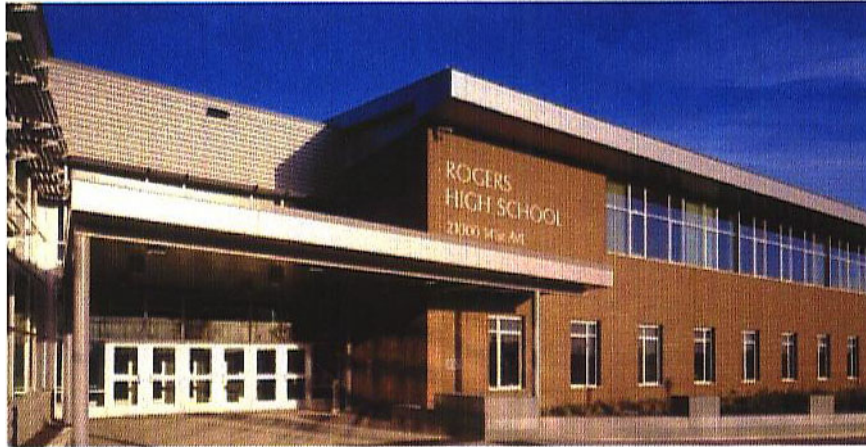


Fig. B35 Rogers High School Main Entry Mid Day

**Project Description:**

Opened the fall of 2003, this school was designed to be sustainable, expandable, and aesthetically pleasing. 255,000 square feet are designed to maximize daylight (100% to all spaces) and to minimize impact on the building site. Mechanical and electrical spaces were grouped within the facility to allow for flexibility in layouts for both present and future needs. "Clustered classroom design provided a small-school atmosphere with the curricular resources of a larger population" (American School Board Journal, 2004). This school is a particularly successful example of sustainable design when it is utilized as a design focus from the early stages of design.

Positive Points:

An excellent example of innovative architecture combined with a sustainable solution. This project is chock full of environmental design strategies that create a more efficient and more effective learning environment. The goal for this building was to reduce the energy consumption by 50% when compared to similarly sized buildings. The mechanical, electrical, and plumbing facilities were centrally grouped so as to allow for future modification of building and curricular changes that may take place.



Fig. B36 Rogers High School Entry at Dusk

Negative Points:

Although it is designed to house several clustered classroom units to simulate smaller schools within a larger population, the design still appears to be subjugated to the traditional and formal atmosphere that schools have commonly had over the past century.

What can my project take from this?

Sustainable strategies. The best example to take from this school is the attention to reducing energy cost and improving user health by creating naturally, well-lit spaces.

Fig. B37 Rogers High School Cafeteria



Project Name: Minot High School

Location: Minot, North Dakota

Year Opened: 197?

Project Description:

This high school solution was developed in the 1970's as a response to increasing population of the community's high school students. The decision was made to, in lieu of adding a completely separate high school. There is now a split campus mega-high school where one building houses the 9th and 10th grade students (central campus) and the other houses the 11th and 12th graders (magic city campus). The central campus, the original site of the high school utilizes the amenity of courtyards as gathering space for social and educational functions. It has been modified over the years to adapt to the growing population. Located centrally within the city it has a more compact campus setting. Whereas the Magic City campus is on a site that is considerably more spread out.



Fig. B38 Minot High School Central Campus Entry



Fig. B39 Minot High School: Central Campus Exterior

Positive Points:

The use of outdoor space is integral in designing a space that fosters a sense of community. Allowing the idea of what a classroom can and should be defined as to be flexible and responsive to individual needs is a goal of my thesis.

Fig. B40
Minot High
School:
Central
Campus
Courtyard
Space



Negative Points:

This split is an example of an unsuccessful solution for many practical reasons once post occupancy success was measured. Student's and faculty experienced a disconnect between the two facilities. Athletics teams become so large that there becomes issues of participation opportunities being limited, as occurs with any other extracurricular activity within the school. This model for expansion of a school district's facilities is an example of what not to perpetuate. Learn from others' mistakes.

What can my project take from this?

This project solidifies the need for one campus to be developed rather than trying to segregate any further.

Project Name: Sharm El Sheikh School
Location: Egypt
Year Opened: 1998

Fig. B41 Sharm El Sheikh Site Plan

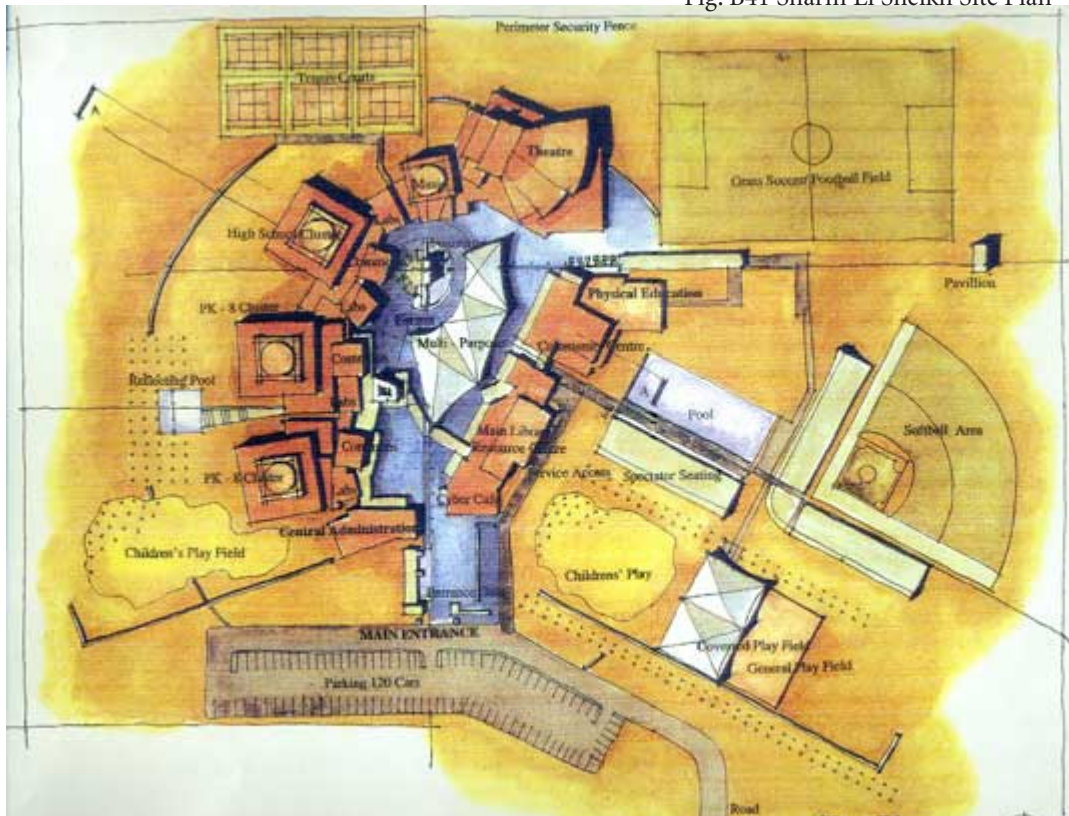


Fig. B42 Sharm El Sheikh First Floor Plan

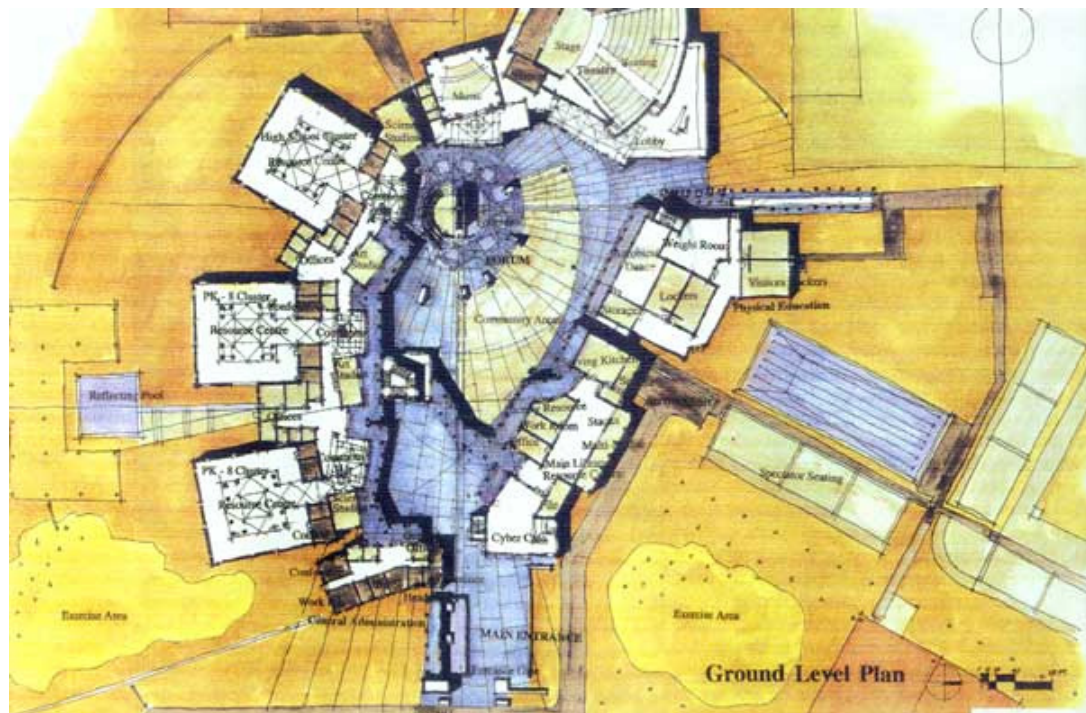
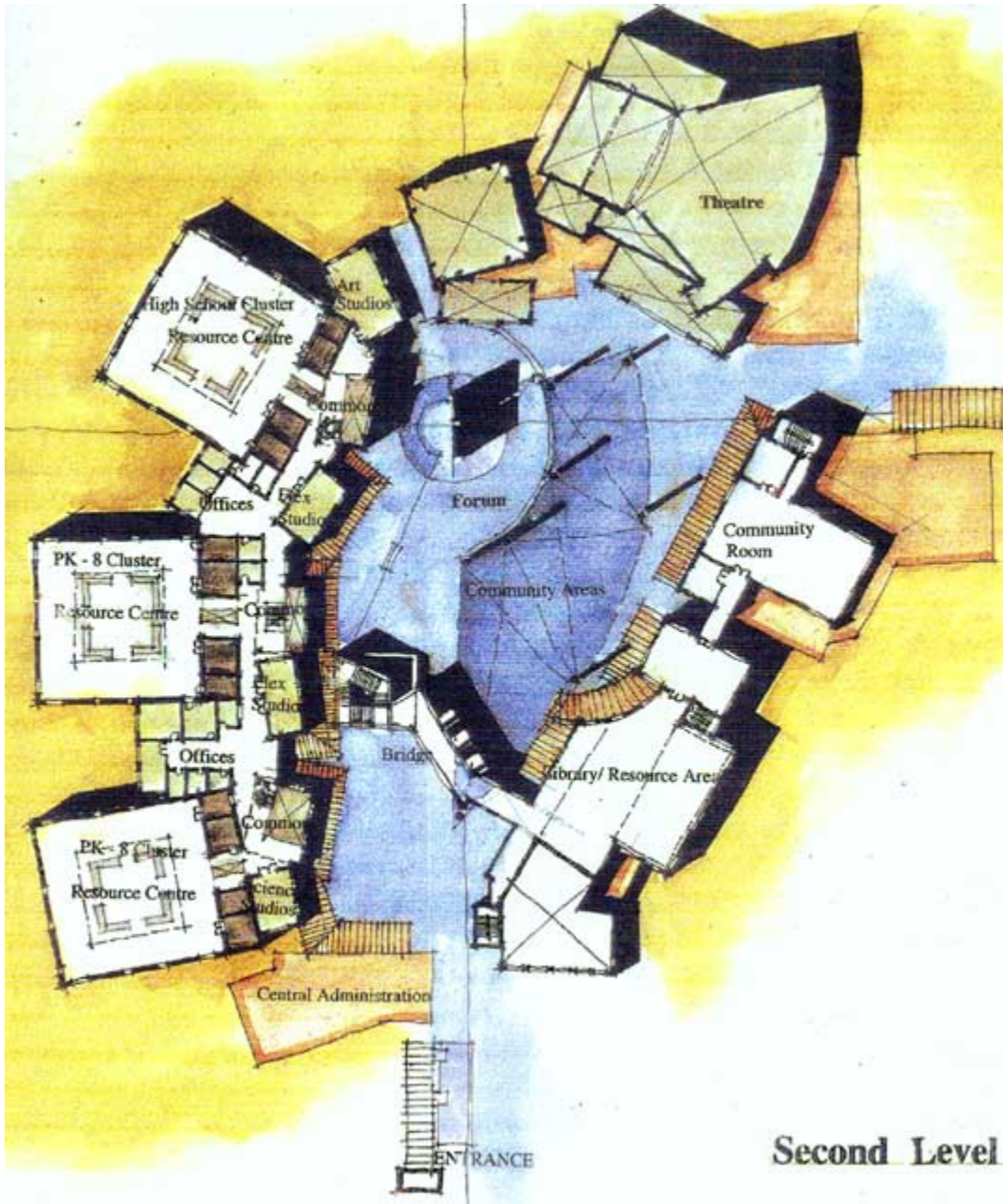


Fig. B43 Sharm El Sheikh Second Floor Plan



Project Description:

This school is designed as a response to several principles. Ninety percent of human learning occurs by experiencing, so the design responds in kind by enhancing the physical experiences of the occupants breaking from a linear grid to emulate the more organic site planning of the Greeks. “Family/Cluster” as an organizational approach to education feeds off of the principles of Abraham Mazlov’s assertion that human need for identity is highly important. The school is differentiated into four “neighborhoods” (pre-kindergarten, 8th grade, and two high school units) each of which is composed of 10-12 smaller work groups.

Positive Points:

The site development and internal organization are prime examples of the newest direction of educational planning and architecture.

Negative Points:

The school format does not match that of the public systems of the United States.

What can my project take from this?

Site and Programming cues. Looking at the site is the best way to determine what the building should become. The goal for this study’s spatial organization, to enhance the participant’s physical experience of the space is something this thesis should work towards.

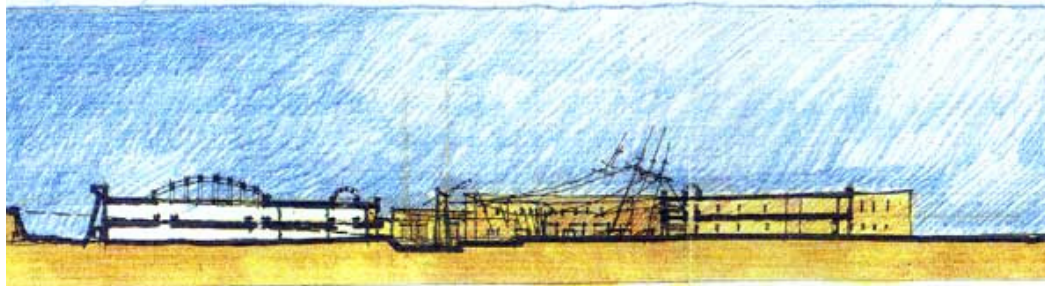


Fig. B44 Sharm El Sheikh Spatial Organization

Plan Key

- Admin. / Office
- Art
- Classroom
- Commons/Cafeteria
- Corridor
- Elevat', Stair, Ramp
- Entry
- Health, Counseling
- Lg. Group Instruct'n
- Library, Media Cntr.
- Music, Theater
- Physical Education
- Science Lab
- Small Group Room
- Teacher Planning
- Team Resource
- Technology, Shop
- Support / Utility

Fig. B45 Sharm El Sheikh Building Section





History / Context

From the Past to Present

In order to gain an understanding of the project I must begin with what was there before now. In this section I will cover:

- Local History
- Schools in the area
- The general response I was given from the community.

The information used for this section was obtained through personal interviews and literary research.

Local History

Past

Incorporated in the year 1872 Farmington was the second township of Dakota County to be incorporated. The town provided the county with a place for the Dakota County Fair to be held, which was the center of the technological development for many years. This is where the latest and greatest inventions and innovations were unveiled on a yearly basis. To date, the County Fair is still held in the city causing an excitement and commotion during the month of July.

Present

Farmington is a community that is experiencing rapid growth rates, at approximately 500 homes annually accompanied by an influx of commercial and industrial newcomers. Population was most recently reported to be 18,282 (estimated in 2003). Fifty-one percent of the community's population is comprised of families with children under the age of eighteen. The median age for residents of Farmington is 30 years.

The local government is a Mayor/Council format, dealing with a budget of \$18,800,000 and a community bond rating of Moody's – A2.

Future

“These people are the fair promise of the future, for without them we should have no hopes of improvement. Their example will be contagious - others will imitate them, and in time we shall all be better for their influence.” John Emery

This was a statement made in the late 19th century about the community's residents, but I find it has a relevance to today's climate. The design of a new school building, or any public building for that matter will set a precedence in a growing community. Architecture inherently sets and maintains a pace for a place. With this building the community can express their intentions for the future clearly and in a concrete manner. This building must be designed for flexibility, for success, and for the future as it is created by what is done today.

Schools in the Area



District 192 covers 80 square miles and is made up of sum 4000 students. As the single largest employer for the city, the Farmington School District employs 540 individuals. Currently, the district facilities consist of: 20 Baseball/Softball Fields, 8 Soccer Fields, 20 Tennis Courts, 16 Outdoor Basketball Courts, 24 Indoor Gym Courts, 1 Indoor pool, and 1 Outdoor Track. The student to teacher ratio is 24;1 for the four elementary schools, 25;1 for the two middle schools, and 23;1 for the existing high school. District 192 has an 80% rate of graduates attending post-secondary education, while the state average is 65%. The nearest institutions of higher learning are the College of St. Olaf, located 15 miles away in Northfield, MN, and University of Minnesota of Twin Cities, which is approximately 30 miles away.

The schools that are included in the District are:

Akin Road Elementary School	current population: 570 Projected 2008: 701
Kindergarten Center	current population: 243 Projected 2008: 272
North Trail Elementary School	current population: 761 Projected 2008: 818
Farmington Elementary School	current population: 641 Projected 2008: 681
Meadowview Elementary School	current population: 761 Projected 2008: 893
Farmington Middle School East	6th and 7th Grades current population: 867 Projected 2008: 1,045
Farmington Middle School West	8th and 9th Grades current population: 841 Projected 2008: 954
Farmington High School	10th thru 12th Grades current population: 984 Projected 2008: 1,197

Currently, the schools are facing a dramatic increase in student population. Projections for the near future foretell a 30% increase from the present capacity of the district. Grades 10-12 particularly will experience an increase of 38% while the 8th and 9th grades will experience a 41% increase. The community and school board have employed a Facilities Planning Committee to assess the situation. This committee has recommended, based on maintaining the existing curriculum structures and the district's infrastructure, to build a new 2000 student high school. The recommendation is to include the 9th graders in the high school configuration rather than locate them with the middle school's 6th - 8th grades.

This thesis approaches the same situation with an alternative solution. It is designed to be a high school that includes the 9th grade yet does not maintain the current curriculum structure. The school will have a capacity for approximately 800 students, which will alleviate the swelling population at the high school level yet it will also allow for a future expansion of a community center (performing arts component and full athletic accommodations). The internal design will remain flexible enough to be utilized for many alternative functions.



Community Responses

I found the residents of the community to have a strong desire to maintain their independent identity. This is true while I also found that keeping up with the progress of neighboring communities was a concern. This town is in need of a solid stance and clear direction in order to step forward and successfully keep pace with the changes they are now and will continue to undergo. Success is dependent upon the formation of a strong statement of intent amongst the members of the community. To add school buildings arbitrarily will only create a disorganized framework for the future. This school building has the potential to bring the community together to promote a strong and successful future, which is wholly the intention of this project.



Site Analysis

"All is born of water, all is sustained by water"
-Goethe

Take a Look Around

After several visits to Farmington I was able to obtain the information you see in the section that follows. Photos, maps, and literature were all extremely helpful in determining the site for this project and driving decisions for future design. (I found the city's planning and engineering departments to be of great help in this area).

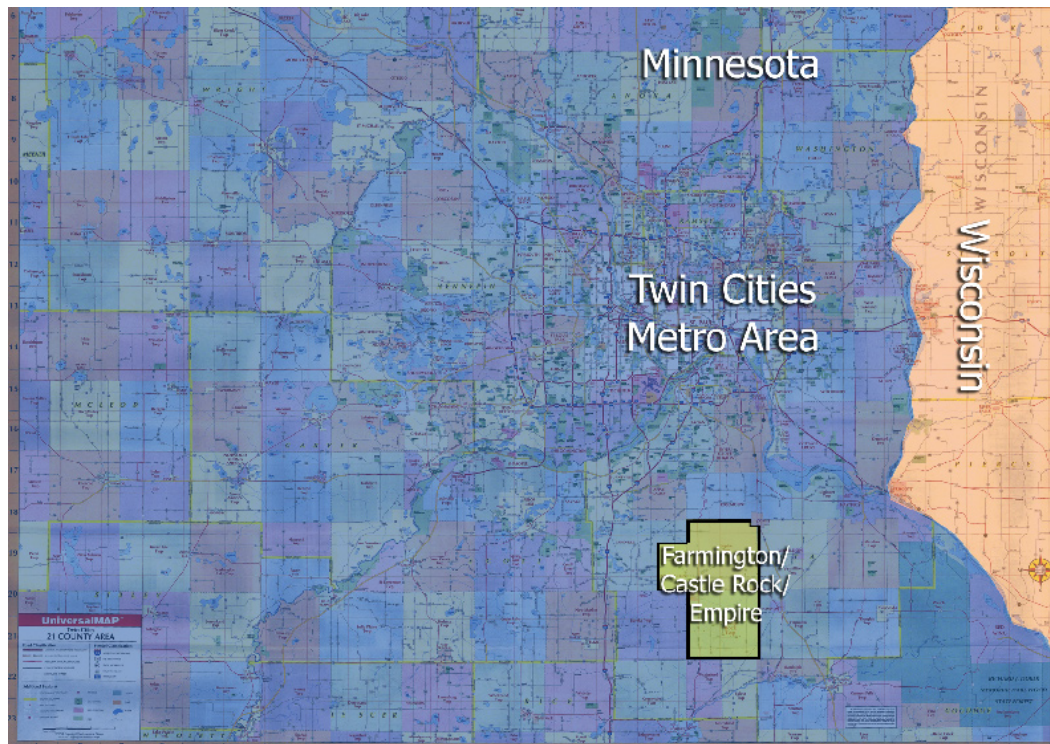
- Climate Summary
- Maps
 - State
 - County
 - City
 - Site

- Site Analysis
 - Soils
 - Views
 - Wind
 - Transportation Routes
 - Surrounding Conditions
 - Relationship to Existing Schools

State Map

Farmington is a community just south of the suburban sprawl of the Twin Cities. This context creates several issues for consideration. The need for the community to retain a solid identity for itself as this sprawl occurs is most pressing. Maintaining a distinct character and the implementing of careful architectural development is necessary to assure that both the structures and institutions they house will be respected and have longevity.

Fig. D1. Minnesota State Map



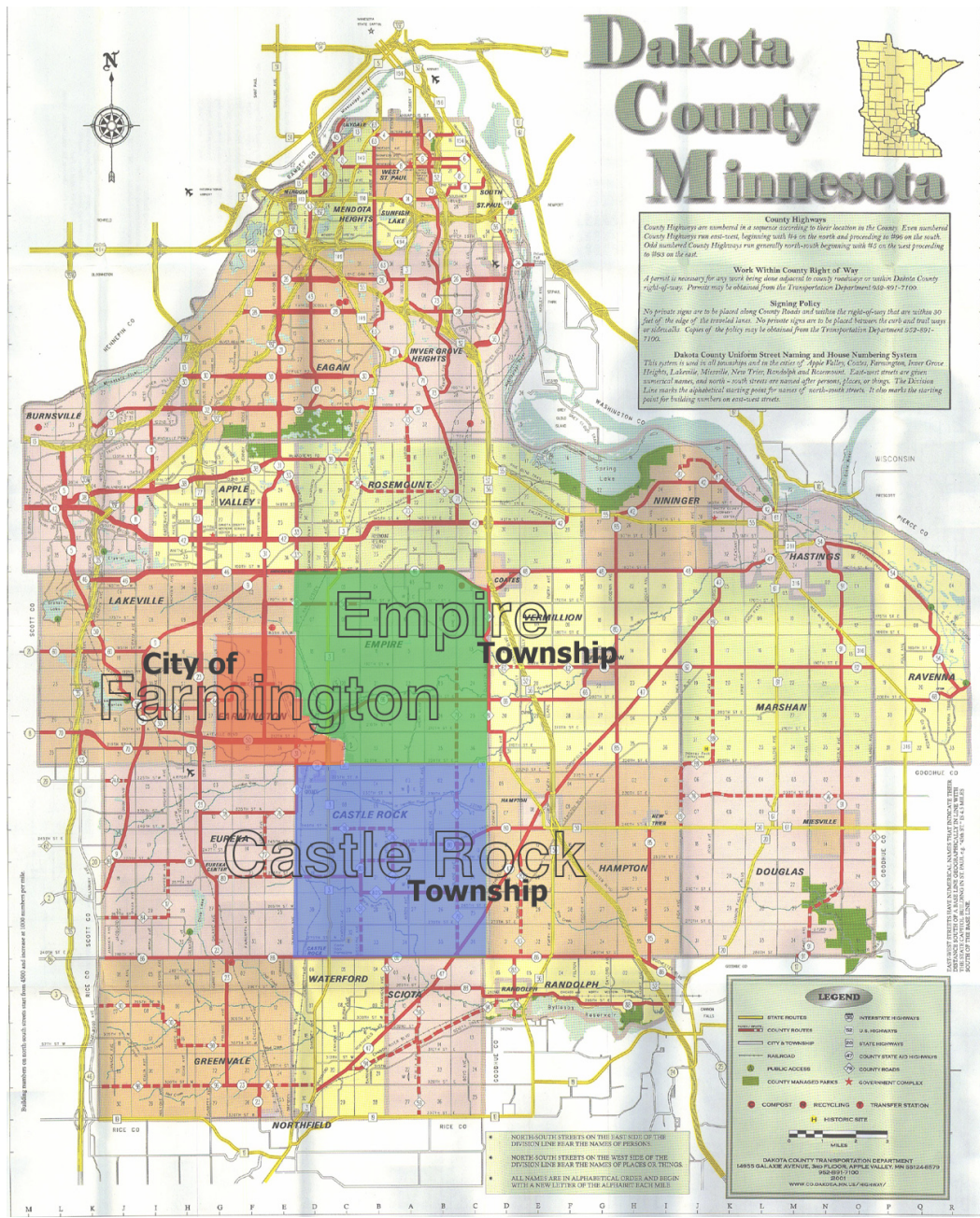


Fig. D2 Dakota County Map

County Map

Located southeast of the Twin Cities, Dakota County is 576 square miles in area (368,640 acres). The northwest border of the county is formed by the Minnesota River, while Mississippi River forms the northeastern and eastern borders. In the portion of the county that contains the community of Farmington, the terrain is “level to gently sloping”.

City Map

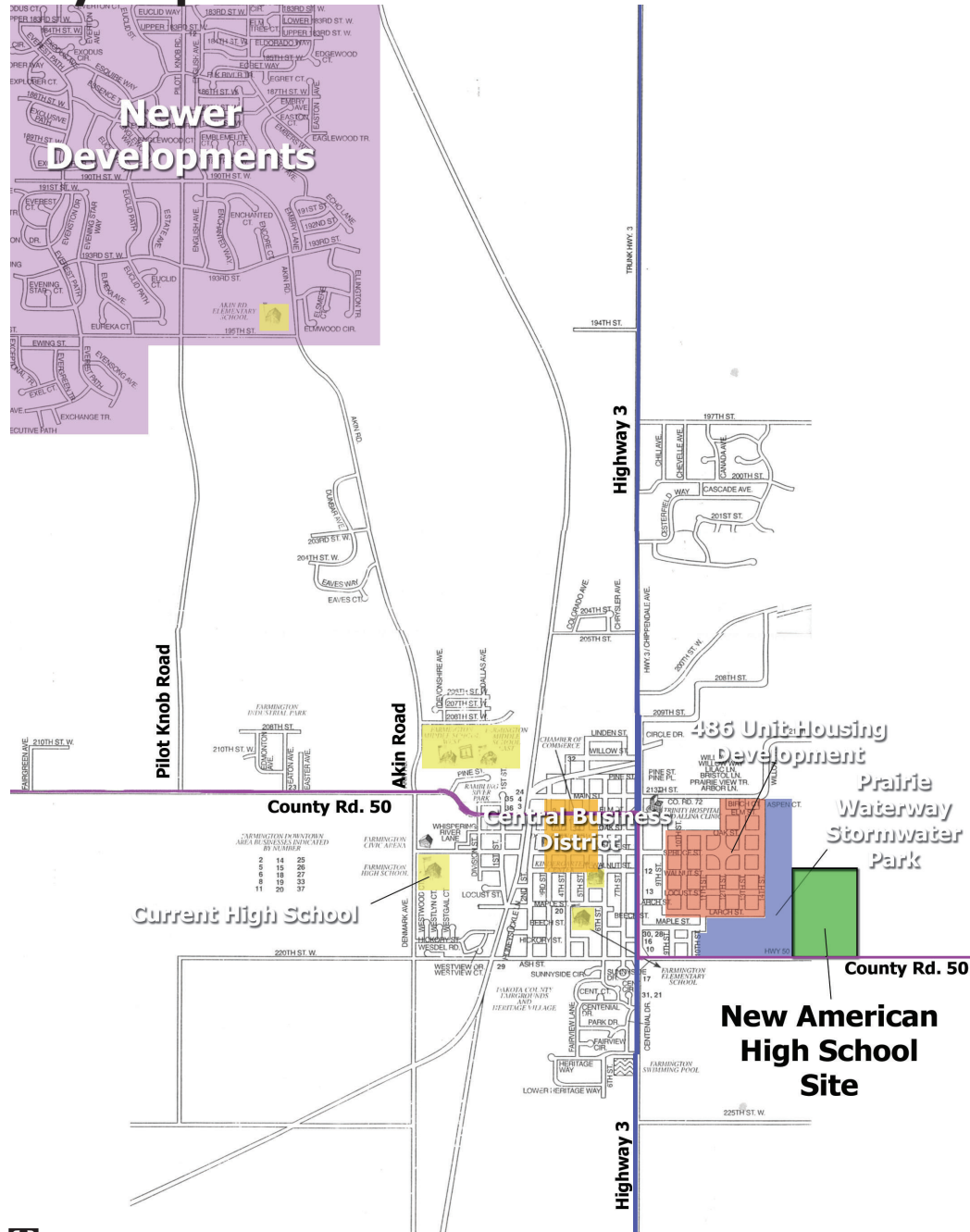


Fig. D3 Map of the City

The city was mainly concentrated around the intersection of highway 50 and the railroad line until the 1990's when population began to increase and developments began to infiltrate from the north. The newer developments create an isolated island of the city's population that starts to divide the identity within the community. Locating the site of the new high school is intended to avoid further deepening that divide by moving to the east rather than the north.

Site Map



Fig. D4 Site Location Aerial Photo/Map

Choosing the site was probably the most surprising find of all my research. Growing up only 5 miles from the site, in the city of Apple Valley I had not taken the chance to really know what Farmington had to offer. Apple Valley, for so long was the edge of the suburban sprawl from the Twin Cities, but now it is moving beyond there...Farmington now resembles the place where I grew up. "Rolling hills, gentle breeze, squint inducing sunshine, and 70 beautiful degrees! Everything is so comforting." (an excerpt from my recordings). The further south you move through the town the more rural the feeling gets. Beyond County Rd. 50 there is little beyond the High School and Dakota County Fairgrounds, except farms and their respective farmlands.

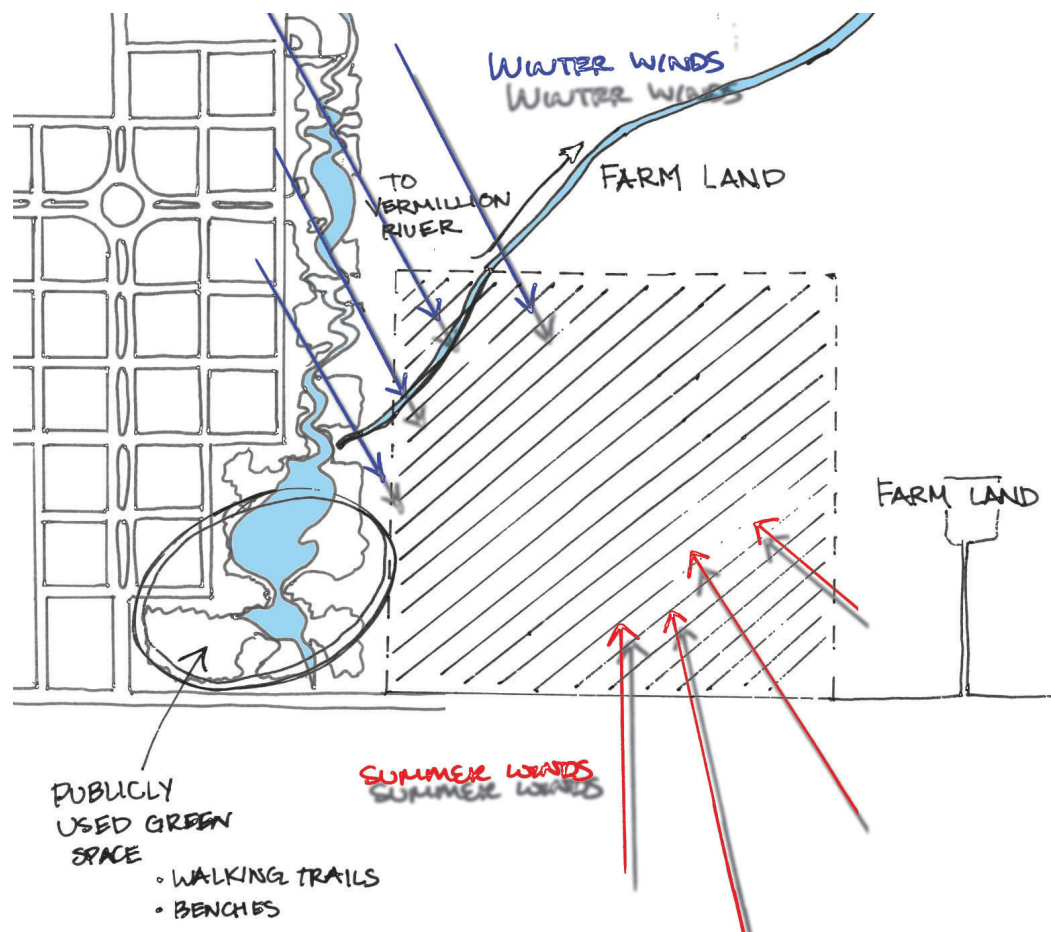


Fig. D5 Site Analysis Diagram

Site Analysis

The site analysis diagram in fig. D5 shows the direction of the seasonal prevailing winds at their extremes. It also shows the relationship of the site to the existing surroundings. Where the site is located is currently farmland with a farm on the site near County Rd. 50. The beginnings of a pedestrian boulevard/ walking path is evident in the photos of the site. (see fig. D6, fig. D7, and fig. D8)



Fig. D6. Site Photo: Looking West onto Site

This photograph was taken from the farm located just to the east of the site. On the horizon are the homes in the development completed in 2000. County Rd. 50 is just beyond the trees on the left hand side of the photo. (see fig. D6)

The walkways developed around the Prairie Waterway provide an opportunity to include the public walking traffic on the school site. The site will allow for many changing “classrooms” outside (see fig.D7).



Fig. D7 Site Photo: Looking North to Prairie Waterway

Fig. D8 Site Photo: Looking Northwest onto Site



The site itself is relatively flat. There is virtually no change in elevation. This will permit a great deal of flexibility insofar as accessibility is concerned. (see fig. D8).

Soils Information

Soils Information:

129 Cylinder Loam

Building Site Materials (table 12)

Roadfill: Fair; wetness

Sand: Probable

Gravel: Improbable

Topsoil: Fair; area reclaim, small stones, thin layers.

Water Management (table 13)

Features affecting Grassed waterways: Favorable

Composition of Soil Layers

Depth: 0-12 inches

Description: Loam

Liquid Limit: 30-50

Plasticity Index: 10-25

Clay (Pct): 22-32

Shrink-Swell Potential: Moderate

Erosion Factors: $K = .24$ $T = 4$

Depth: 12-25 inches

Description: Loam, Clay Loam

Liquid Limit: 30-40

Plasticity Index: 10-20

Clay (Pct): 22-30

Shrink-Swell Potential: Moderate

Erosion Factors: $K = .32$

Depth: 25-60 inches

Description: Gravelly coarse sand, Loamy sand

Liquid Limit: ----

Plasticity Index: NP

Clay (Pct): 2-12

Shrink-Swell Potential: Low

Erosion Factors: $K = .10$

Flooding: None

Risk of Corrosion

Uncoated Steel: Moderate

Concrete: Low

High Water Table

Depth: 2-4 ft.

Kind: Apparent

Months: Nov. – Jul.

Potential Frost Action: High

Bedrock Depth: 60 inches

Soils Analysis Building Recommendations

(The following text is taken directly from the Soils Profile document p. 35)

Buildings with basements should be constructed above the seasonal high water table. The drains around foundations remove excess subsurface water. Landscaping should be designed to drain surface water away from buildings. Foundations and footings should be designed to prevent structural damage caused by shrinking and swelling of the soil. Backfilling around foundation with a suitable coarse material provides added protection against structure damage. Constructing roads on well-compacted coarse textured base material protects them from frost damage. This soil is poorly suited to use as a septic tank absorption field because it has seasonally high water table and does not adequately filter the effluent. This may result in the pollution of ground water supplies. Filling or mounding the absorption field with a suitable fill material increases the filtering capacity of the soil.

This soil is capability subclass IIs.



Fig. D9 Location of Site (within the climate zones)

Climate Summary

The coldest average temperature is reached in January at 12.7 degrees Fahrenheit, while the warmest is reached in July at 72.1 degrees Fahrenheit. Farmington has a somewhat severe climate, changing from warm and humid during the summer months to being cold and somewhat windy during the winter months.

Transportation Links

Farmington is situated very near to major transportation routes, while still being in a predominantly rural setting. (see fig. D6-8)

1. County Road 3 (North-South)
2. Highway 50 (West-East)
3. Minneapolis International Airport located 18 miles to the north
4. Interstate 35, the major north south artery for the state is 10 miles to the west.

School Locations (Existing)

Farmington has 6 schools within its boundaries to date. (See figure D3 to relate them to the site for this thesis.)

- 2 middle schools (Farmington Middle East/
Farmington Middle West)
- 1 high school
- 4 grade schools (Akin Rd. Elementary,
Farmington Elementary,



Building Codes

Creativity within Constraints

Referencing both the International Building Codes and the Minnesota Building Codes I was able to compile the most relevant pieces of information that will apply to the design of this school. The following information is organized by the order set forth in the International Building Code. Each section is labeled by the IBC chapter, but may also include specific information extracted from the Minnesota State Building Code. Researching the codes information, I found that the standards set with the International Building Code, now being universally recognized, made things relatively simple until I addressed the codes required by the individual state. (This section was the most informative and the most frustrating, how many lessons I learned).

Building Code Analysis

Building shall be equipped with a sprinkler system (Cost = \$2.50/ sq.ft)

Set back 30ft. from property lines, which begin in middle of street.

Chapter 3 – Use and Occupancy Classification

Occupancy Classification: E

Occupant Load: (Table 1004.1.2 from the I.B.C)

***All values refer to sq. ft. per individual in the space.

Space	Required Space (per person)
Business Area (Administrative Offices)	100 sq. ft
Assembly with fixed seats (theatre)	18 in. of seating
Assembly without fixed seats	Chairs only = 7 sq. ft. Standing space = 5 sq. ft. Un-Concentrated (tables & chairs) = 15 sq. ft.
Locker Rooms	50 sq. ft. (gross)
Libraries	Reading Rooms = 50 sq. ft. (gross) Stacks = 100 sq. ft. (gross)
Classroom Area	20 sq. ft. (net)
Shops (vocational rooms)	50 sq. ft. (net)
Kitchens (commercial)	200 sq. ft. (gross)
Swimming Pools	In Water = 50 sq. ft. (gross) On Deck = 15 sq. ft.
Stages & Platforms	15 sq. ft.

Table 1004.1.2 of I.B.C

Chapter 5 - Allowable Building Heights and Areas

This school is intended to be design out of a Type II Construction
 Area Modifications: (calculations taken from 2000 IBC)

Frontage Increase = 75%

Automatic Sprinkler System Increase = 200%

Allowable area per floor (sq. ft) = 14,500 sf + 10,875 + 29,000 sf
 = 54,375 sf per floor
 Total Building Area = 108,750 sf

*Assuming there is a public way or open space having 20 feet open minimum width surrounding the building's perimeter

*The building is equipped with sprinkler system

Chapter 9 - Fire Protection Systems

Automatic Sprinkler Systems

903.2.2 Group E – An automatic sprinkler system shall be provided for Group E occupancies as follows:

Throughout all Group E fire areas greater than 20,000 sq. ft. in area.

Throughout every portion of educational buildings below the level of exit discharge.

EXCEPTION: An automatic sprinkler system is not required in any fire area or area below the level of exit discharge where every classroom throughout the building has at least one exterior exit door at ground level.

Chapter 10 - Means of Egress

Door Swings:

- Doors swing in the direction of egress travel
- The minimum distance between two hinged, pivoted doors in series shall be: 48 inches + the width of any door swinging into that space.
- Doors in series shall swing either in the same direction or away from the space between the doors.

Corridor width for Group E shall not be less than 72 inches (6 foot corridors)

Egress width factor (the doors necessary to get the occupants of the space out in case of emergency: see Table 1005.1)

for stairs = 0.2*
for all doors = 0.15

* Hand rails shall protrude no further than 4.5 inches from the wall. Hand rails may not infringe upon width necessary for egress.

Distance to a point of egress = 250 ft. (sprinkler equipped building: see Table: 1015.1)

Minimum Number of Exits per occupant load (Refer to Chapter 3 for occupant load)

1-500 people = 2 exits
501- 1,000 = 3 exits
More than 1,000 = 4 exits

Corridor Fire Resistance Rating = 0 (sprinkler equipped building: see Table 1016.1)

Place of Refuge – 30 in. x 48 in. not to infringe upon required width for egress

Elevators do not need to be accessed from an area of refuge or horizontal exit in buildings and facilities equipped throughout with an automatic sprinkler system.

Chapter 11 - Accessibility

Ramps

Maximum slope = 1:12 within the building, 1:20 as exterior ramp (specifically from Minnesota State Building Code)

Minimum clear-width for ramp shall be 36 inches
Landings at beginning and end of ramp run = 2x the width of ramp leading to that particular landing.

Landing length = min. 60 inches
If ramp changes direction = min. dimensions shall be 60 in. x 60 in.

Handrails are required when rise is greater than 6 inches
If handrails are not continuous then they must project 12 inches beyond the top and bottom ramp segment parallel to the floor/ground.

Parking

Total Parking = # of accessible spaces required

1-25 = 1

26-50 = 2

51-75 = 3

76-100 = 4

101-150 = 5

151-200 = 6

201-300 = 7

* For every 8 handicapped spaces, or fraction thereof, there must be one van-accessible space provided

Clear floor space necessary for wheel chair = 30 in. x 48 in.

Operable Windows: If present, at least one must be accessible, while ALL required operable windows must be accessible.

Chapter 12 – Interior Environment

Equipment and Systems: Interior spaces intended for human occupancy shall be provided with space-heating systems capable of maintaining a minimum indoor temperature of 68 degrees Fahrenheit at a point 3 feet above the floor on the design heating day (65 deg. F.)

Natural Ventilation: The minimum openable area to the outdoors shall be 4% of the floor area being ventilated.

Natural Light: The minimum net glazed area shall not be less than 8 percent of the floor area of the room served.

Floors: Toilets and bathing rooms shall have a smooth, hard, nonabsorbent surface that extends upward onto the walls at least 6 inches

Walls: Walls within 2 feet of urinals and water closets shall have a smooth, hard, nonabsorbent surface to a height of 4 feet above the floor.

Recycling Spaces Required

(This portion is not found or related to the I.B.C, only the Minn. State Building Code)

Space must be provided for the collection, separation, and temporary storage of recyclable materials within or adjacent to all new or significantly remodeled buildings or structures that contain 1,000 sq. ft. or more.

Location – Space designated for recycling must be at least as easily accessible as where regular solid waste is collected.

Identification on Plans – must be included on plans submitted for a building permit.

Minimum Space – must be sufficient to contain all the recyclable materials generated from the building.

Means of Egress

Egress width factor (the doors necessary to get the occupants of the space out in case of emergency: see Table 1005.1)

- for stairs = 0.2

- for all doors = 0.15*

hand rails may not infringe upon this width, hand rails protrude no more than 4.5 inches from the wall

Distance to a point of egress = 250 ft. (sprinkler equipped building: see Table: 1015.1)

Corridor Fire Rating = 0 (sprinkler equipped building: see Table 1016.1)

Fire Protection Systems

Building shall be equipped with an Automatic Sprinkler System
The approximate cost of which is \$2.50/ sq.ft, which can be easily offset by the benefits in area allotment, fire rating of interiors, among others.

903.2.2 Group E – An automatic sprinkler system shall be provided for Group E occupancies as follows:

Throughout all Group E fire areas greater than 20,000 sq. ft. in area.

Throughout every portion of educational buildings below the level of exit discharge.

EXCEPTION: An automatic sprinkler system is not required in any fire area or area below the level of exit discharge where every classroom throughout the building has at least one exterior exit door at ground level.

Allowable Building Heights and Areas

(see Table 503: Assume “A” fire-rated material (Type IV = heavy timber))

Group	Type I	Type II	Type III	Type IV	Type V
E	Unlimited	3 stories 26,500 sq. ft.	5 stories 23,500 sq. ft.	3 stories 25,500 sq. ft.	1 story 18,500 sq. ft.

Space	Multiplier
Auditoriums, gymnasiums, public swimming pools	0.001
Classrooms	0.002
Parking	0.001
Kitchens (commercial)	0.003
Libraries	0.002
Locker Rooms	0.001
Offices	0.0025
Mechanical Equip. Rooms	0.001
School Shop Rooms	0.0025
Storage & Stock Rooms	0.0025

Footing Depth for Frost Protection

Dakota County (Zone II) = 3' 6" minimum allowable footing depth. This calculation must be considered along with the depth of the water table on the site which is, at it's highest, 5' below grade.

Snow Loading Conditions = 50 psf



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Design Parameters

"Space, Form, & Order"

What Goes Where? Why?

Beyond the constraints laid out by the codes and those existing from the site, I have found information to guide the design further. In this section I will define the program of the project as it relates to the final intent of the project.

- Client/User Definitions
- Specific Requests
- Environmental Control Systems
- Spatial Definitions

The Client/User Definitions

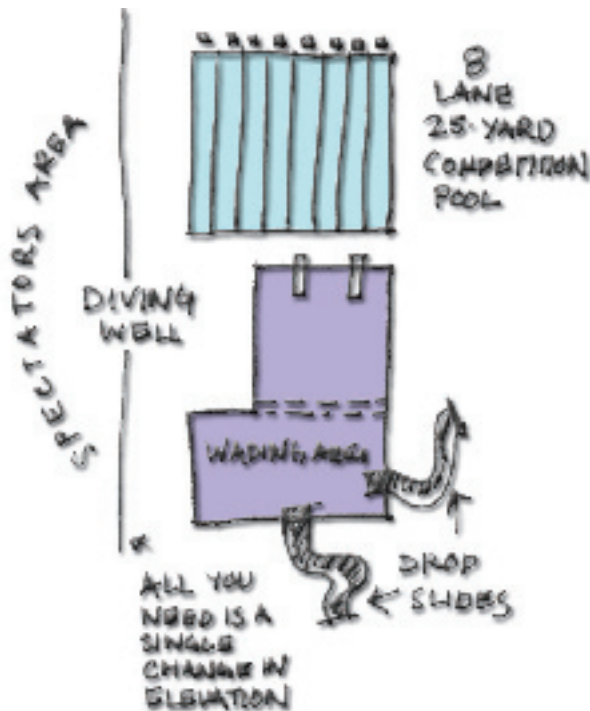
The users of this building will include the students, faculty, and staff of the school. Secondly, there will be users that extend beyond the day-to-day student body. The space will be designed for use as a community education facility as well. The building is intended to function as a base for the students, for their interaction with community professionals, while at the same time creating a space for the local community members to carry out continuing education and/or public meetings. Furthermore, the users of this facility will extend beyond what a normal school, as this thesis project is an attempt to incorporate and coordinate a public and highly active set of functions into the “traditional” functions of a school. The public will be able to partake in continuing education courses as well as use a fitness center that will potentially be included.

Ultimately, the client will be the State of Minnesota and School District 192. The community itself will be the major source for the funding of the project. The way that this project will be funded is by the community voting on allocation of bonds.

Specific Requests

In the process of speaking with a director of a community aquatics facility I was urged to include a facility that would serve both the community as well as the school as an athletic amenity, not to mention a means of raising revenue. The information that proceeds is a listing of ideal and necessary components of a successful facility. This information would be used in the second Phase of the design [Fitness Center].***

Fig. E1 Pool Diagram



“First of all... the water must be BLUE.”

-- S. Wrangham

There are 2 bodies of water, 1 having separation between diving well and wading pool so they can both be maintained on the same thermostat and water supply.

Pool = 25 yard x 25 meter (8 lanes)
 Depth = 5'0" to 7'6"
 Under deck lane line storage
 15 meter lines on pool bottom & ceiling
 Flag markers & lane markers on ceiling
 (this can be done in structure)
 Recessed Gutters
 Bungie Cord Eyeletes at lane ends
 Large competition starting blocks
 Block Height = 30 inches
 Temp. = 83 degrees

Diving Well/ Wading Pool (separated by bulkhead)
 2 x 1 meter boards
 water agitation below boards
 Depth of diving well = 12 feet
 Temp = 87 degrees
 2 drop slides into wading area
 Depth at wading area = 3 feet

- Ceiling must be linear to follow pool orientation
- Frosted Glazing = allows light in, while cutting glare
- Lighting
 - 50-100 footcandles
- Deck showers
- Storage Closets recessed into wall
- No metal window framing (rust)

The intention is for the facility to be a community amenity as well as an efficient, and effective competition site. The above listed guidelines are geared towards that goal. For this information I would like to thank Todd Peters, Women's Head Coach of Swimming and Diving at Minnesota State University of Moorhead, as well as Steve Wrangham, Assistant Swimming and Diving Coach for the University of Minnesota of Minneapolis/St. Paul.

*** This portion of research did not make it into the final design, however it could be of use in Phase II of the overall design.

ECS Requirements

In designing a school it is important to lead by example not only in behavior but also by environmental responses. This portion of the program is the information used to guide the design of environmental control systems. Values and applicable information are tailored for Farmington, Minnesota. (Some values are taken from the nearest available data point: Minneapolis, MN).

Latitude: 45 Degrees North

Annual Heating Degree Days: 65 Degrees Ferenheit

Annual Cooling Degree Days: 65 Degrees Ferenheit

Interior Lighting

Interior lighting for schools involves many different considerations.

1. Quantity
2. Control of Lights
3. Appearance of Color
4. Cost of Installation
5. Cost of Use & Architectural Appearance

According to LHB Architectural publication, Perspectives (2003), "The quality of light can be as important, or sometimes more important than the quantity of light." In a learning environment it is pertinent that the supplemental electric lighting available is adequate to reduce glare on computer screens, decrease eye strain in doing particular tasks and maintain a level of visual comfort.

Natural Daylighting

Table E1. Sun Shading Values

Month	8am - 4pm		9am - 3pm	
	December	June	December	June
Azimuth	53	85	41	72
P - Value for South- Facing	54.21	0.46	5.41	0.46
P - Value for East- West Facing	70.94	1.32	4.69	0.89

In order for a space to be naturally lit there are some considerations that need to be made for that to happen appropriately. Sometimes a space needs shading from direct light or help catching light at different angles. The diagrams in fig. x and fig. x are to aid in the design of shading and reflecting fins/louvers for a building. The necessary values are listed in Table E1. For this particular thesis the design value for a horizontal shading device along the south side is 3.88 ft. This will block the direct sunlight from entering the classrooms on the south side at the most critical points.

Fig. E2 Vertical Fins Diagram

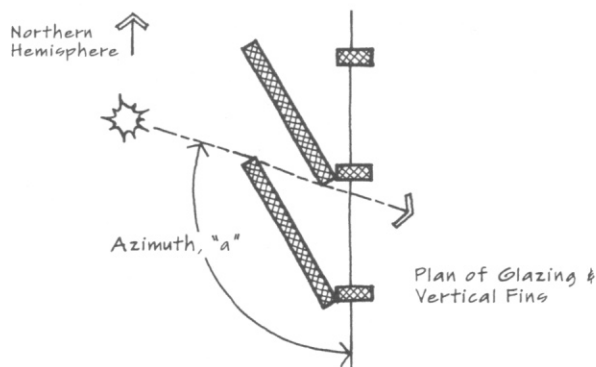
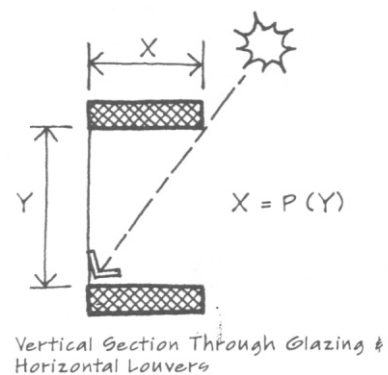


Fig. E3 Horizontal Louvers Diagram



Spatial Requirements

Major Project Elements:

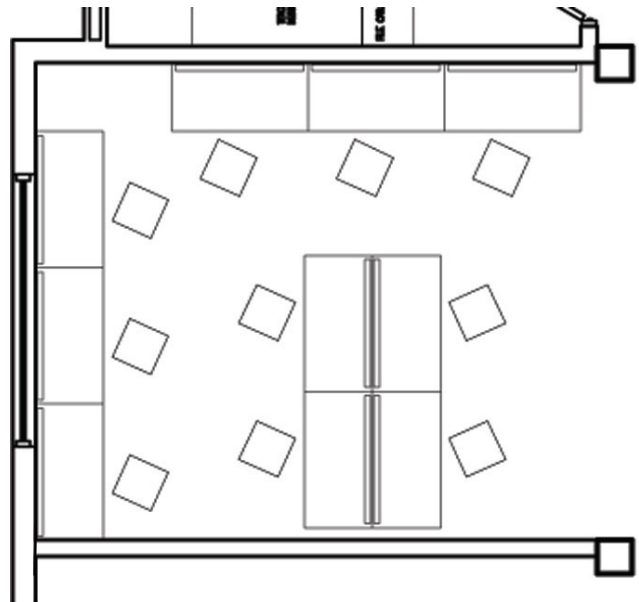
The following are definitions for each space within the final program. First the features of the space are discussed and then the purpose with which the space was intended is laid out.

Student Pod

The student pod is the smallest grouping unit of the school. It is composed of 10 students that have their own desk with locking storage and chair. Walls separating each student pod are at 4' height to allow for clear views across the House area, while maintaining a level of privacy.

The purpose of the student pod is to provide an automatic network for students to share homework tips, and help each other gain understanding of subject matter. The most crucial purpose of this unit is to encourage and require the ability to work with other people, which is undoubtedly a life-long skill.

Fig. E4 Student Pod



Teacher Pod

Each Teacher Pod is located within the House central and accessible to all students. The walls between the House and the Pod are full height with a closing door to permit complete privacy, however they are glazed with translucent and transparent panels so as to allow for a constant connection to the students and House space. Within each Teacher Pod there is a space for collaborative meeting at a central table.

The Teacher Pod does for the teachers what the Student Pod does for the students. Five teachers of different disciplines are required to work together to plan lessons and to produce a comprehensive and coherent curriculum for the students.

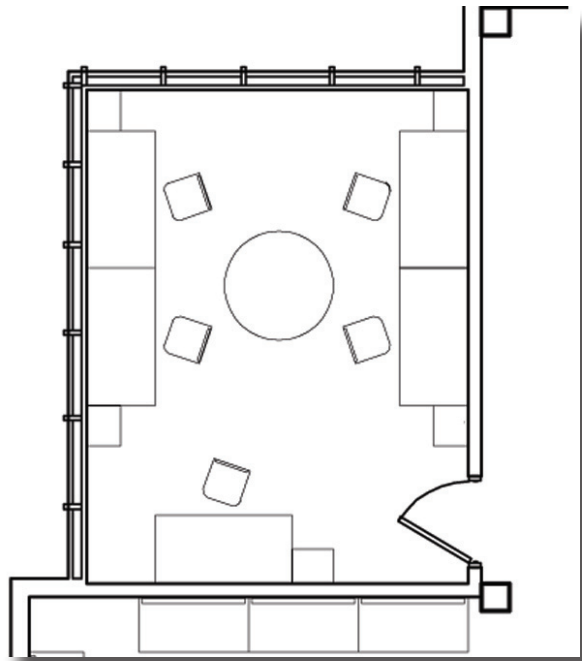


Fig. E5 Teacher's Pod

The Centrum

The Centrum is the central area of the House that has flexible seating and space for the students of the House. Several configurations can be achieved with the accordion-like partitions to accommodate teaching/learning demands per lesson.

The purpose of this space is to replace traditional classrooms. It is fitting within the curriculum to have a space as flexible as the real-world subject matter that it addresses.

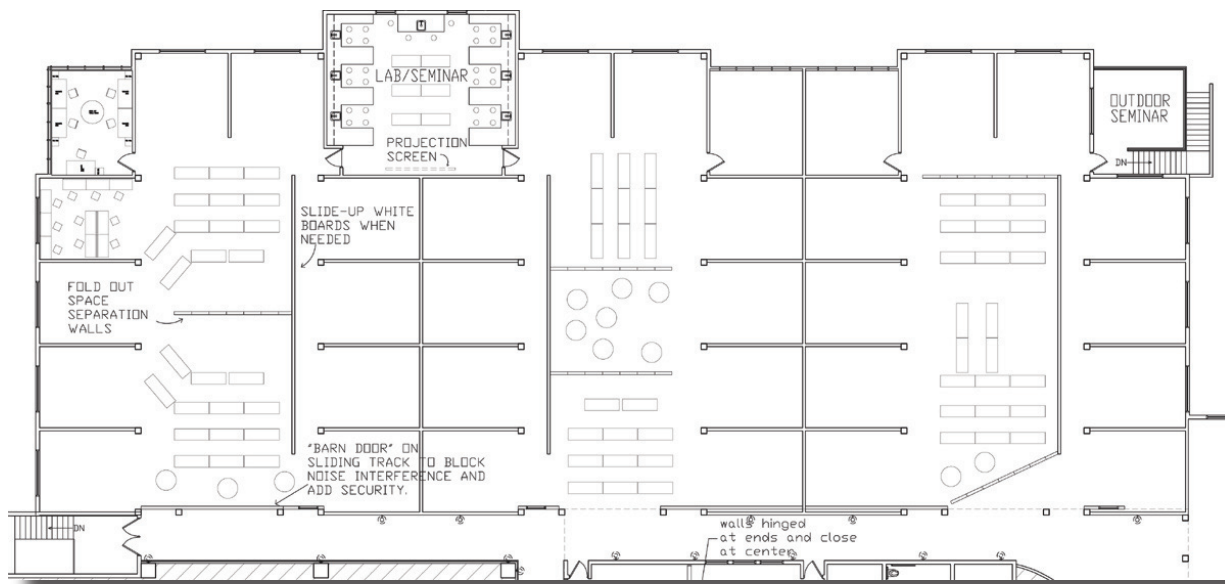


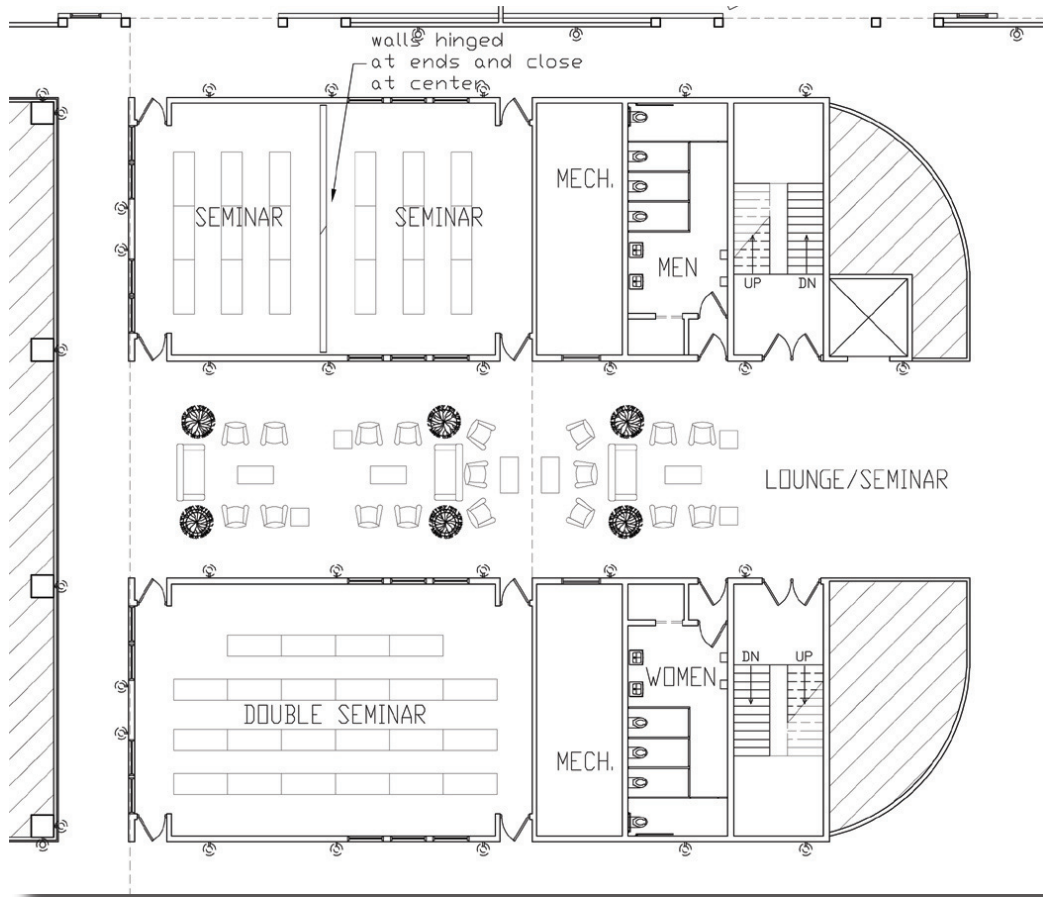
Fig. E6 The Centrum

Seminar Rooms

Seminar Rooms are located throughout the building. Several spaces are designated as “Seminar Rooms”, however the concepts of the curriculum drive a creativity in learning environments. Seminar Rooms may actually be located outside of the school property in collaboration with local professional organizations. “The World is the Classroom”.

The purpose of the Seminar Room is to provide a space for student-teacher /student-student conversation and activity to gain understanding of a subject matter.

Fig. E7 Seminar Rooms

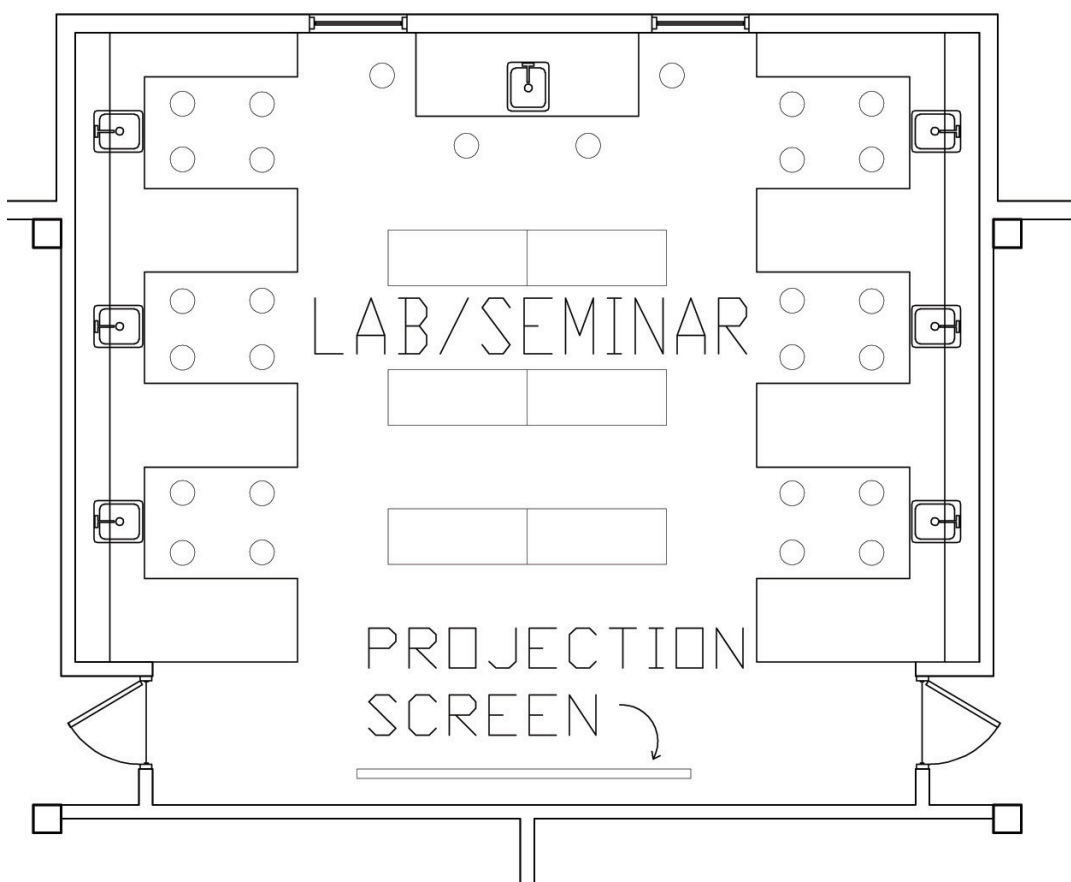


Science Labs

Each lab is equipped with lab tables and chairs around the perimeter with ample storage along the walls and in upper cabinets. Each Lab room is equipped with a projection screen and regular student tables at the center for alternative instruction. The Lab, while not in use as a physical science laboratory can act as an additional seminar room as well.

The purpose of the labs is to recognize the importance and relationship of physical sciences to the process of education.

Fig. E8 Science Labs

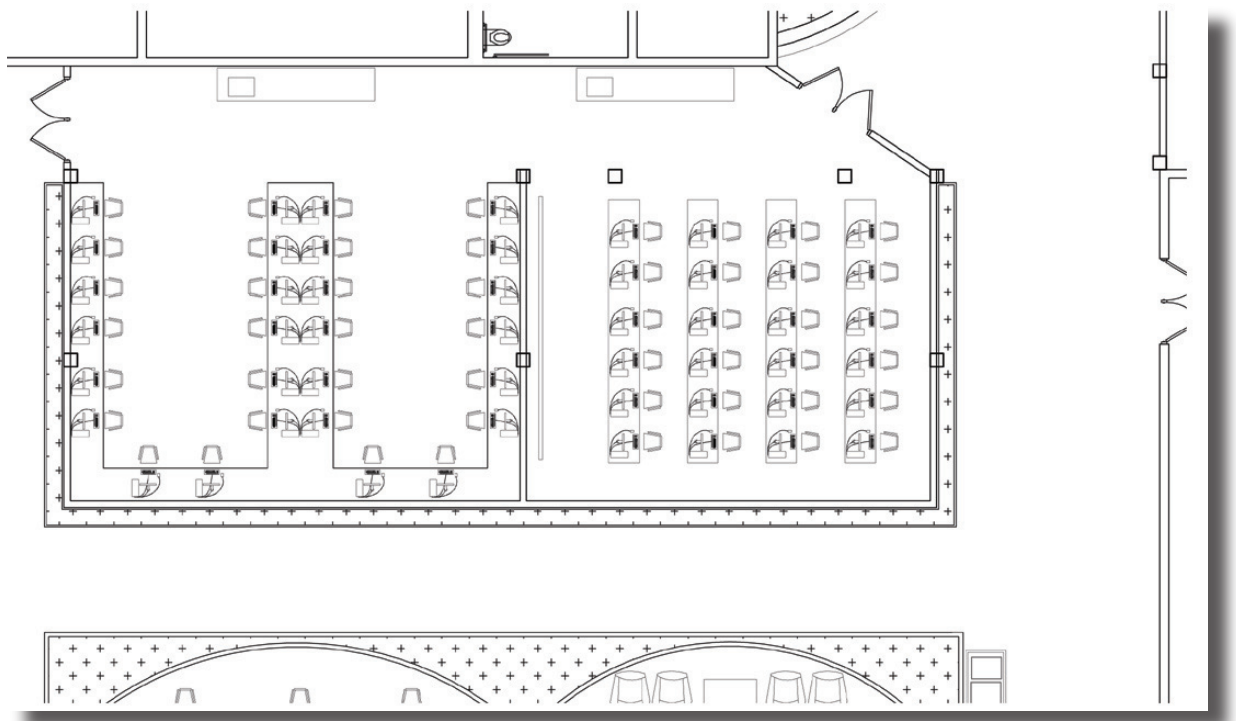


Computer Labs

The Computer Labs are located near the central core of the building away from windows that may increase heating loads with direct sunlight. Also, avoiding the direct sunlight reduces glare on computer screens. Lab A [on the left] is designed for more individual use organized in a less formal manner, while Lab B [on the right] is organized for classroom instruction set-up. Lab B is equipped with a projection screen for class lectures. Also in these Labs there will be rechargeable laptop units to be rented out by students for in school use.

The inclusion of well-equipped Computer Labs is increasingly important in preparing students for the digital world. Much of the research done on current topics is hard to find in print; rather it is far more accessible by Internet sources.

Fig. E9 Computer/Research Labs

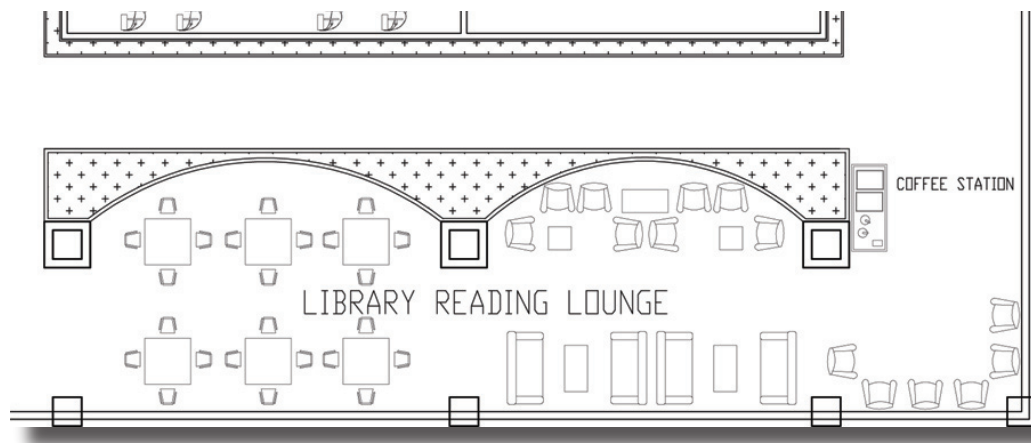


Lounges

Throughout the building there are located comfortable seating and “lounging” areas. Materials that are tactile and more engaging than cold, stiff chairs, and no place to “put your feet up”. The Lounge in the Library in particular is a place where students can retreat to read study material, leisure readings, and converse with one and other. There is a coffee stand where often hot or cold beverages will be available for students and staff as well as school visitors.

The purpose of the Lounges is to make the school more inviting, more of a place that people can feel at ease. The reason for including materials such as fabrics and more comfortable wear-prone upholstery is to communicate that students are not just people who belong in childproof environments, but rather they are worth the investment and respect.

Fig. E10 Library Lounge



Garden Level

On the Garden Level there are two gardens atop the circulation towers at the building's core. Between the two gardens there is additional space that can be used as teaching/ seminar space. At the North side of this level there is a mechanical room that coincides with the mechanical chase along both the North and South sides of the floor. These mechanical chase spaces are earmarked for mechanical systems to capture fresh air and naturally heated air that is found here. Overhead is a glazed green house like covering that has insulated glazing and louvered fins to allow for fresh air to circulate within the building and to maintain warmth in the evening.

The purpose of this level is not only for technical benefits, but for educational and practical benefits as well. Students can utilize the space for alternative lessons, hands on experience with such systems and similarly benefit from the increased availability of natural day lighting the space affords.

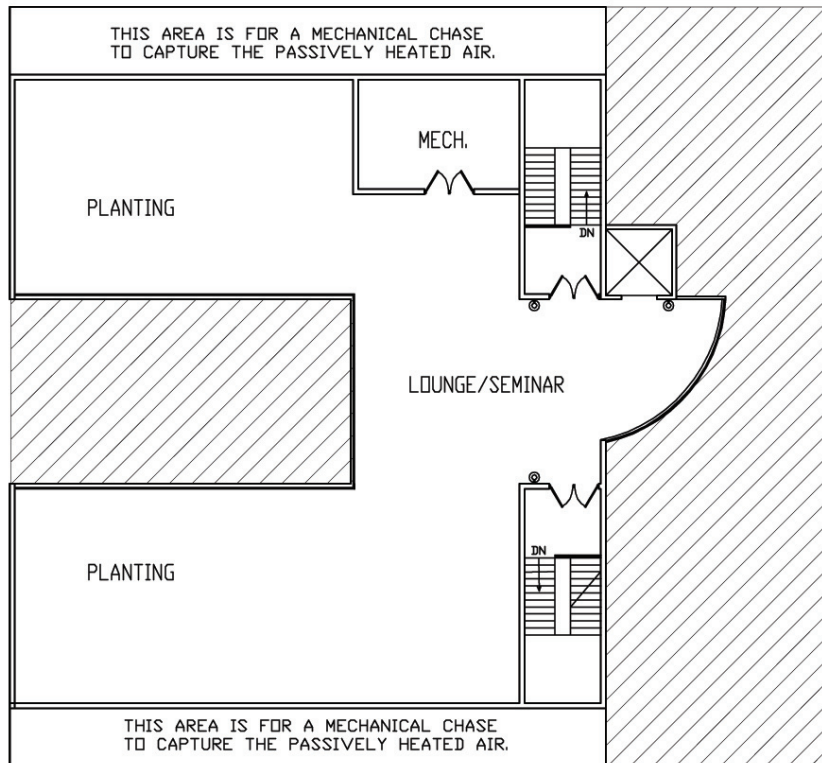


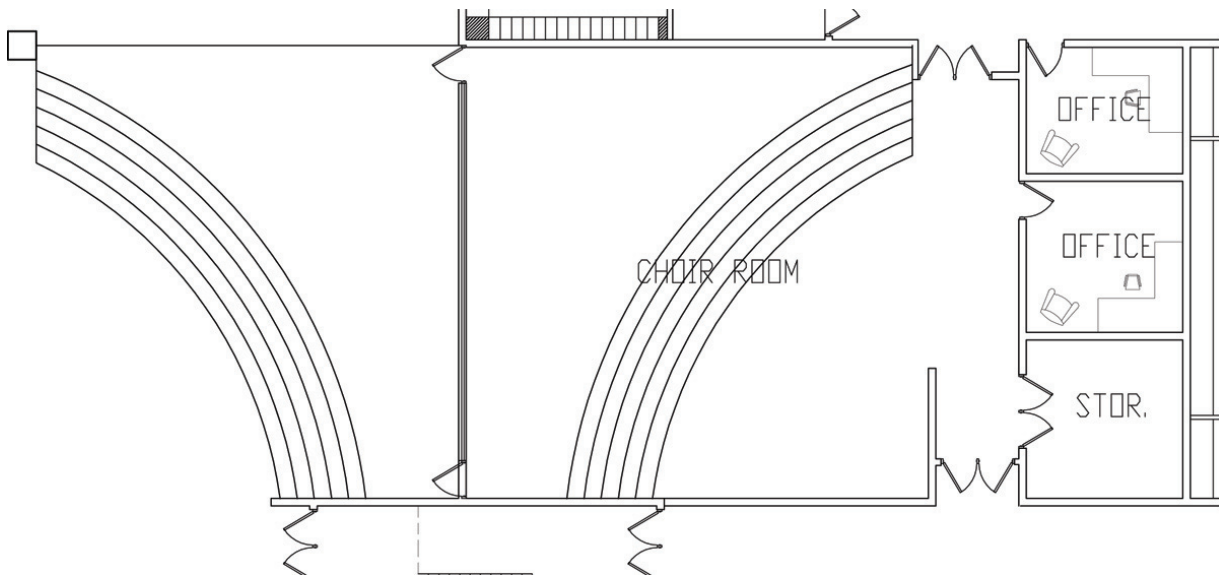
Fig. E11
The Garden
Level

Choir Room

This Choir Room is located just off of the Forum of the school. It contains a tiered set of platforms for choral arrangement within the space, while its interior doors open up to the Forum where the sounds can be shared with the rest of the building when desired. Alternately the doors at the west end of the Choir Room open up to a mirrored outdoor performance shelter. This is covered with a wooden latticework with opportunity for greenery to grow creating natural shading.

The purpose of this space's inclusion is to enhance a core curriculum and appeal to those students who are more receptive to learning through music. It also provides a great asset for the community.

Fig. E12 The Choir Room/
Performance Area



Locker Rooms

Each Locker room is equipped with full showers [accessible] toilet facilities, sinks, vanity, individual lockers, changing areas, hand/hair dryers, and natural lighting. Each locker room has ribbon windows at the ceiling height that are translucent, not transparent.

The placement of the locker rooms is designed to be added onto with the second phase of the project being the Fitness Center. Their function is to provide for the physical education program within the building, as well as to encourage physical activity such as biking, running, walking, or the like on the part of staff members or students who may have a free period.

Fig. E13 Locker Rooms

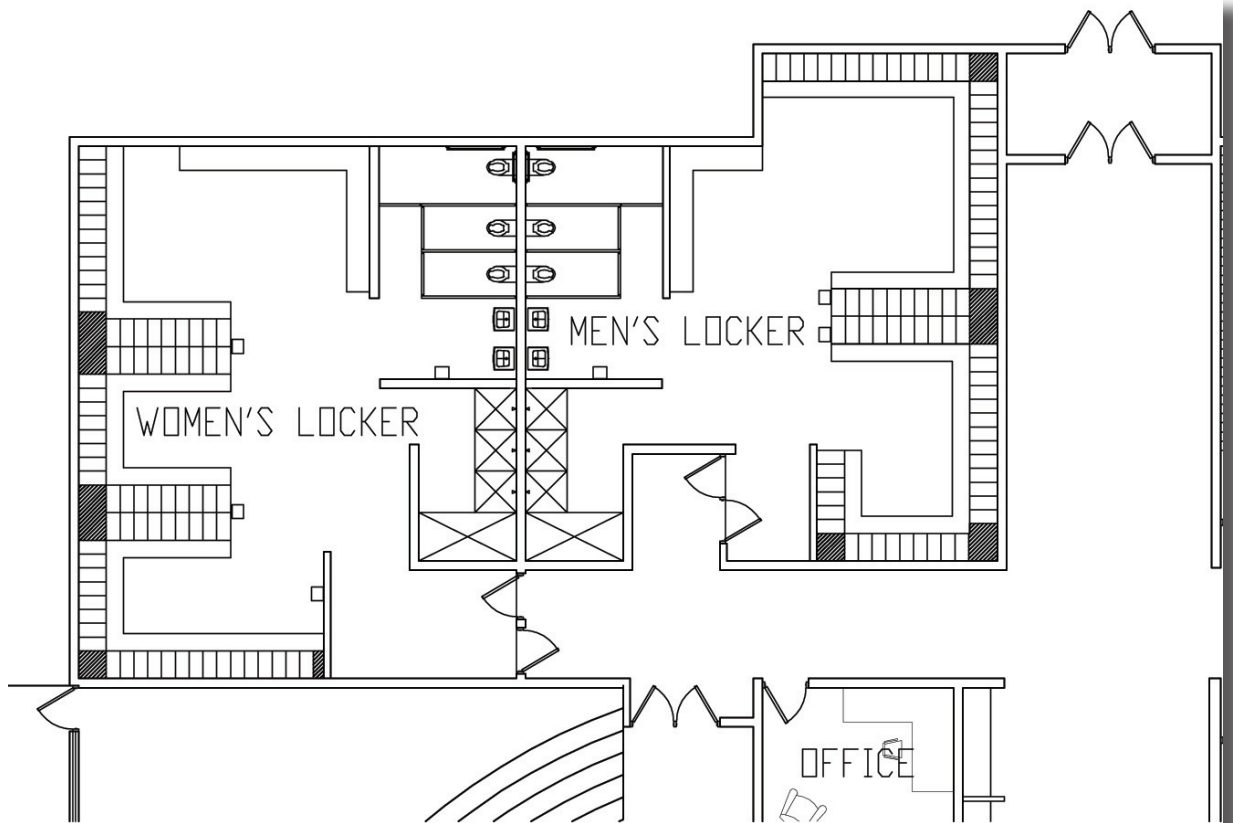
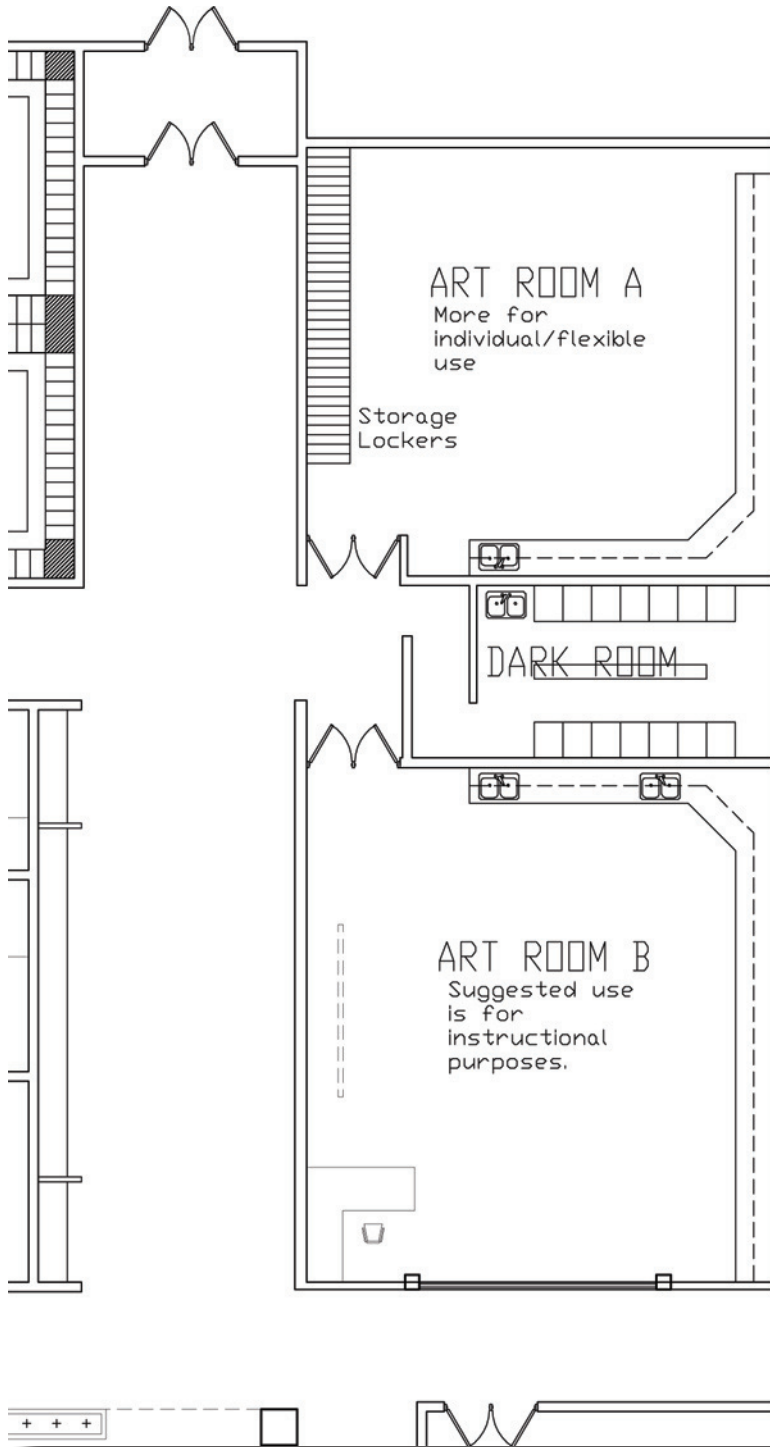


Fig. E14 Art Rooms



Art Rooms

The Art Room to the North is designed for individual, less structured use with storage lockers along the bottom half of the wall and sinks and supplies storage along the interior walls. The Art Room to the South is set up for instructional purposes having an area for an instructor to be stationed as well as a projection screen for presentation capabilities. Between the two rooms is a Dark Room that is primarily for student use.

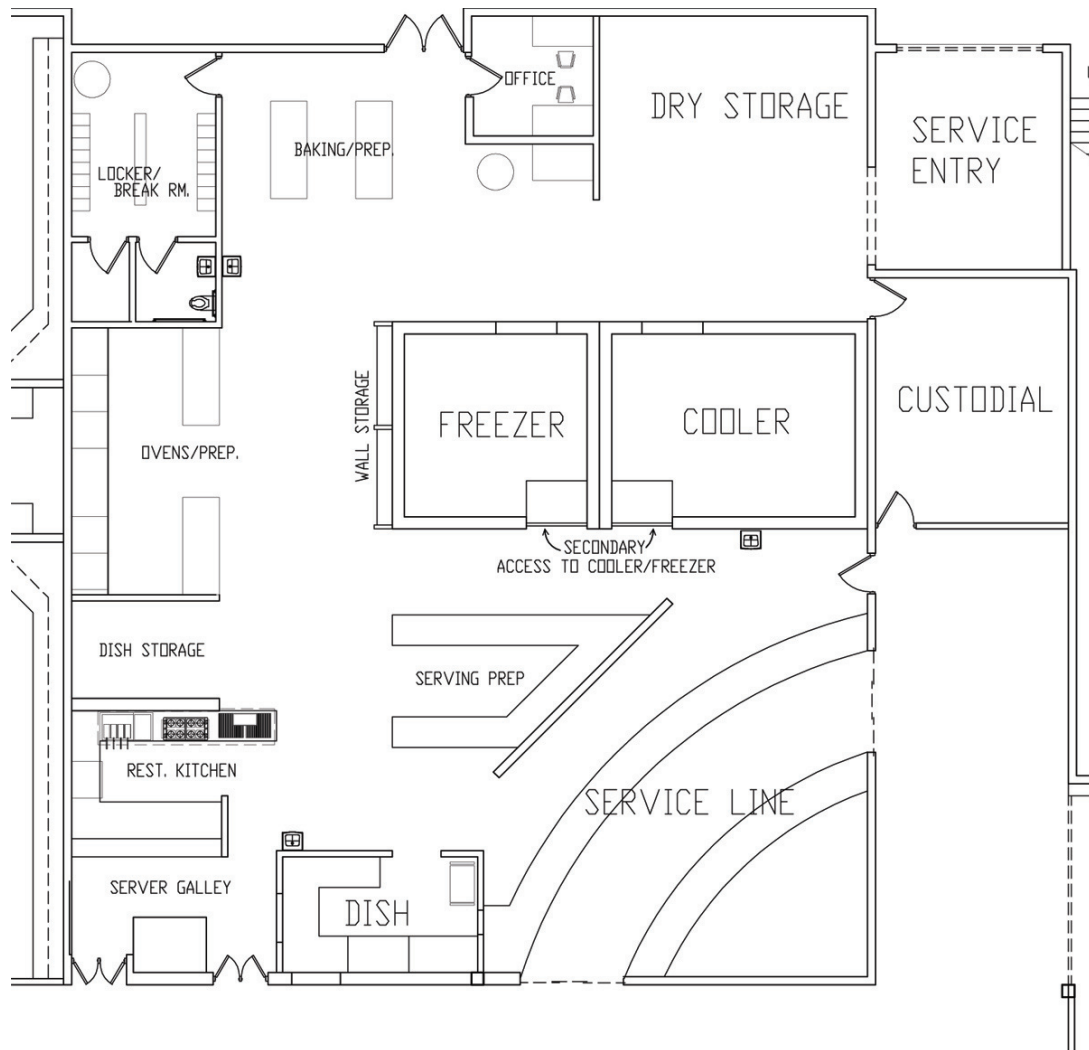
The inclusion of these Art Rooms is to broaden the student's understanding and allow for a more rounded education. This appeals to students who are more visual and hands on learners.

Kitchen

The Kitchen is fully equipped to handle multiple functions. It contains an employee/staff break room with toilet and changing facility as well as lockers. Double ovens and baking area, a full dish room, walk-in-cooler, walk-in-freezer, dry storage, access to service entry, service line, and cashier stand, a used dish return window at the hall, a commercial dining kitchen for catering/serving, and easy access to the Café and Forum.

The reason for the kitchen to be so complex is that this kitchen is meant to be able to serve much more than just the students. It is designed to handle large format catered events and seated dining events. A kitchen like this could also be used as an alternative, practical opportunity for teaching students.

Fig. E15 The Kitchen

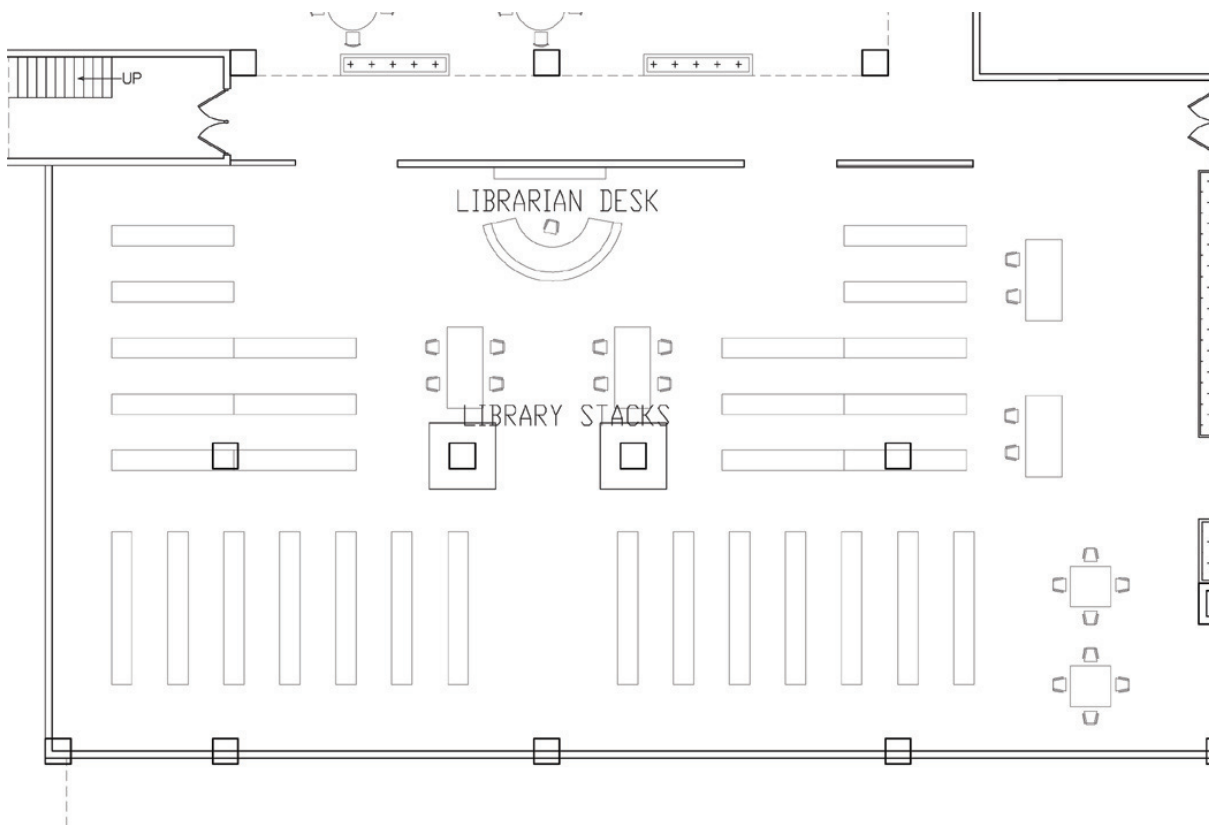


Library

The library includes all volumes of reference and literature owned by the school, as well as technology access for internet and catalogue purposes. A librarian's desk is located in central view of all areas so as to be easily found and asked questions (because let's be honest with all the internet hooey we young folk know like the back of our hands, who can understand the Dewey Decimal System anymore?) The stacks are located away from the exterior glazing to avoid damaging UV rays.

The library is an added resource for the students, teachers, and community members. This is where students can access texts from other connected library systems such as the local public library and university libraries as well.

Fig. E16 The Library

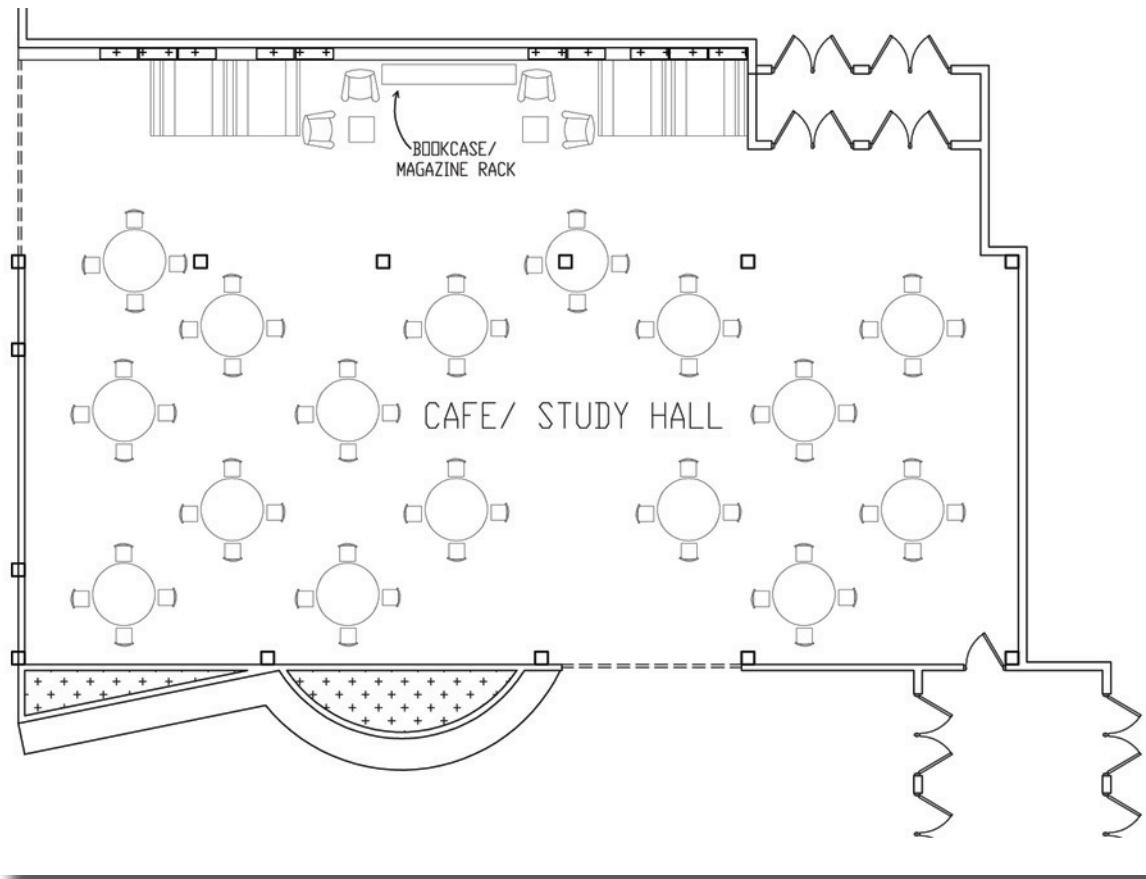


Café/ Study Hall

The Café/ Study Hall is located at the front of the building to be accessible to the public and to the students. Depending on the hours this space can be accessible only to students, or only to public, based on need of use. There are multiple round tables to encourage social engagement, several booths for study or dining, and a few lounge chairs and tables with a magazine rack /book shelf for reading material. An exterior patio is found just outside the doors for dining and socializing purposes.

The purpose of this space is to increase the flexibility of the school. It affords a great meeting place for seminars, for individual meetings with local professionals or for visitors to wait for whomever they are there to meet.

Fig. E17 Cafe/Study Hall

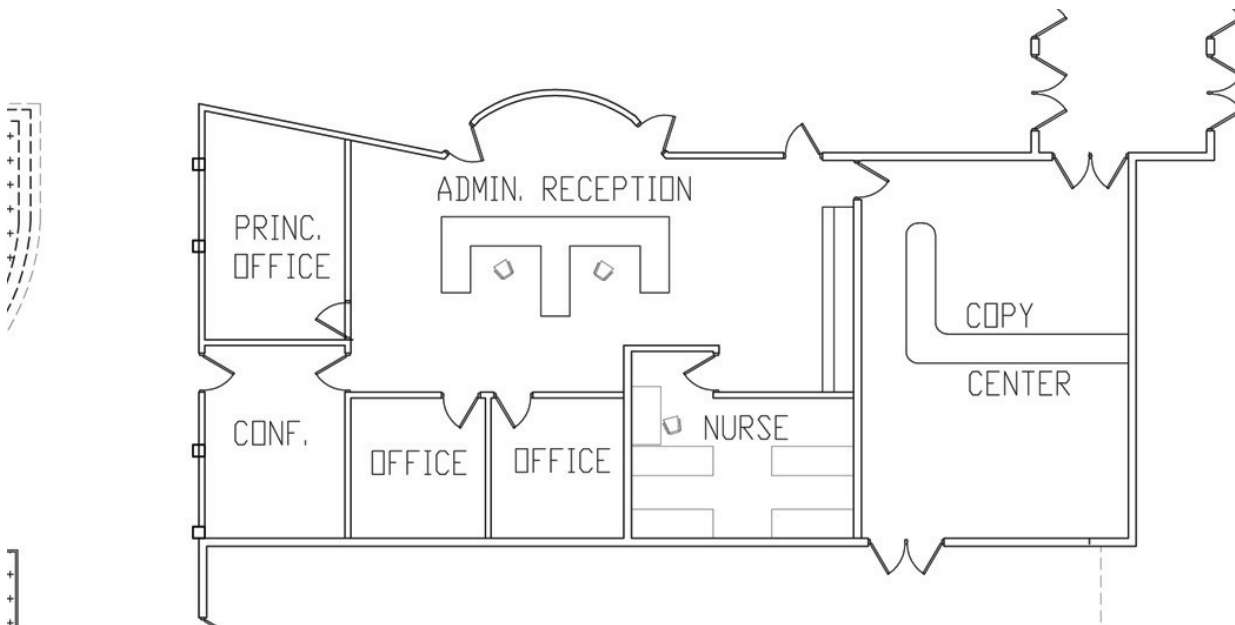


Administrative Offices/ Copy Shop

This space houses the principal's office, 2 counselor's offices, 2 administrative assistant desks at the center, a mailbox site for students and staff, the Nurse's office with 4 beds, and access to the front Copy Shop. The Copy Shop is where fully equipped printing stations are located for use first and foremost by the students and staff, and also by the public.

This space is meant to be immediately greeting to those who visit, and very accessible to students. The wall looking onto the main entry is glazed entirely to permit visibility at all times for students as well as staff. The Copy Shop adds another dimension of public involvement as well as creating yet another opportunity for students to gain experience.

Fig. E18 Administration/ Copy Shop

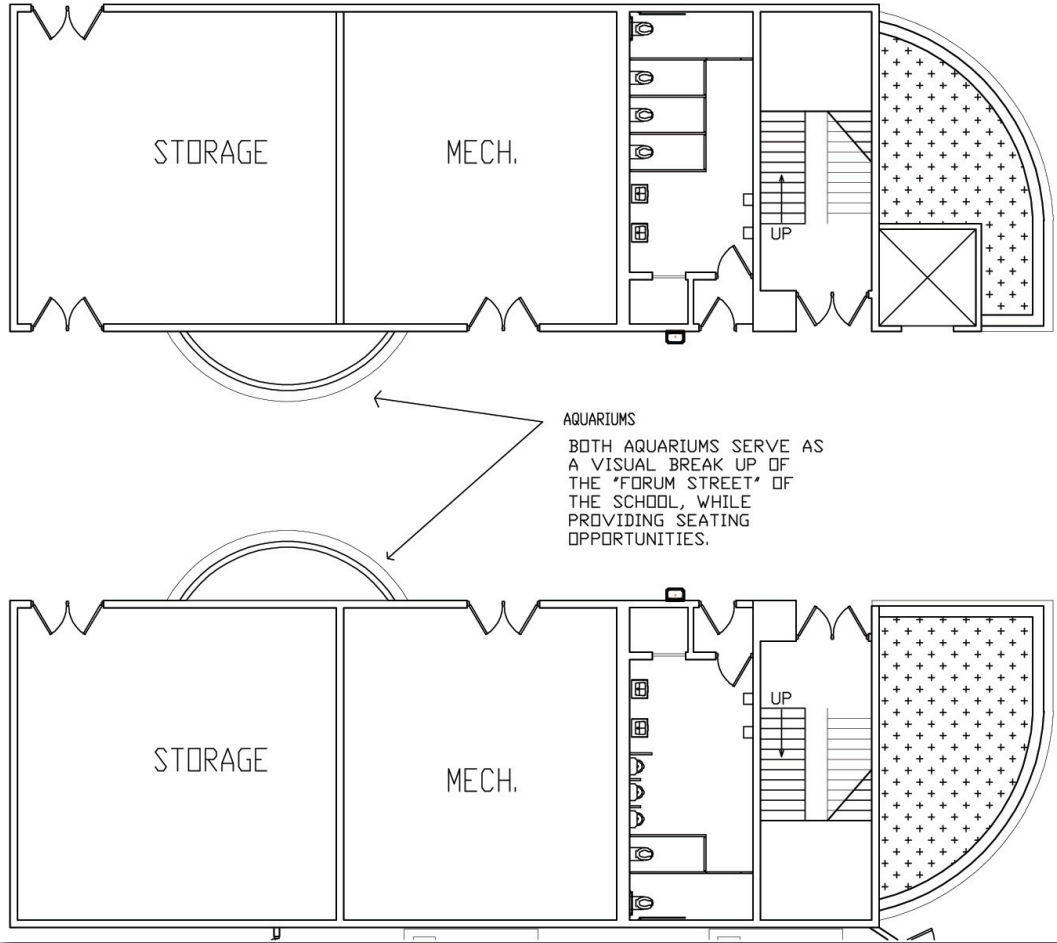


The “Forum Street”

This central circulation spine of the school provides a complete visual connection from entry to the most common destination: the Forum. It is lined with the functional necessities of the building: Mechanical access, Restrooms, Storage, and 2 of the major stairwells. The Restrooms are equipped with hand driers that save the use of hand towels and the maintenance that is often needed to clean up after the hand towels. Each of the restrooms operates on a sensor-controlled light, which turns on and off based on occupancy. Within the Forum Street there are two aquariums located one on either side. One is salt water, while the other is fresh water. There is a seating ledge at the base of each aquarium for those waiting for others or resting to study the aquatic micro-habitat. Not only are they aesthetic components, but they are opportunities for student learning as well.

The purpose of the Forum Street is to allow for creative circulation within the building, and to increase the visual interest of the space.

Fig. E19 The Forum Street

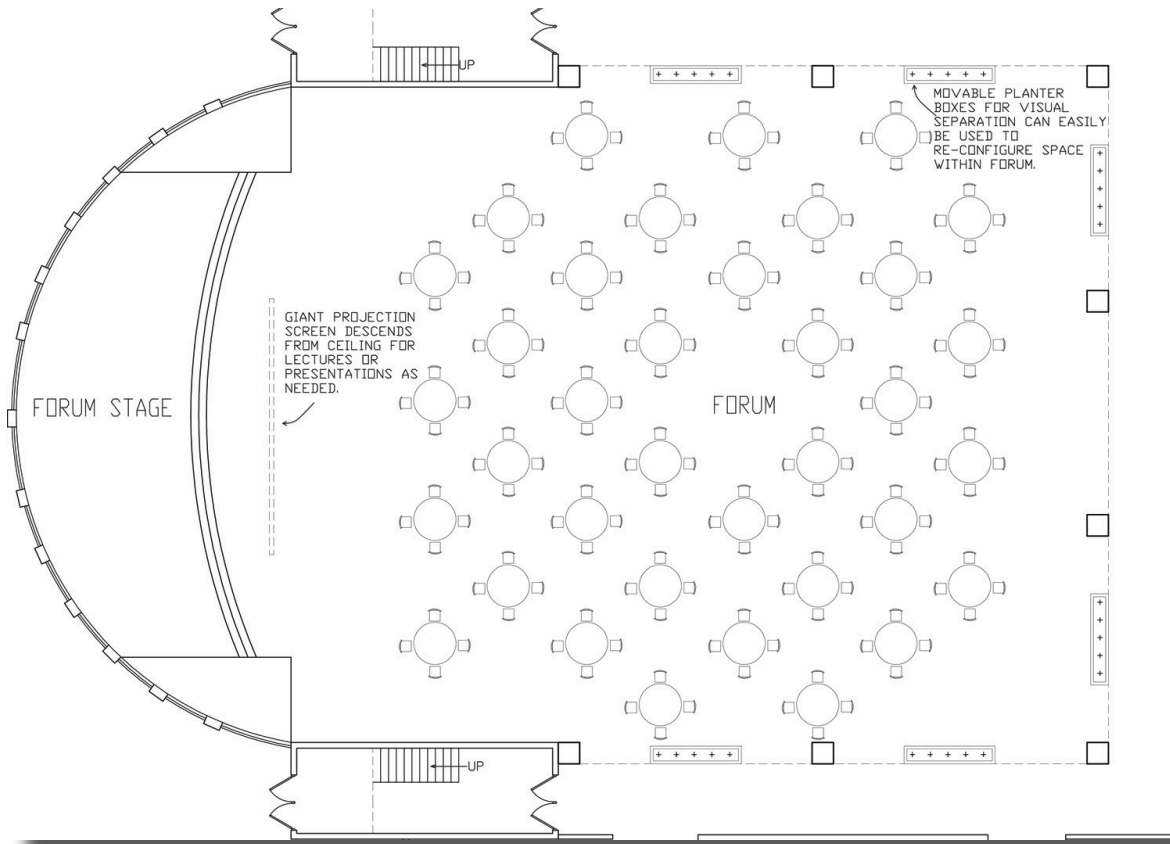


The Forum

This space has the capacity to hold the entire student body for all school announcements and presentations when they occur. Round tables are used in place of linear folding tables as they promote social engagement amongst students. This space acts as a performance/lecture hall, dining room, large gathering space, multiple seminar rooms, and rental space for public use after school hours, display space for artwork and advertisements for student activities. Equipped with tapestry hanging apparatuses the acoustics can be controlled with aesthetic opportunities around its perimeter. Hanging lights as well as wall sconces illuminate the space to desired configuration. The expansive glazing at the West end affords ample day lighting while also having the ability to close the key operated shading devices in the event that light needs to be minimized. At the head of the Forum there is a low-rise stage flanked by single story planting beds, and the inclusion of a giant projection screen for multi-media presentations. Storage is easily accessible for tables and chairs as well as other instruments needed in this space. Around the perimeter there are planter boxes that sit 4 feet in height on wheels that can be configured to create more intimate spaces within the larger.

This space is where everything comes together. It is the heart of the building and the educational process that takes place here. Students and teachers are to come to this space as equals to learn from and to teach each other. This space is included into the building program to instill a sense of pride in the school community, something that is visually stunning and is a place where students can feel that they are included in something much bigger than themselves without feeling lost.

Fig. E20 The Forum

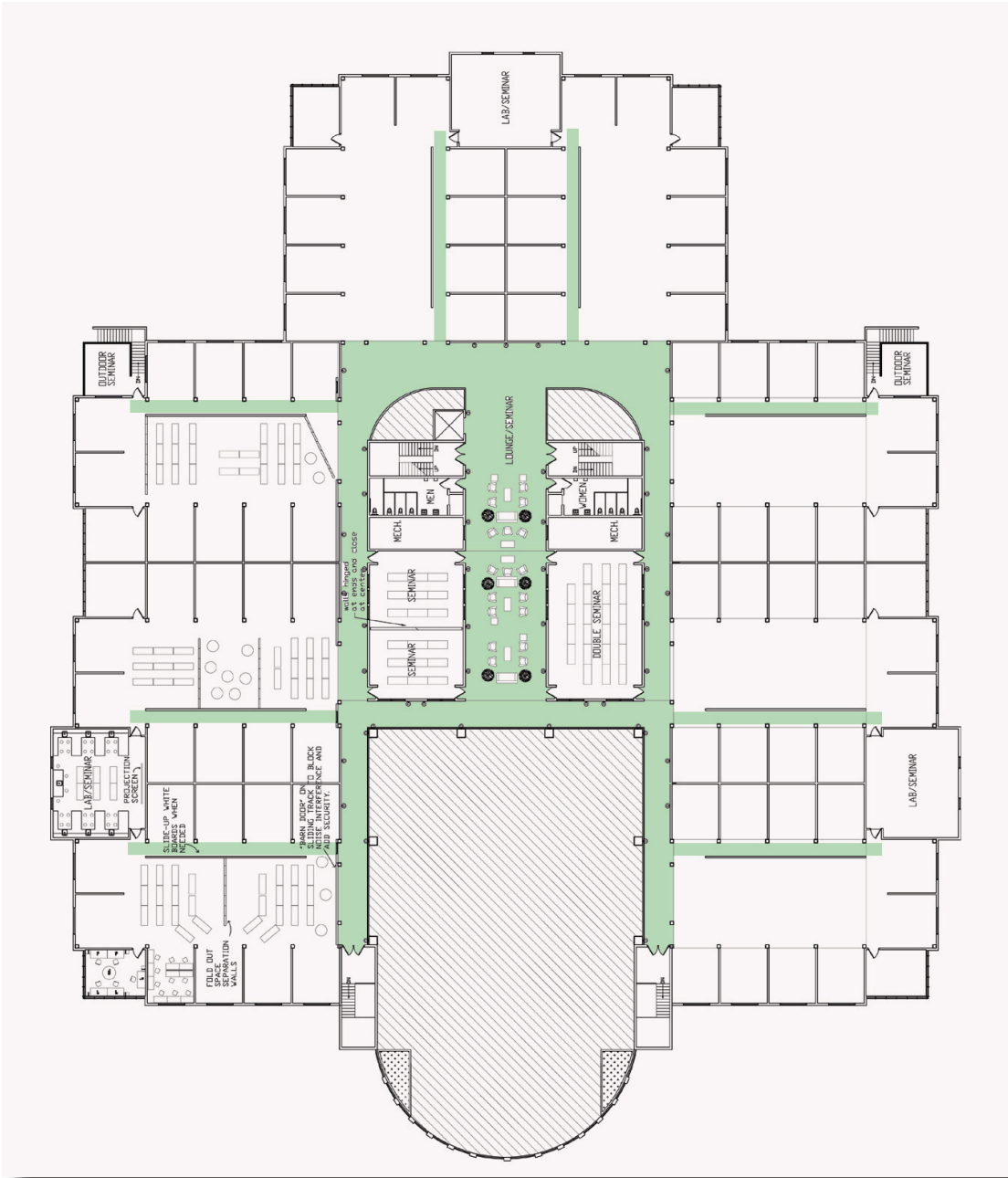


Circulation

For safety, beyond the rush hours of school or special events, all doors are locked for entry at all points except for the Main Entrance Hall, which runs in front of the Administrative Offices. Circulation occurs primarily within highly visible paths that provide for safety and for opportunities for social engagement. Also, the circulation is according to fire egress and occupancy needs. The building can be closed off into separate areas by locking doors to stairwells, closing gates along the 3 major thoroughfares of the main level, or by simply locking individual doors to rooms or Houses.

The circulation within this building is meant to foster multiple encounters with others throughout the building, which lends another means by which students are no longer anonymous.

Fig. E21 Upper Level Floor Plan



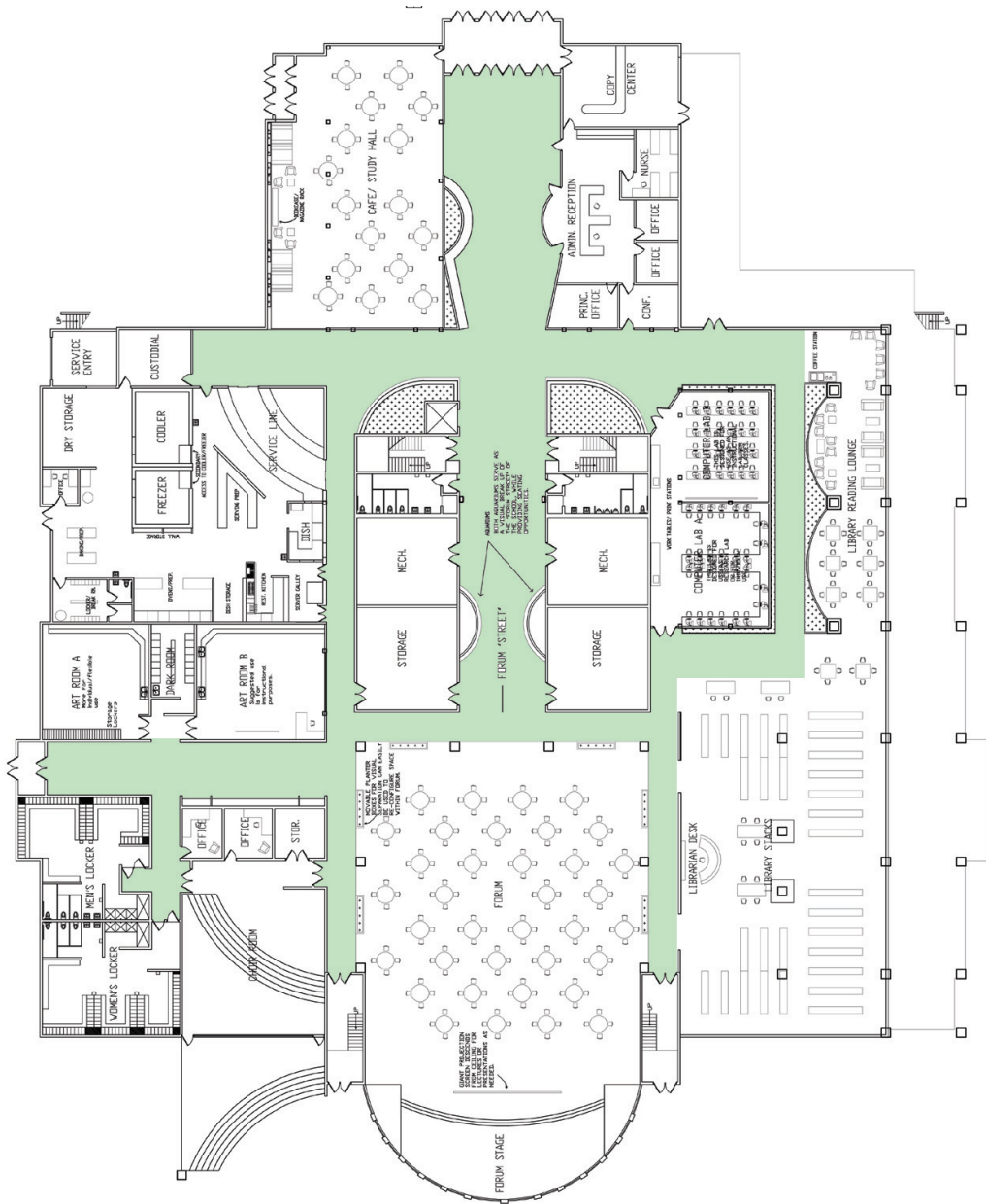
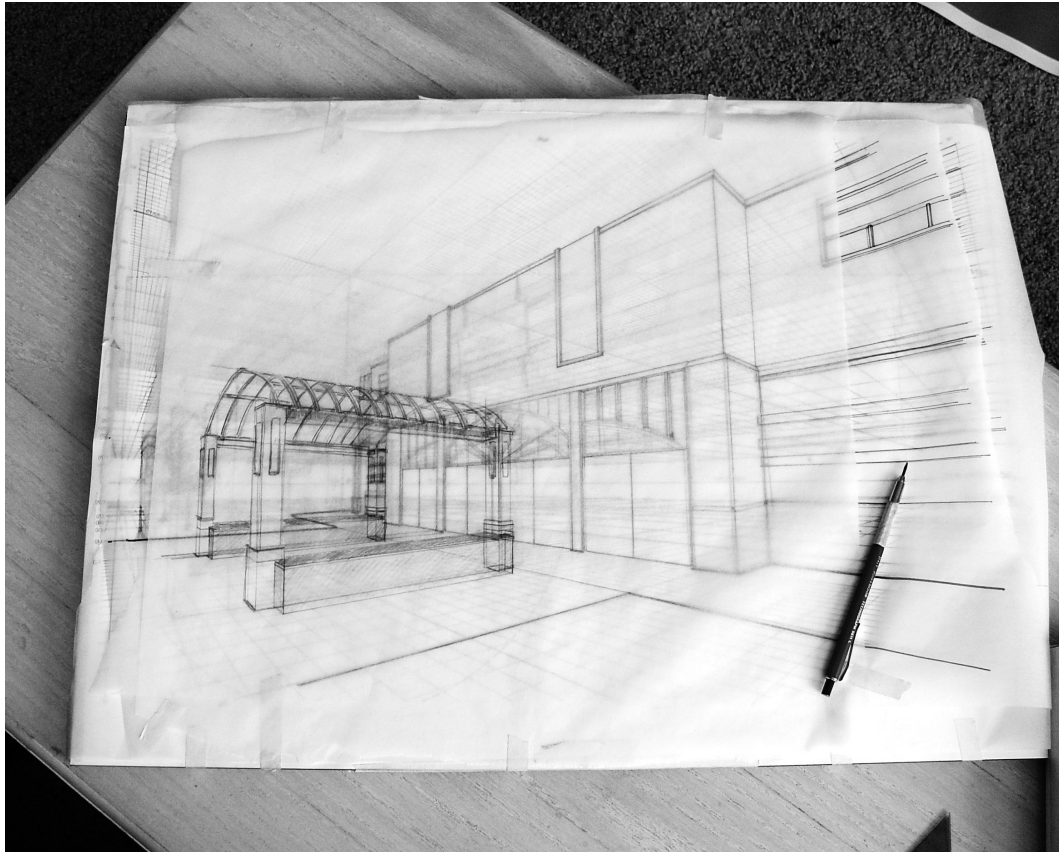


Fig. E22 Main Level Floor Plan [Ground]



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Process

"The difficulty lies not so much in developing new ideas
as in escaping old ones"
- Keynes

How'd you do that?

This section covers how I developed my design from the very beginning. It outlines the methods and strategies that I used to generate conclusions and gain a better understanding of my project.

- Interviews
- Sketching and Exploring
- Computer methods
[Sketch-Up and CAD 2004]
- Photographs

Interviews

In order to gain a complete understanding of how an Architect might approach the design of an education facility, I opted to interview 2 respected Architects that work primarily within that field. Julie Rokke, a principal Architect with YHR Partners in Moorhead and Bruce Jilk of Atelier/Jilk based out of the Minneapolis area are the two sources I found to be highly informative. As important as it was to look at the design of a school through the eyes of a designer, it was strongly advised by the Architects to involve the actual user group. So, I interviewed two very experienced school administrators from two very different settings. Dan Bodette, school Principal for the School of Environmental Studies in Apple Valley, Minnesota and Dr. Charles Cheney, Superintendent of West Fargo Schools in West Fargo, North Dakota were the two I chose to interview. Aside from the formal interviews that I will outline in the following text, I spent some time speaking casually with the people of Farmington, Minnesota and with several school administrators within the District. These informal interviews allowed me to get an even better feel for what the community needs.

Julie Rokke: Principal Architect

YHR Partners of Moorhead, MN
Interviewed October 2004
(19 years of experience)

Selected Notes:

- Sterile Environments do not provide a relief from constant focus that is experienced in schools.
- Student learning styles and abilities vary so widely, it is ridiculous to think that one way...one design is the way they have to go.
- "Architecture cannot solve the social problems outright, but it can create an environment that fosters a healthier individual."
- Create an environment in which students feel respected and they will be respectful.

Fig. F1 Julie Rokke:
YHR Principal Arch.



Fig. F2 Bruce Jilk: Architect.



Bruce Jilk: Architect

Atelier/Jilk of Afton, MN
 Interviewed December 2004
 (42 years of experience)

Selected Notes:

- The biggest issue seemed to be the more you construct a space into something specific the less effective it becomes.
- He discussed the Waldorf School model and mentioned other very different models of school design to look at as case studies.
- “Put them (students) in a position to deal with the problems of real life”
- Several references he made guided me towards several areas discussed in my Research/Theory portion of the project (ie. Abraham Maslow’s Hierarchy of Self –Actualization).
- His most poignant advice was to think outside of what other people have defined as a “school”, break away from the confinement of tradition.

Fig. F3 Dan Bodette: School Principal



Dan Bodette: School Principal

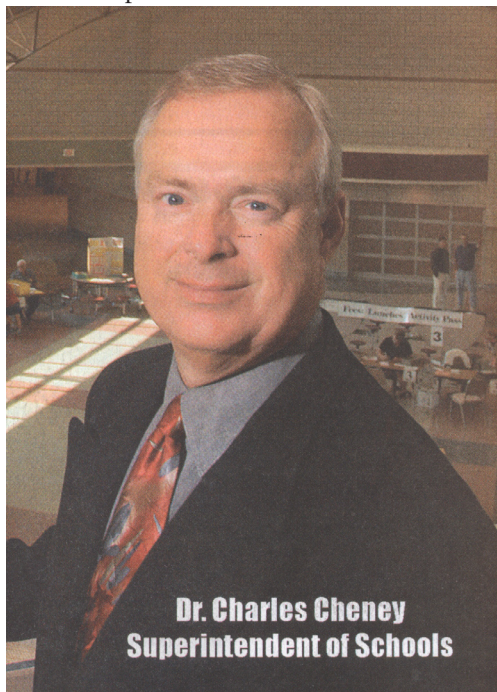
School of Environmental Studies of
 Apple Valley, MN

Interviewed multiple times between
 August 2004 and January 2005

Selected Notes:

- Having interviewed with Dan Bodette several times I was able to get constant feedback on design thoughts as they formed.
- He gave me a practical perspective on designing a school that was “non-traditional” in design and curriculum.

Fig. F4 Dr. Charles Cheney:
School Superintendent



Dr. Charles Cheney: School Superintendent

West Fargo School District in West Fargo, ND

Interviewed October 2004

(34 years of experience with schools)

Selected Notes:

- Highlighting a more traditional school format: there is "too much melt down when you focus on integration" (referring to integrated teaching methods).
- An interesting process was that of targeting the 9th grade students as "highly vulnerable" and attempting to combat this problem with a segregation approach.
- West Fargo Schools are undergoing much the same transition as Farmington in the fact that they are rapidly outgrowing their educational infrastructure.
- "Design it for the students, not because of the students"

Sketching and Exploring

Through the means of a pen and paper combined with photographic exploration I was able to motivate my design to reach its final stages. The following images are taken from my sketch book and photographs throughout the entire process.

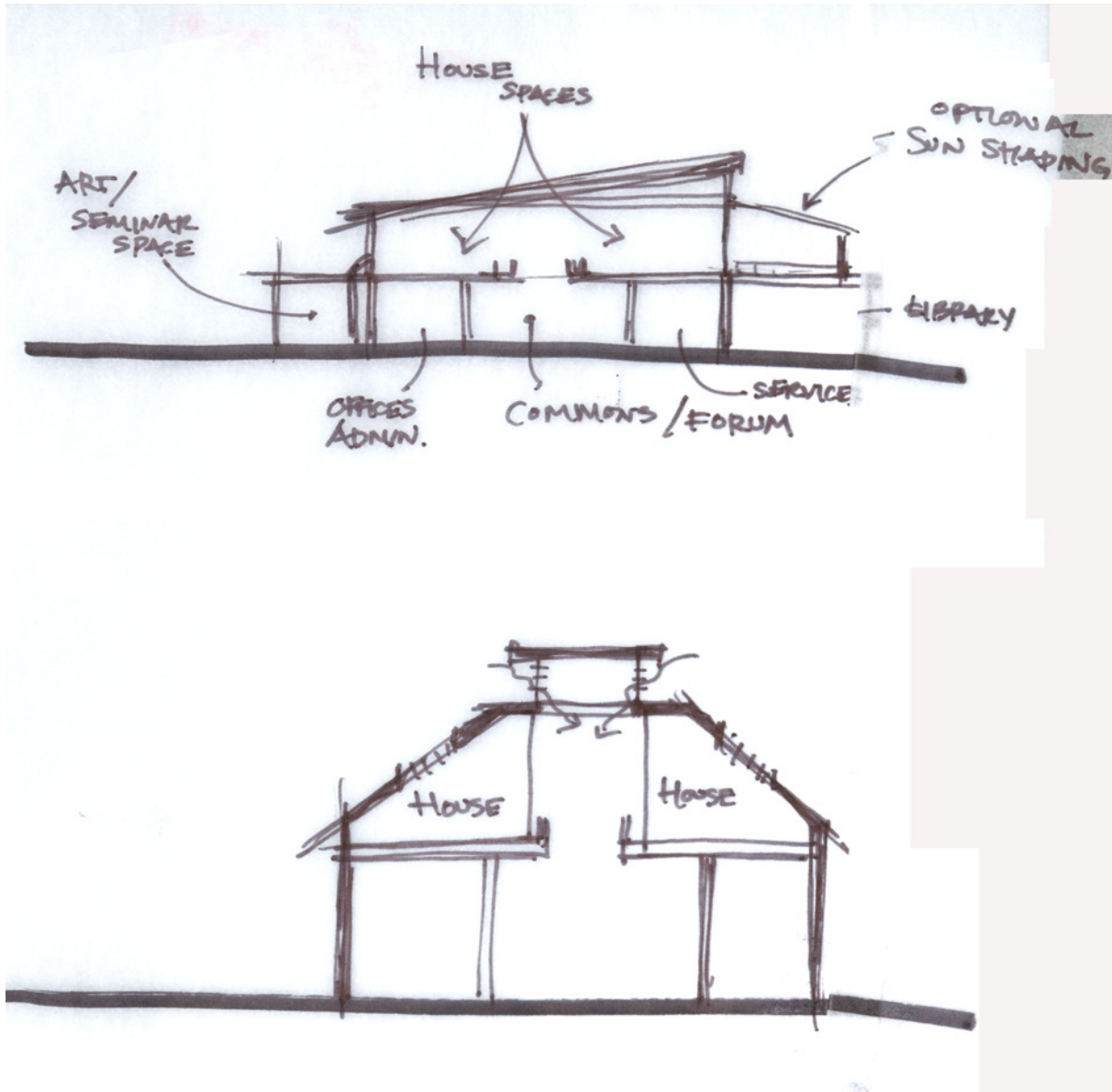


Fig. F5 Section Cut Sketches

Fig. F6 Spatial Configurations Explored

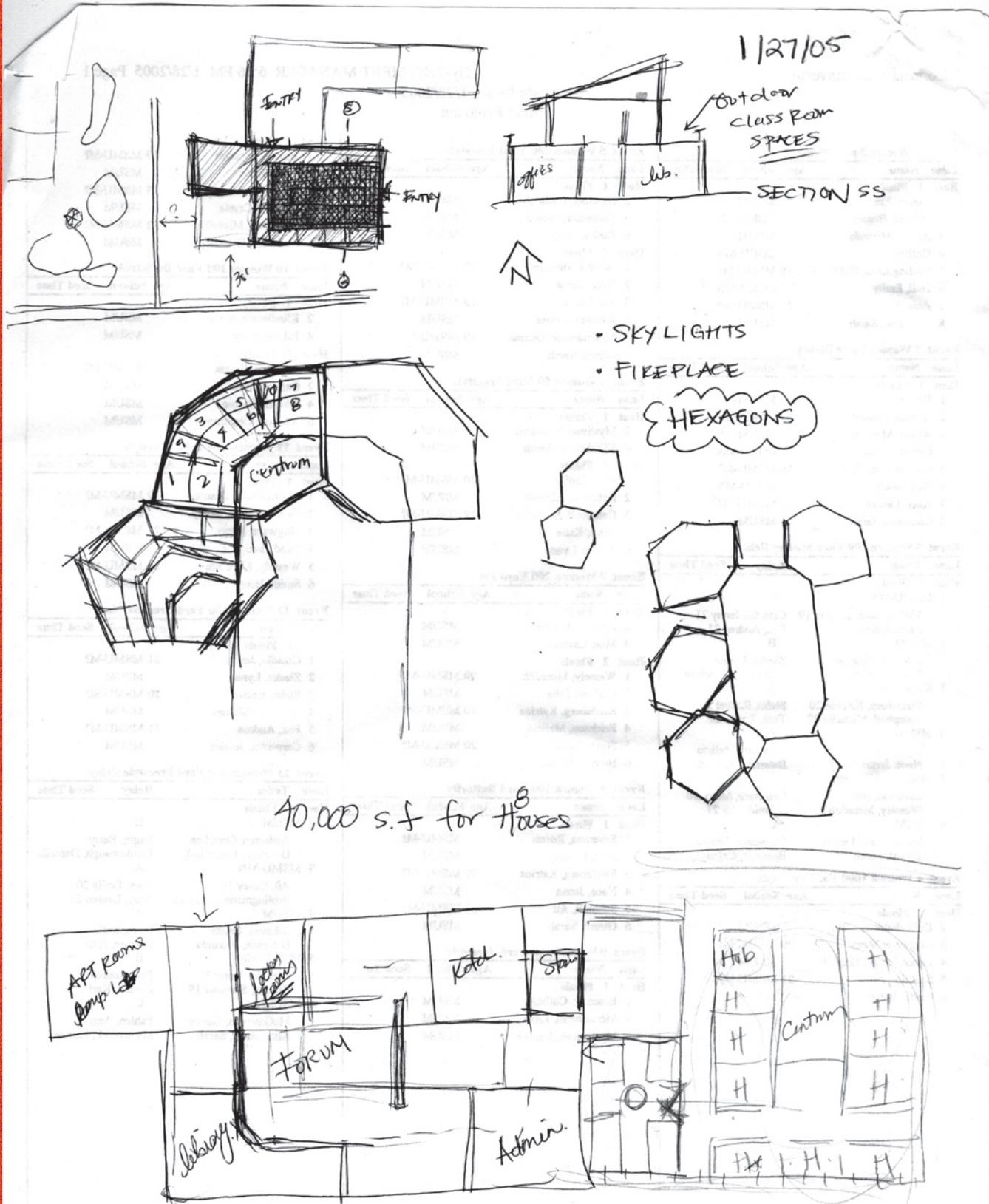


Fig. F7 Site Masterplanning

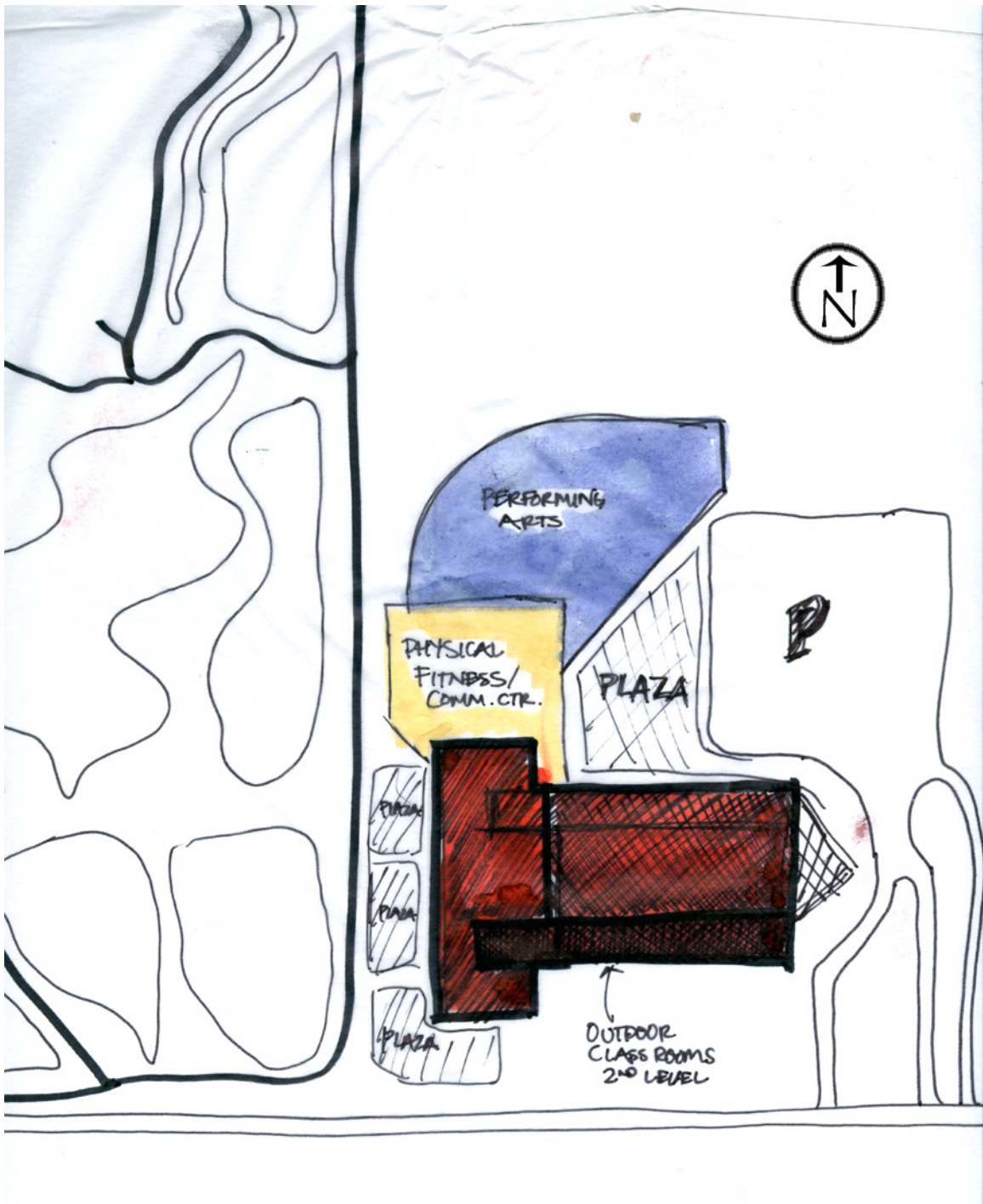


Fig. F8 Site Masterplanning

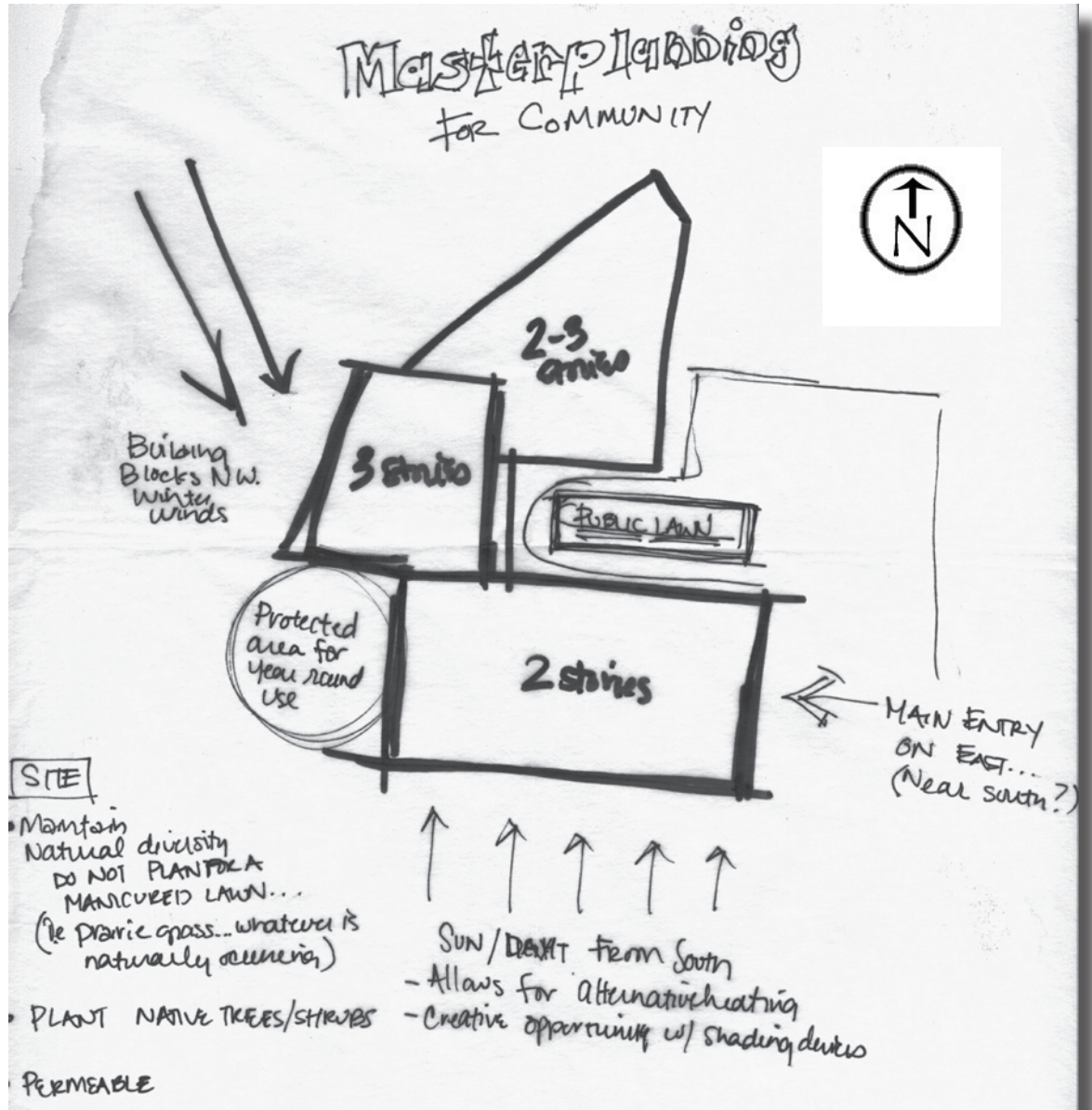
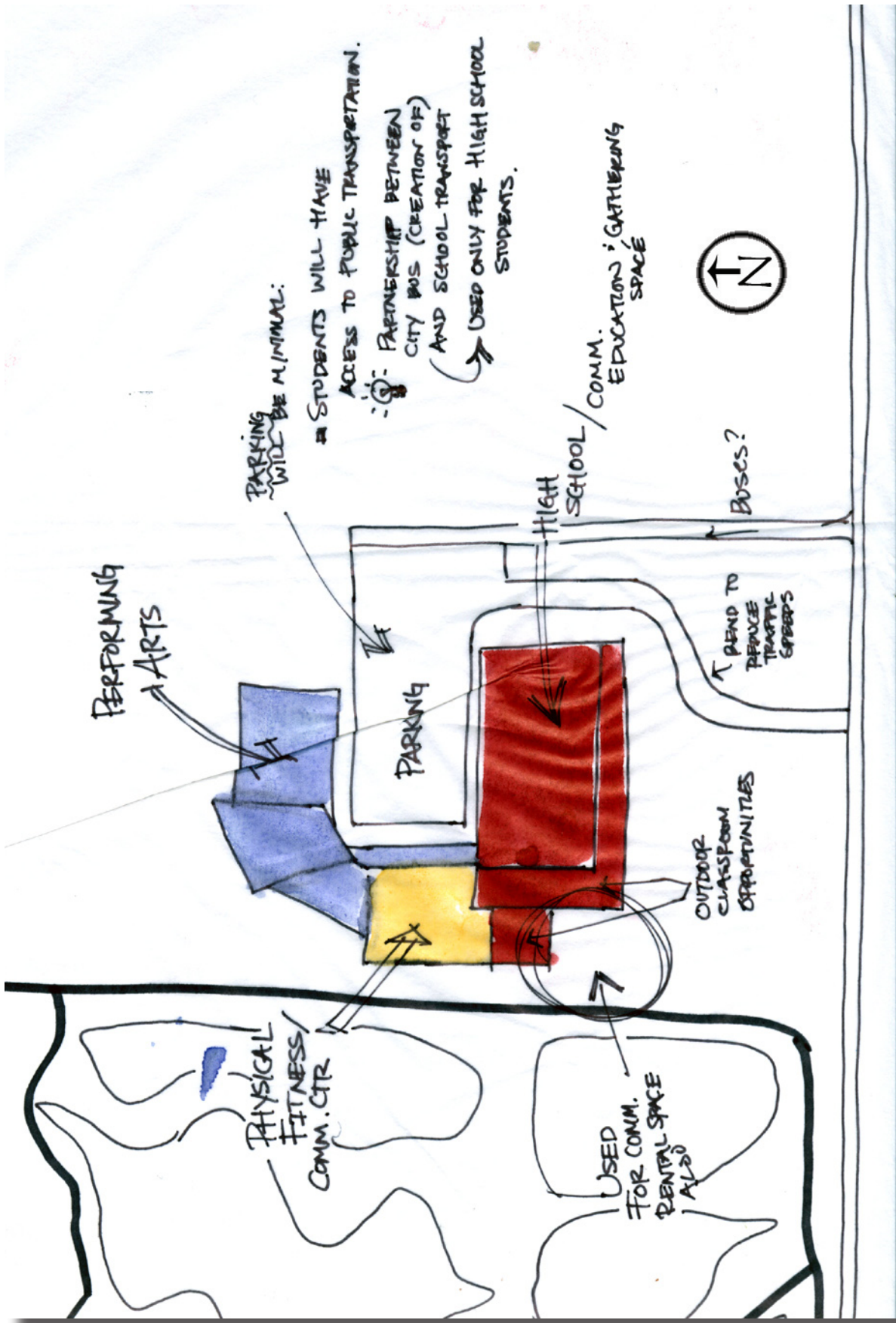
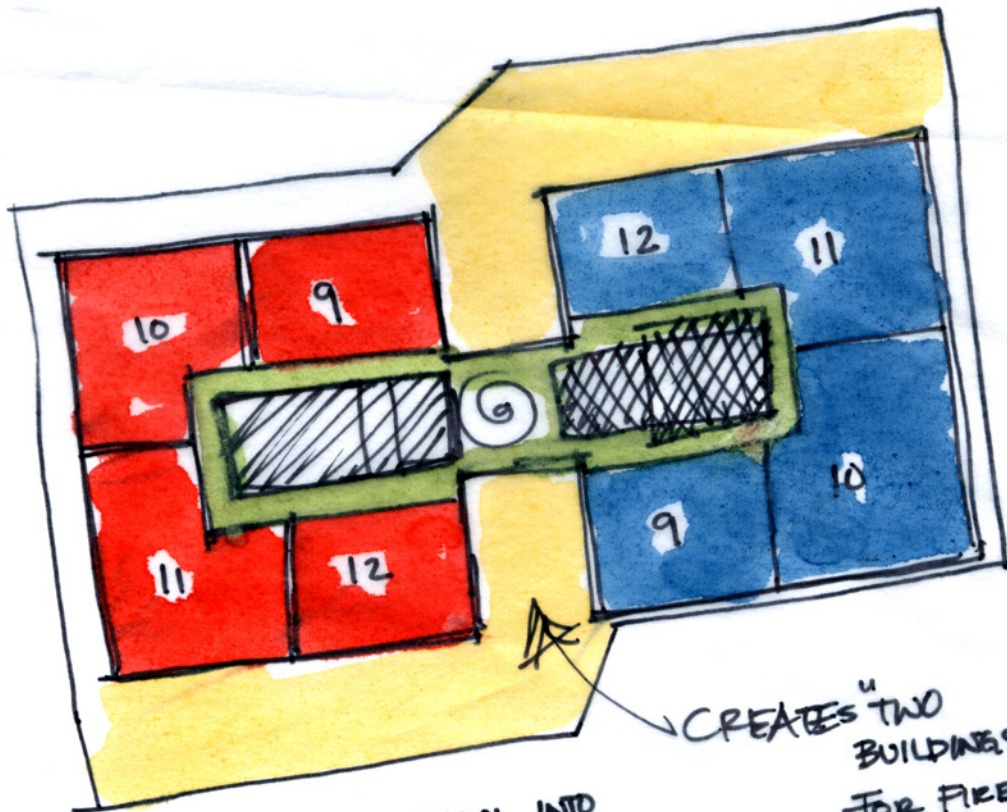
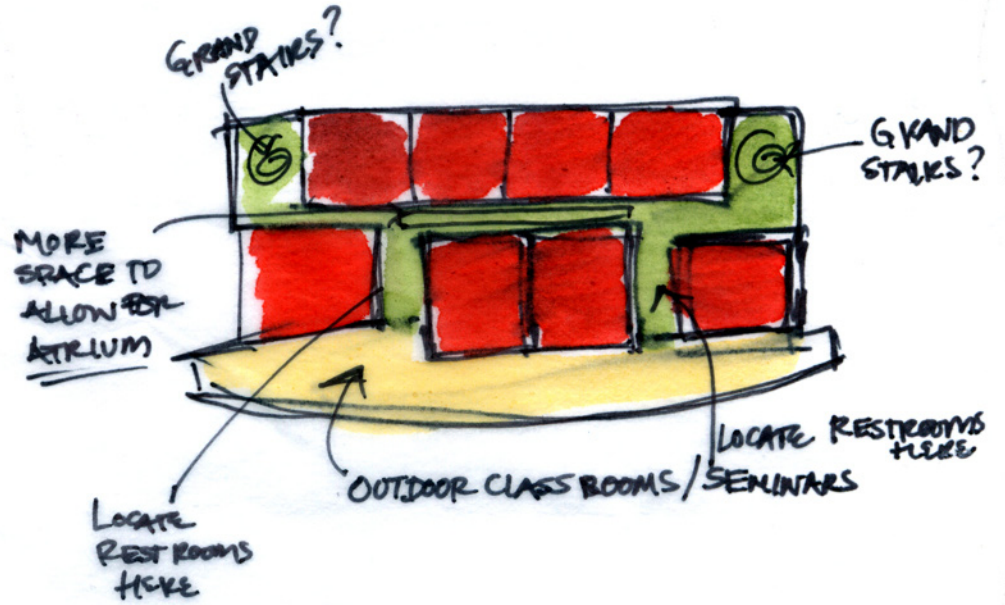


Fig. F9 Site Masterplanning



Process

Fig. F10 Spatial Organization Sketches



SEPARATE THE SCHOOL INTO
TWO FOCUS CURRICULUM?

- STUDY THE SAME ISSUES
& @ SAME LEVELS

⊕ SOCIAL EMPHASIS

⊕ POLITICAL EMPHASIS

CREATES "TWO
BUILDINGS"
FOR FIRE SEPARATION
IN ORDER TO ADD
SQ. FOOTAGE

Fig. F11 Building Layout Sketches

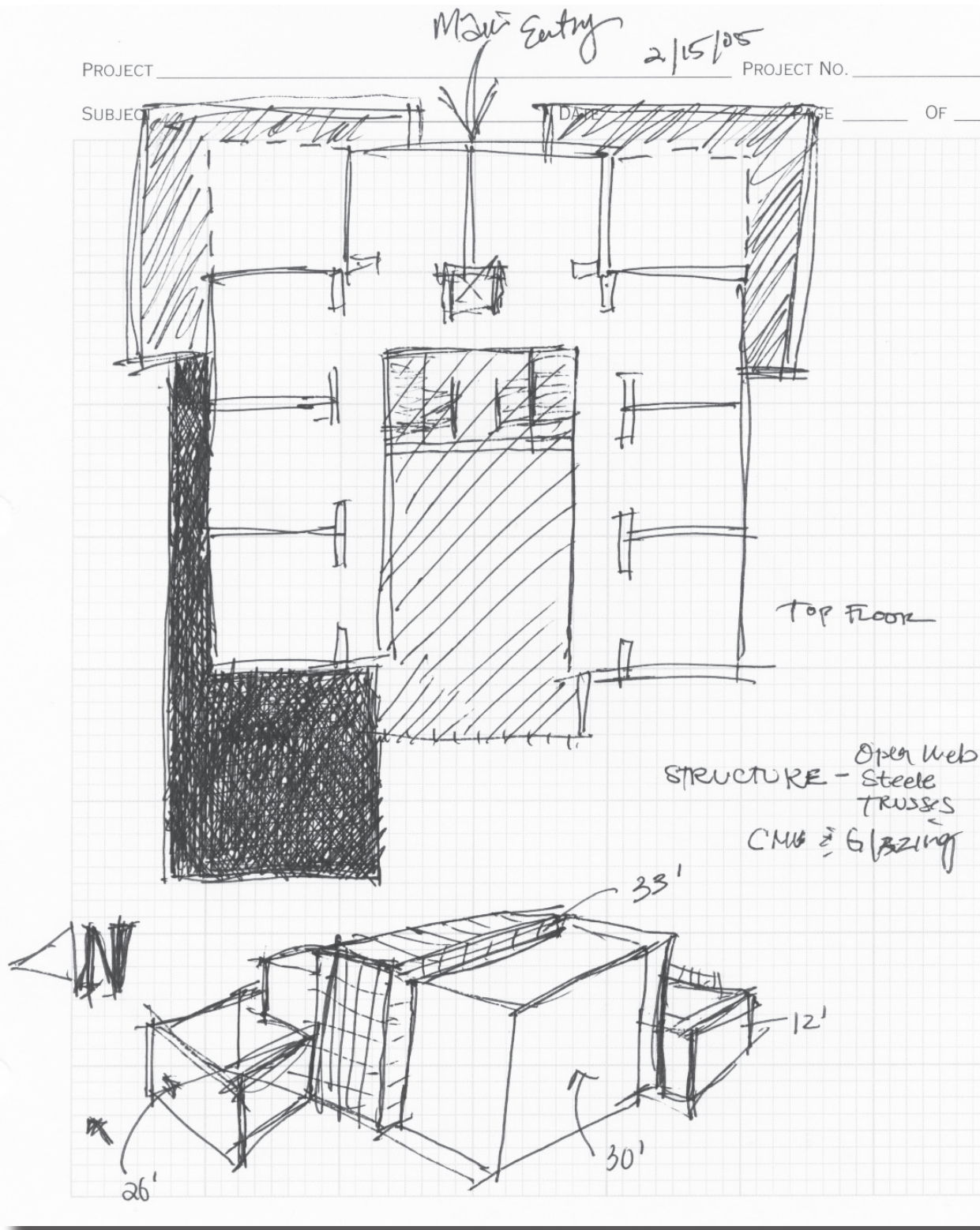
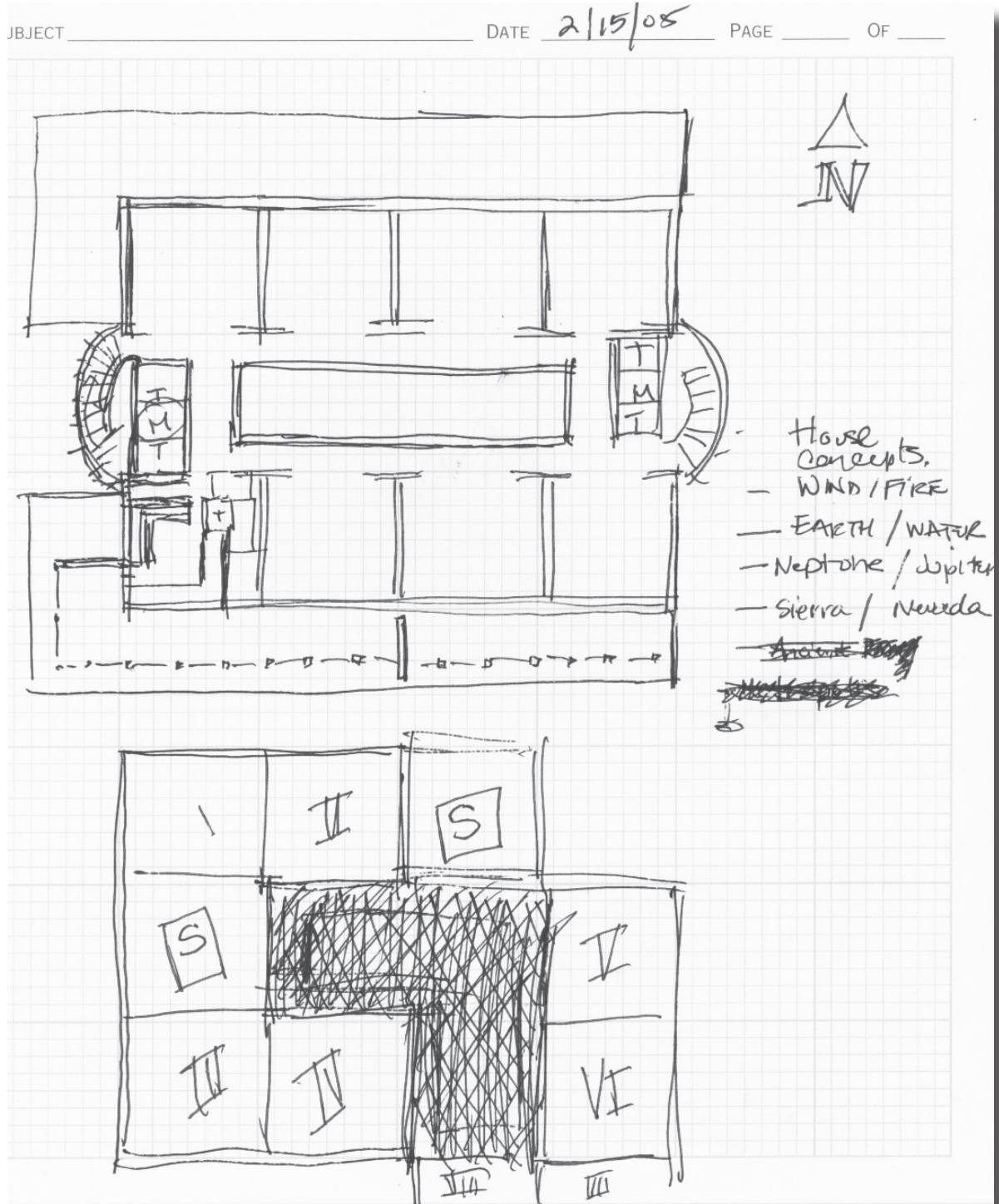


Fig. F12 Building Layout Sketches



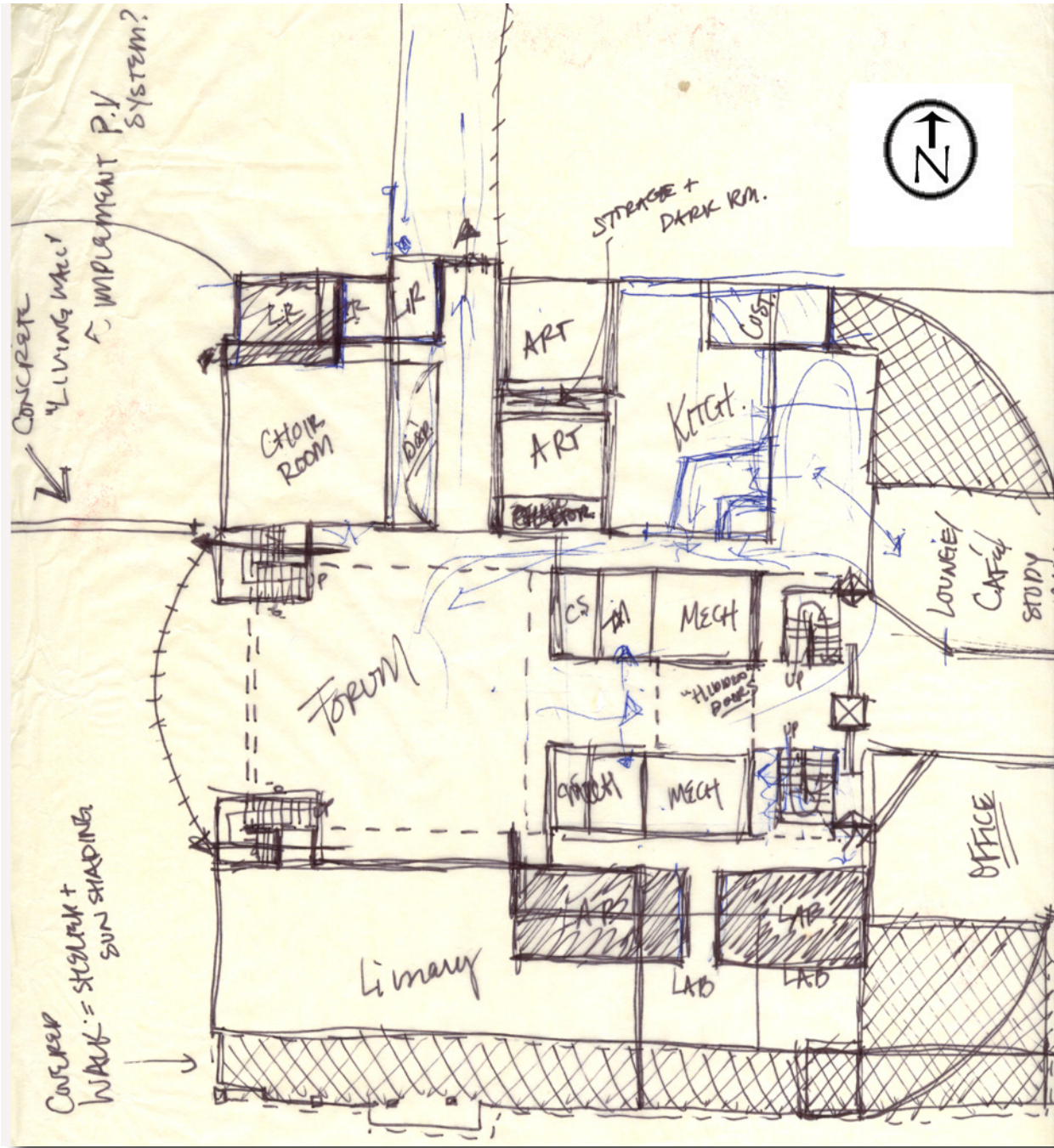


Fig. F12 Internal/ External Spatial Organization

Process

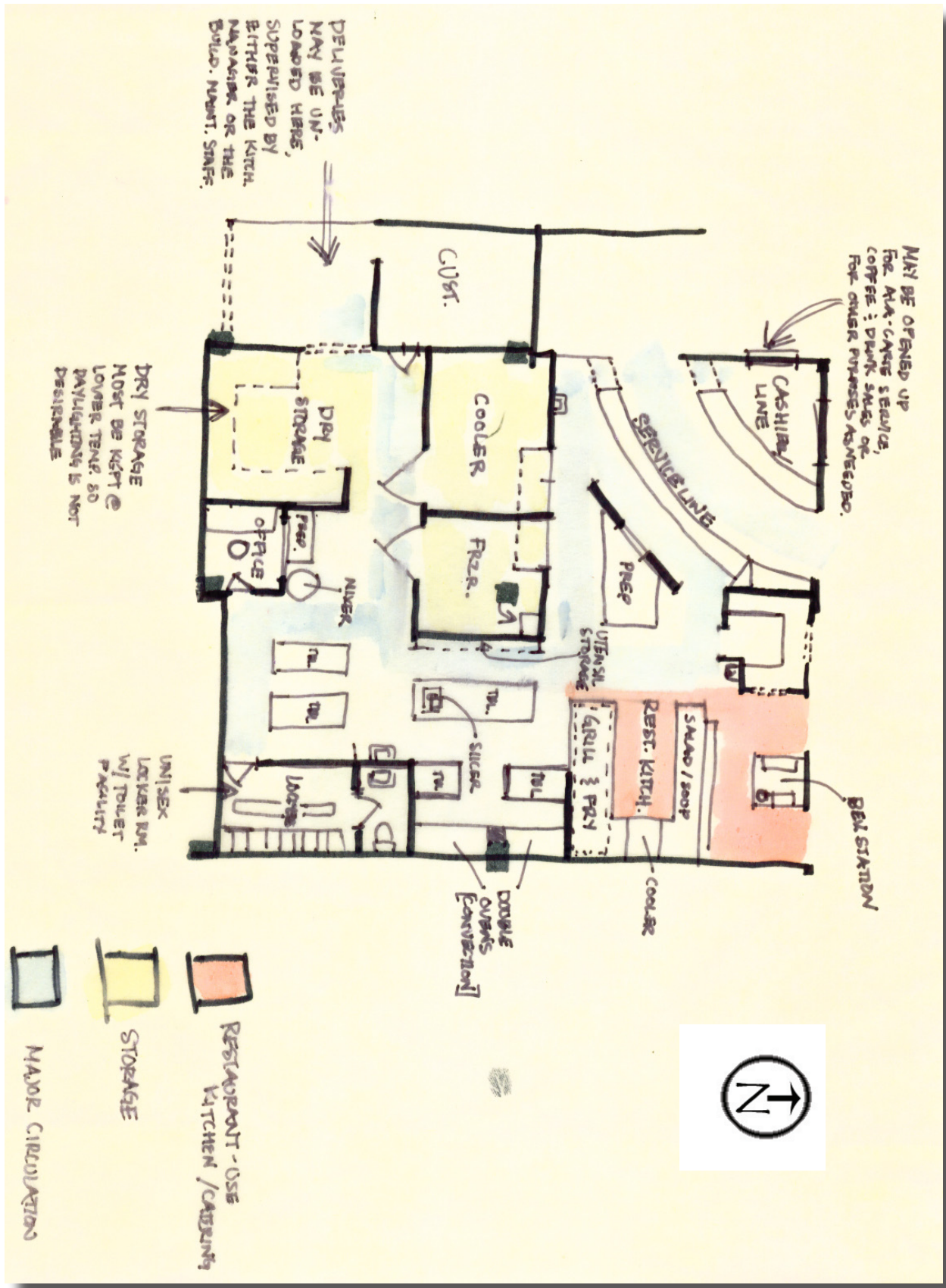
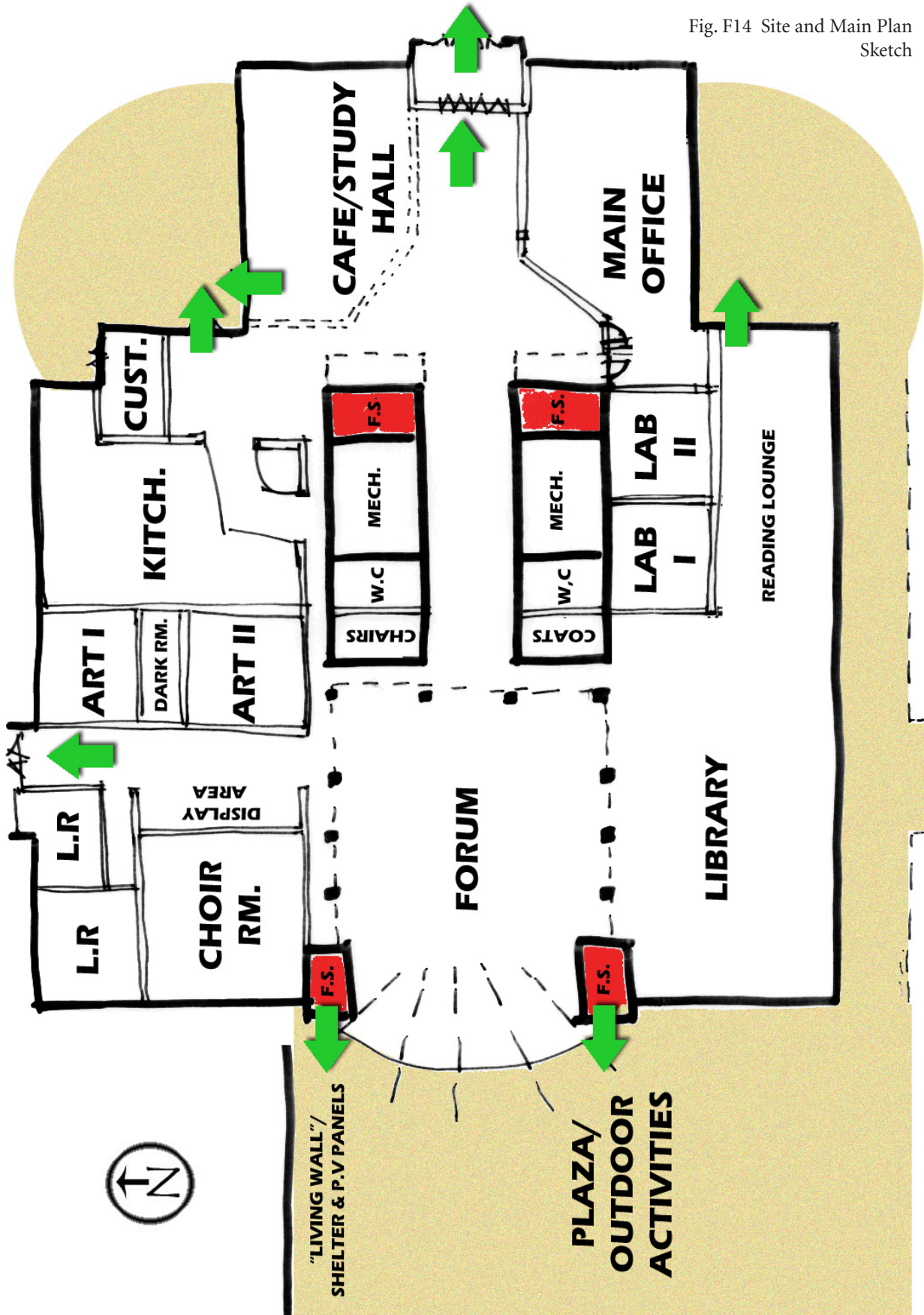


Fig. F13 Detailed Sketch of Kitchen Functions

Fig. F14 Site and Main Plan Sketch



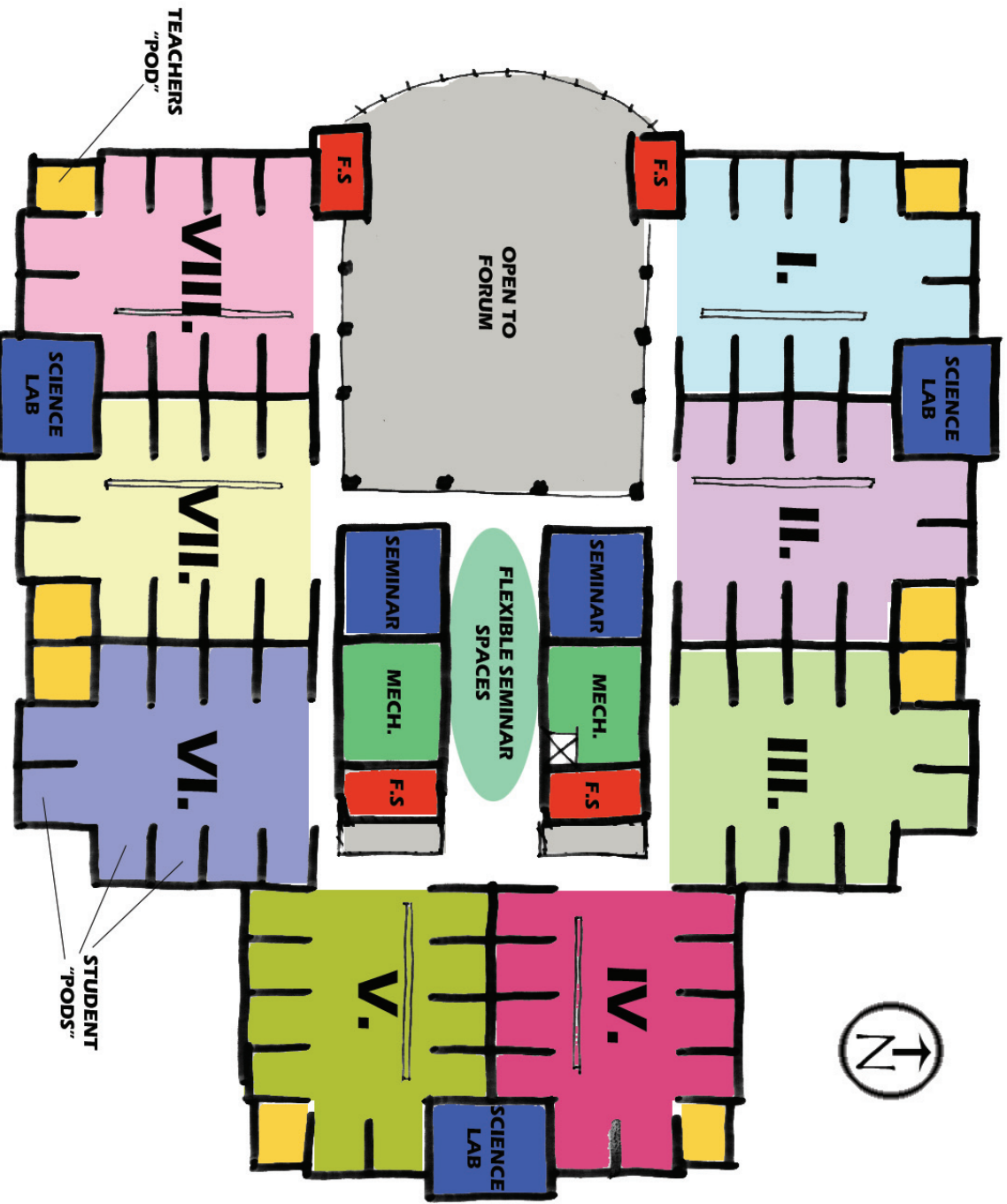


Fig. F15 House Organization Diagram

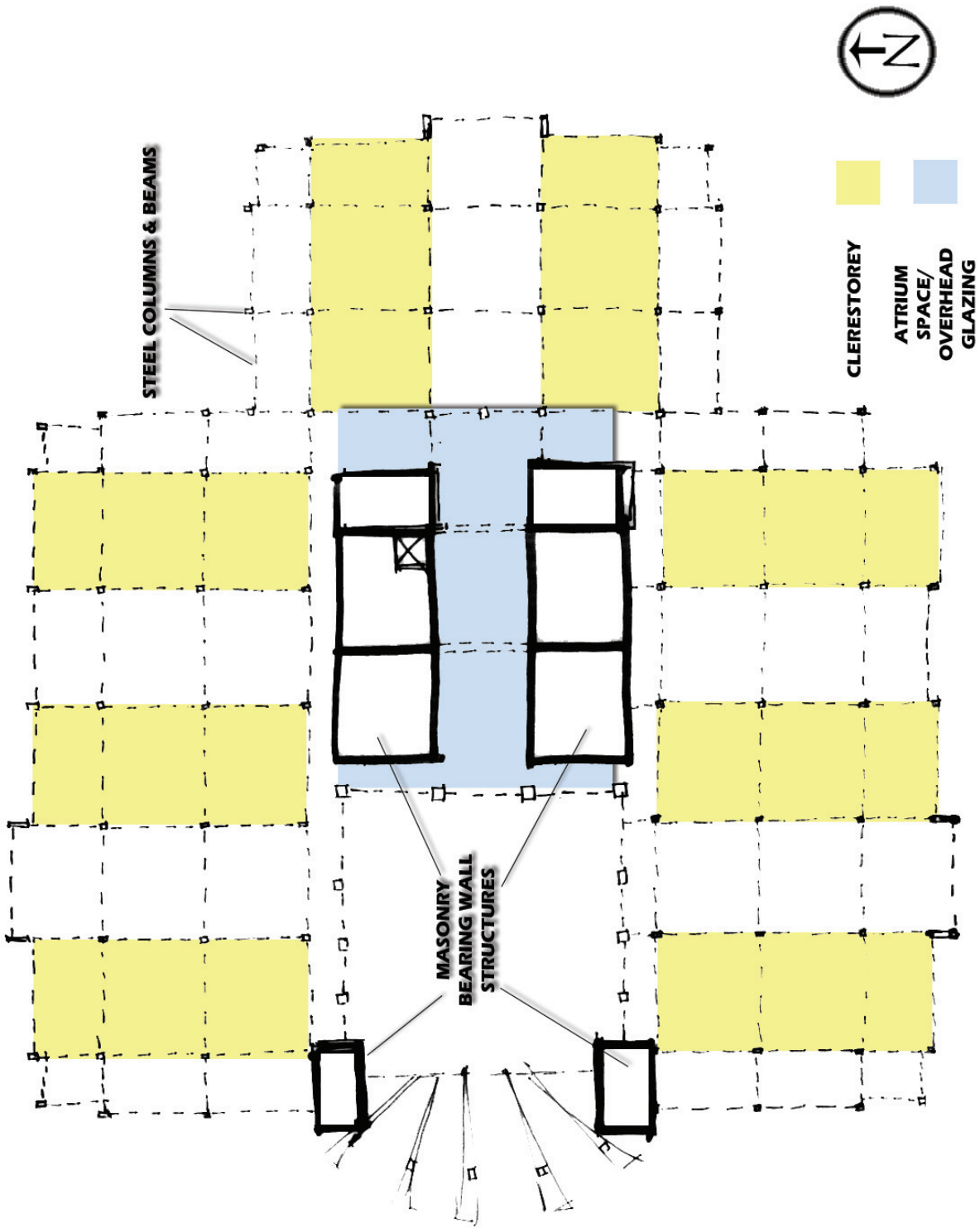
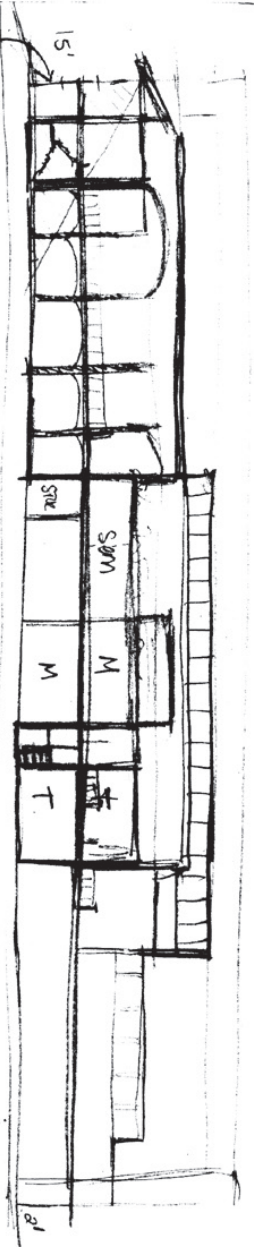


Fig. F16 Structural Diagram

Fig. F17 Interior Section Sketches

15' Ft to Ceiling Ht.
2' Int. post to post space

SECTIONS



2/29/05

Air is heated + cooled through ductwork
in central Cor

Barrel vault
glazing @ center
used insulated louvers to retain warmth @
use insulated windows
concealing curtains

Buildings sits @ 2' above grade
to permit drainage away from
structure.
(S.W.P. = 5%)

exterior glazing w/ light structure
@ 4' above

exterior pavement
to house radiant lighting
into library

Masonry barrel vault
latent heat for later return

Mass of
floors
inertia will
allow in-floor heating/cooling
by water run through pipes
below surface.

Computer Methods/Tools

My use of the computer was directed at helping my design become a reality. Using CAD 2004 and Sketch-Up I was able to produce a comprehensive design product. I only used each tool for what they could best accomplish for this project: CAD 2004 was used to generate the 2Dimensional pieces while I was able to use Sketch-Up to generate a 3D model of the project as it progressed. The following images show some of the Sketch-Up framework from which I developed my thesis. [examples of CAD 2004 can be found in the Design Parameters Section of this text]

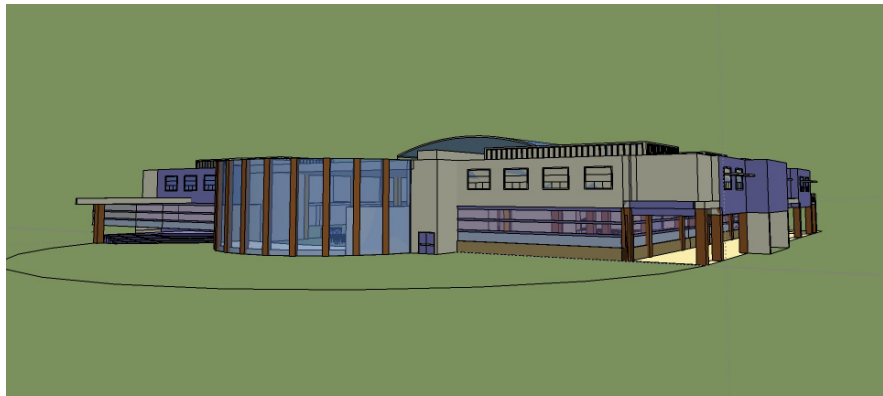
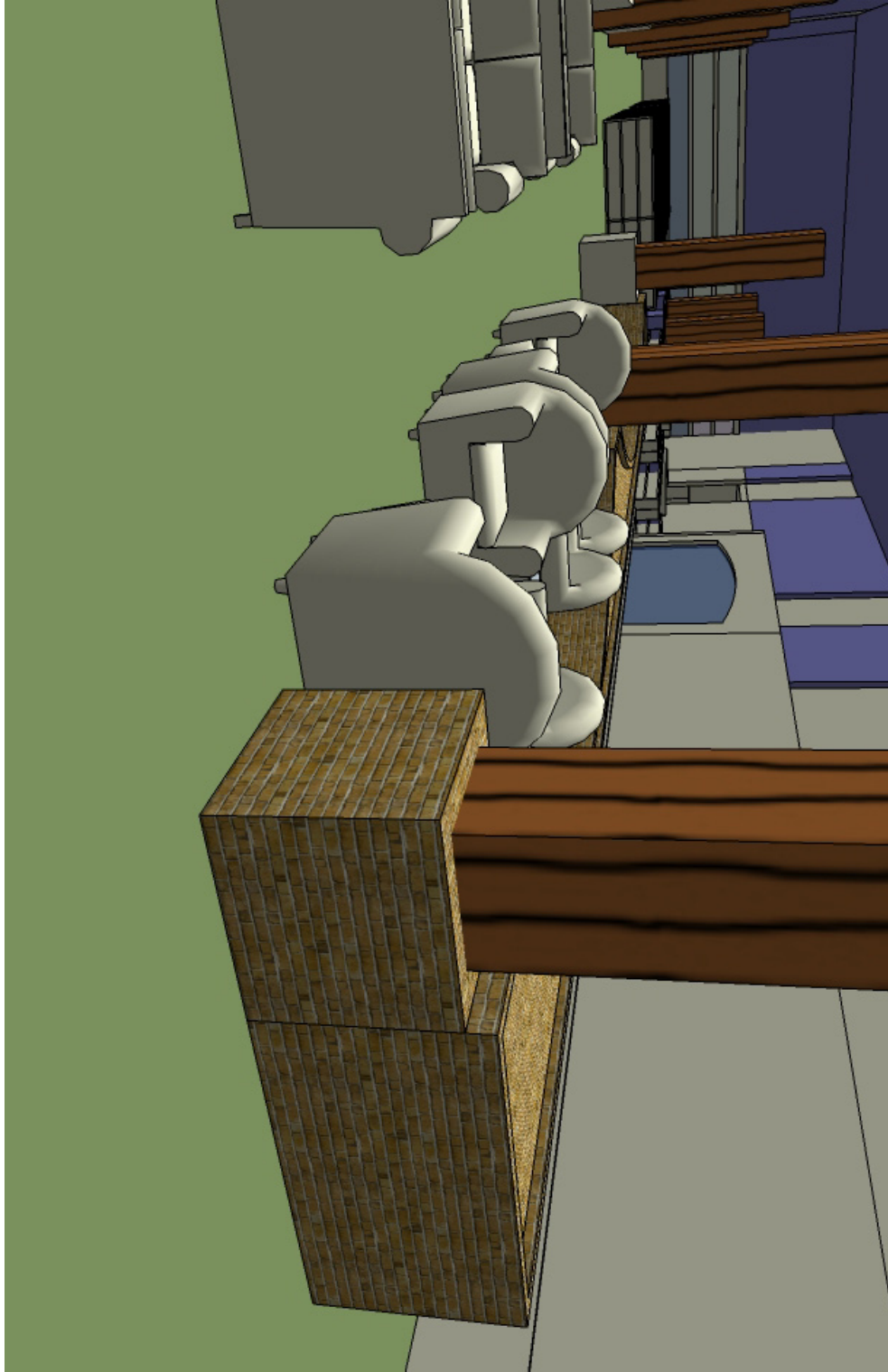


Fig. F18 Perspective: Sketch-Up,
(from Southwest)

Fig. F19 Perspective: Sketch-Up
Library Lounge



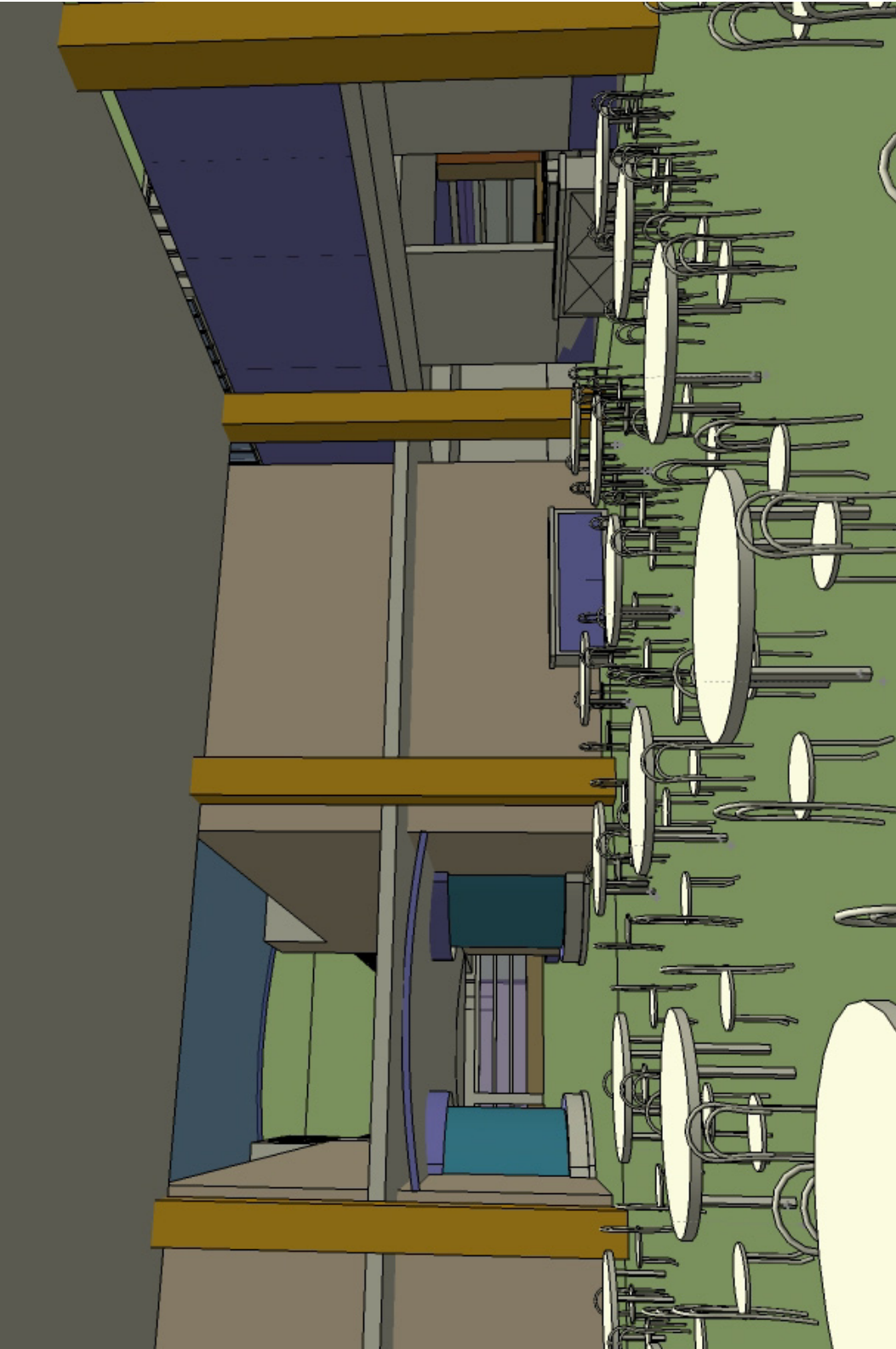


Fig. F20 Perspective: Sketch-Up
The Forum

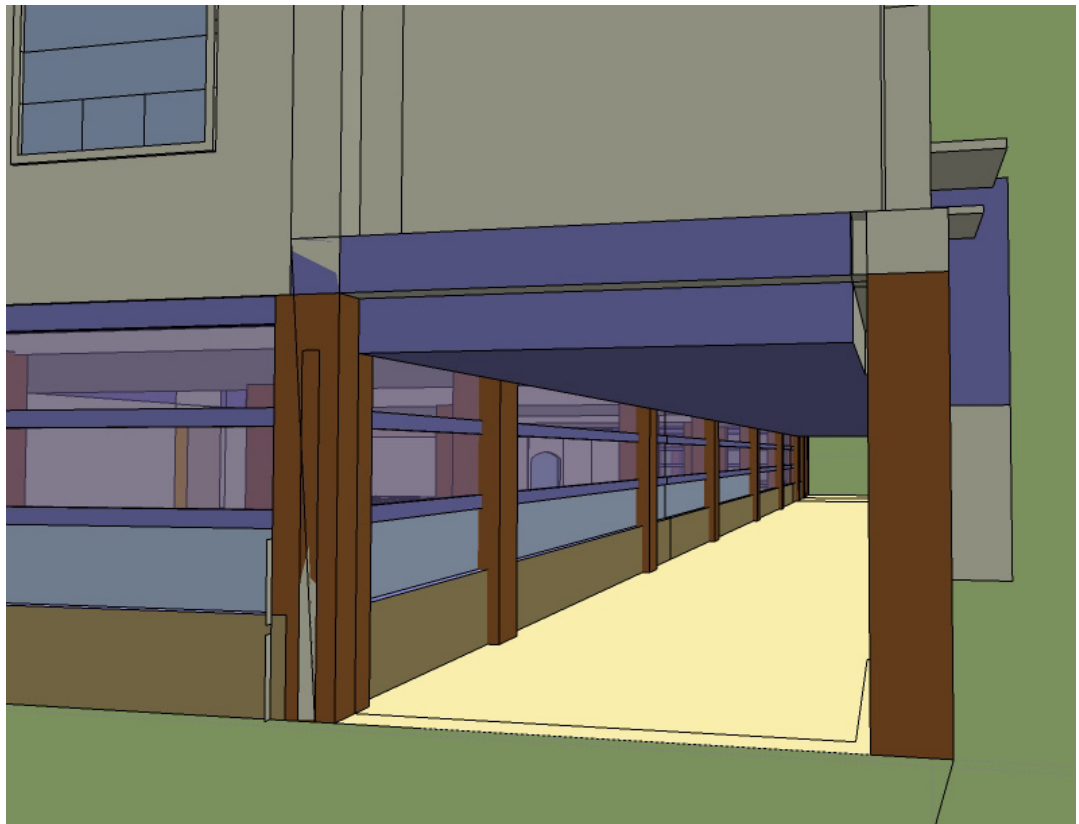


Fig. F21 Perspective: Sketch-Up
Collonade along South Side

Fig. F22 Perspective: Sketch-Up
Collonade looking out to West

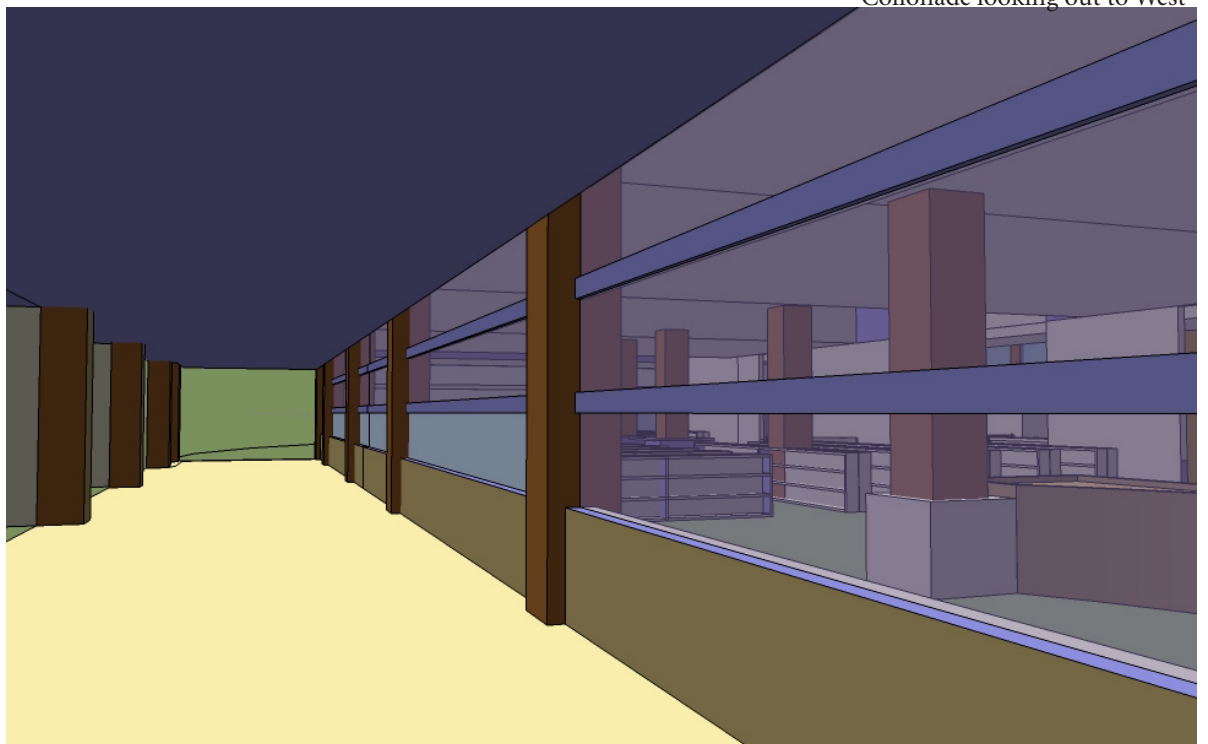
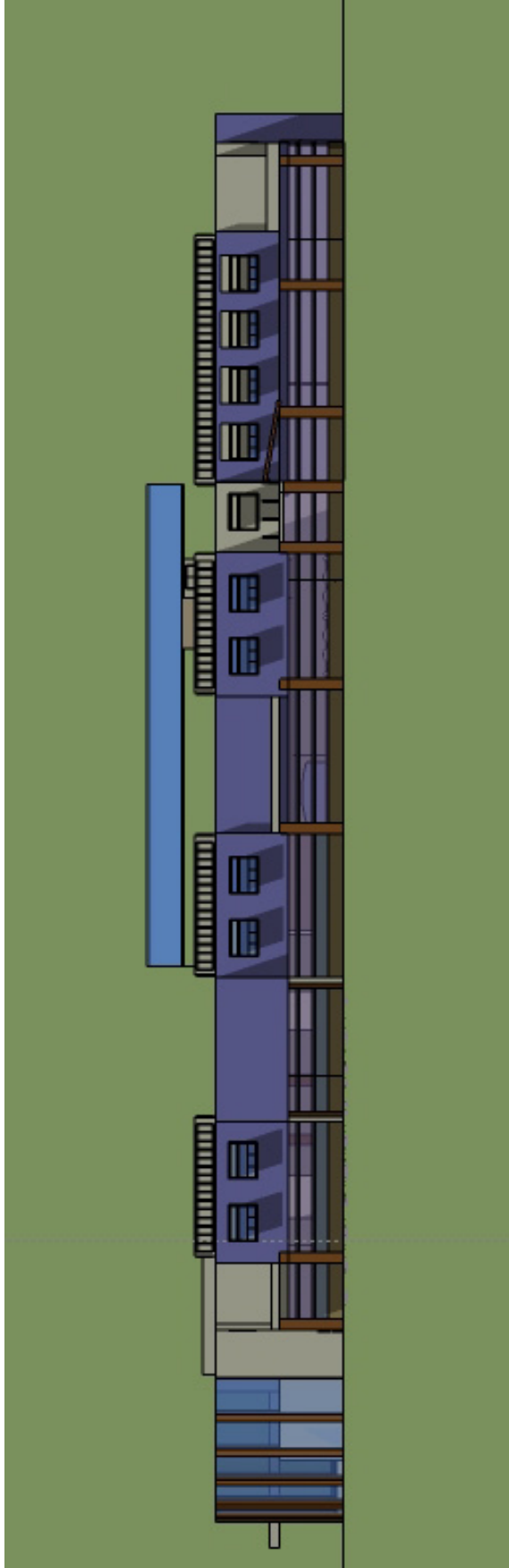


Fig. F23 Elevation: Sketch-Up
South Facade with Shading



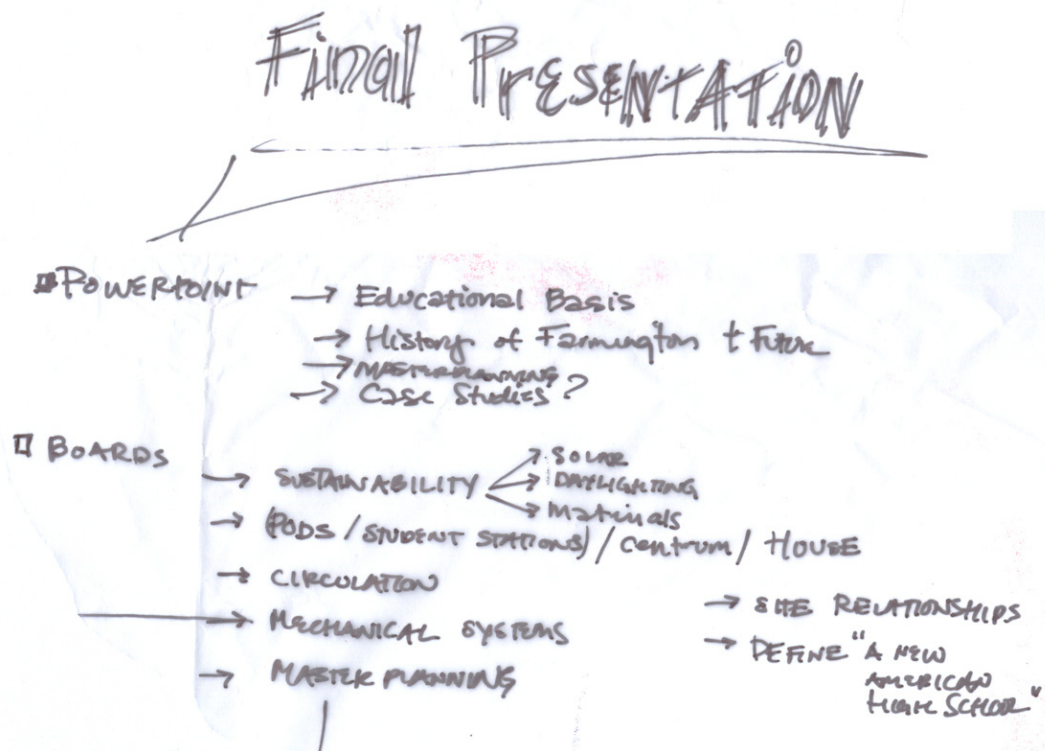
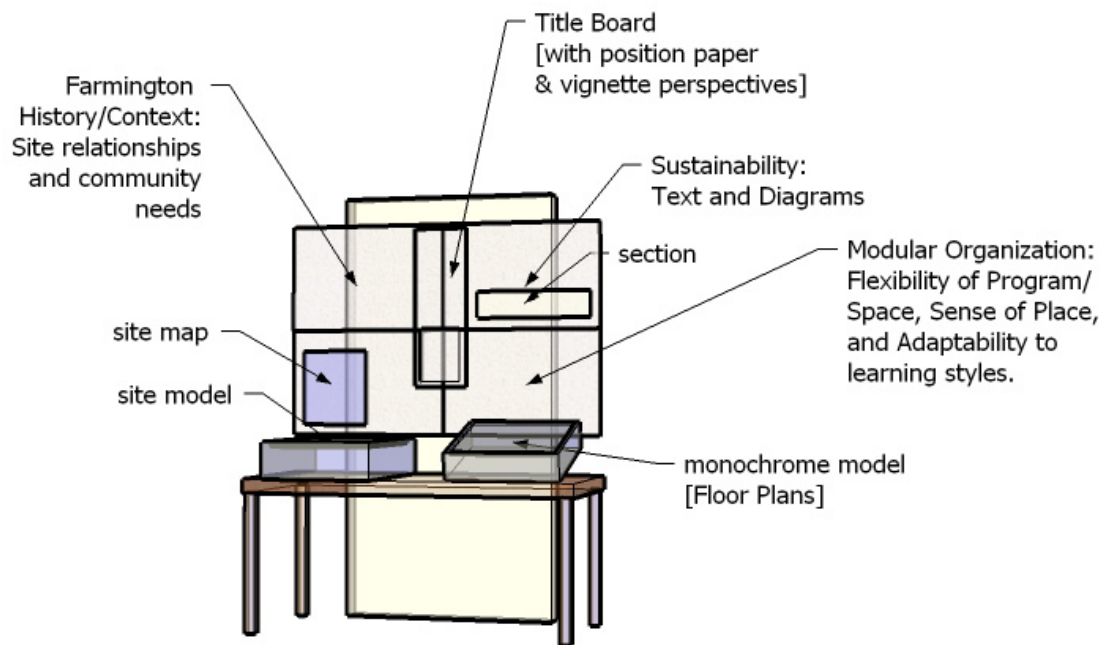


Fig. F24 Planning Diagrams for Final Presentaion



Photographs

The following photos were taken on the multiple site visits that were made throughout the Thesis process.



Fig. F25 Photos taken at Farmingtons' Community Park

Fig. F26 Photos taken in The Central Business District of Farmington, MN





Fig. F27 Photos taken to capture the city.



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Final Design

"There will be plenty of time to work hard; Enjoy yourself!"
-Cookie Fortune

Not another word.

This section is the final product of all that precedes.

- Final Renderings
- Final Boards
- Final Models

Final Renderings

These renderings were done using a combination of Sketch-Up, hand sketching, and watercoloring. They were completed by being scanned into digital format and then applying them to the layout of the Final Presentation.



Fig. G1 Rendered
Main Entrance



Fig. G2 Rendered
Library Lounge



Fig. G3 Rendered
Exterior of
Collonade

Fig. G4 Rendered
South Elevation





Fig. G5 Rendered
Detail of Individual
Workstation

Fig. G6 Rendered
Interior of The
Forum

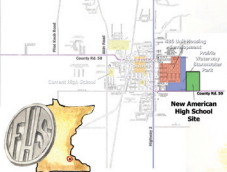




[The photos above were taken on several site visits to the city of Farmington between October and December 2004.]

Why Farmington?

I chose Farmington because of its rapid growth rate, its demographic composition, and its location near the Twin Cities area. This community is growing at a rate of 275 housing units per year, with a current population of nearly 14,000. The median age is 21 years and 31% of the population is composed of families with children under the age of eighteen. Farmington is on the edge of the sprawl moving outward from the central Twin Cities, and is in the position to respond with innovative educational systems as it replaces and increases its infrastructure.



What is A New American High School?

The All American High School for Farmington, Minnesota is programmed for the following:

- 800 Students
- Grades 9-12
- 4 Mathematics Teachers
- 4 Lab Science Teachers
- 15 Visual Arts Teachers
- 2 Foreign Language Teachers
- 15 Health & Wellness Teachers
- 4 Building Maintenance Staff
- 2 Administrative Assistants
- 2 Counselors
- 3.5 Kitchen Staff/Dietary Specialists
- 1 School Nurse
- 1 Principal

The school curriculum is team taught in Houses and is structured on a daily basis of blocked scheduling. Each house meets for 1/2 day covering various thematic studies from each of the core perspectives: social studies, literature & composition, and the physical sciences. The balance of time is spent throughout the building and community studying elective coursework.

Site Selection was done to maximize existing infrastructure such as athletic facilities and community businesses that are near to the site.

At the front entry there is a canopy that acts simply as an architectural element during the colder months, and dually as a shading element during the warmer months. Vines grow out of the planting bins that line the sides.



Grass-Crete Passive Shading Light colored Paving Native Grasses

Architecture as a Textbook

A New American High School should be designed comprehensively to teach not only through curriculum, but through its architecture as well. The building is designed to be as flexible and as useful as possible to all users. The incorporation of sustainable practices in building orientation, organization, construction, and design philosophy, not to mention the building elements themselves can be readily incorporated into everyday lessons of the students.

A True Learning Community

The intention of this thesis is to create and promote an atmosphere that is not only a center for secondary education, but a center for the continued growth of a strong community. Proximity to residential neighborhoods and future residential developments demonstrates the appropriateness of having included a community center component. The masterplan for this site is such that it will progress in 3 phases.

Looking East along County Rd. 50



Looking South across Prairie Waterway



Looking Southeast onto site



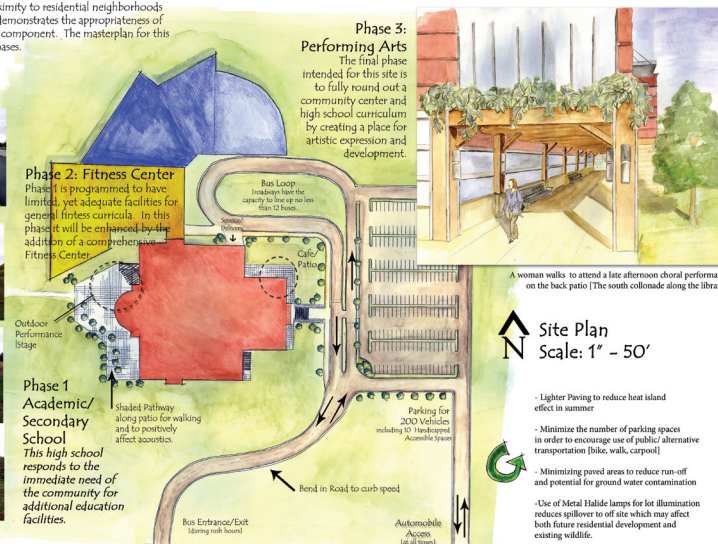
Looking West onto site



Phase 2: Fitness Center
Phase 2 is programmed to have limited, yet adequate facilities for general fitness curricula. In this phase it will be enhanced by the addition of a comprehensive Fitness Center.

Phase 1 Academic/ Secondary School
This high school responds to the immediate need of the community for additional education facilities.

Phase 3: Performing Arts
The final phase intended for this site is to fully round out a community center and high school curriculum by creating a place for artistic expression and development.

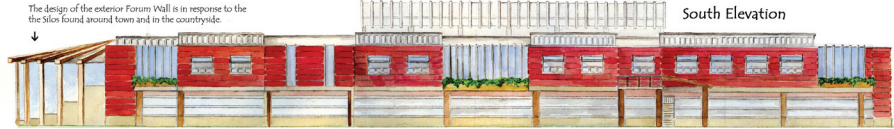


A woman walks to attend a late afternoon choral performance on the back patio (The south colonnade along the library).

Site Plan Scale: 1" = 50'

- Lighter Paving to reduce heat island effect in summer
- Minimize the number of parking spaces in order to encourage use of public/alternative transportation (bike, walk, carpool)
- Minimizing paved areas to reduce run-off and potential for ground water contamination
- Use of Metal Halide lamps for lot illumination reduces spillover to off site which may affect both future residential development and existing wildlife.

Fig. G7 Final Board Layout



Individual Learning Stations

Not every school needs lockers!

Traditionally the smallest unit of a school is a locker. A New American High School designs around the smallest unit being the Individual Works Station. This is a place where a student can truly feel identifiable and that they are not in the lost bit anonymous. The goal is to design a place that avoids students becoming anonymous and unaccountable or unrecognized as having a place within the school.



Students may post photos, calendars, notes and such to make their own.

Lockable Cabinet for valuable storage

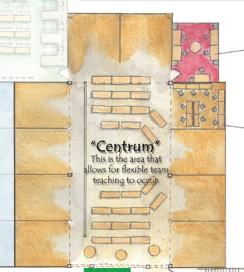


Similar work stations in use.



This is a look into the Library Lounge/Seminar space. Areas throughout the building similar to this are meant to be highly flexible spaces for students to be on an individual basis for studying and socializing, as well as for classes to congregate for discussion and events, and group sessions. Allowing varied locations and spaces for classes to be conducted breaks mandatory for both students and teachers when needed.

The larger unit by which this school is defined is the "House". A "House" is a spatial and grade designated group of students and teachers. For each grade there are two "Houses" located next to each other. Within each House everyone works cooperatively throughout the year to gain understanding of current and relevant topics via core subject approaches. This physical design is geared specifically for team teaching and the use of interdisciplinary methods. The "Centrum" within is equipped with movable partitions to create a single open space or three smaller spaces according to the daily plans for a "House". A House is composed of 10 student "Pods" and one teacher "Pod", which translates into approximately 100 students or less and 3 teachers (2 other teachers teach in other places throughout the building).



Redefining the "House"...

Teachers "Pod"

Houses 5 teachers 2 of which teach daily within the House and 3 others who teach throughout the building.

Student "Pod"

Consists of 10 personal work stations (see above) and create a learning team of students for an academic school year.

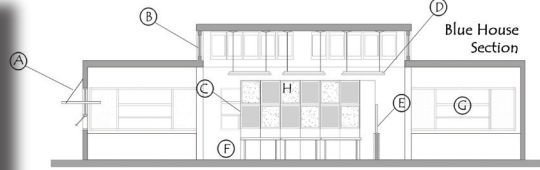
LEGEND

- A - WINDOW Shading overhangs reduce direct sunlight while acting as a light shelf to bounce light further into space.
- B - CLERESTORY Remote controlled shading with operable ventilation openings.
- C - PARTITIONS Accordion-like, these fold out to modify the space and quiet acoustic noise.
- D - LINEAR FLUORESCENTS Last 10-20 times longer than Incandescents and are 3-5 times
- E - HIDDEN WHITE BOARDS Stored within the wall and pulled up as needed.
- F - CARPETING Tiled for ease of maintenance and replacement, also to reduce noise.
- G - POSTING BOARDS Throughout the House each wall has cork board to dampen the sound and allow for display space for various things.

A New American High School

Farmington, Minnesota
Senior Architectural Design Thesis Rachel M. Riopel
May 2005

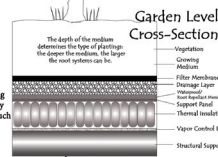
Note: This symbol denotes where sustainable means were directly considered in the design process.



An evening dinner event taking place in the Forum. This space is often utilized by local area organizations and individuals for large events such as weddings, conferences, performances, and presentations/lectures. The on site kitchen and capacity for multiple functions of space make it ideal for many events outside the function of a high school.

Natural lighting is a large part of the programming of this building. Use of daylighting helps reduce electric energy consumption by only requiring supplemental lighting strategies for much of the day. Building users will have a greater awareness/connection to their environment.

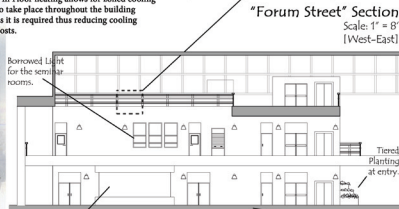
In Floor heating allows for zoned cooling to take place throughout the building as it is required thus reducing cooling costs.



Garden Level Cross-Section

The depth of the medium determines the type of planting. The deeper the medium, the larger the root system can be.

- Vegetation
- Gravel
- Medium
- Filter Mesh/Net
- Drainage Layer
- Root barrier or membrane
- Support Panel
- Thermal Insulation
- Vapor Control Layer
- Structural Support



"Forum Street" Section Scale: 1" = 8' [West-East]

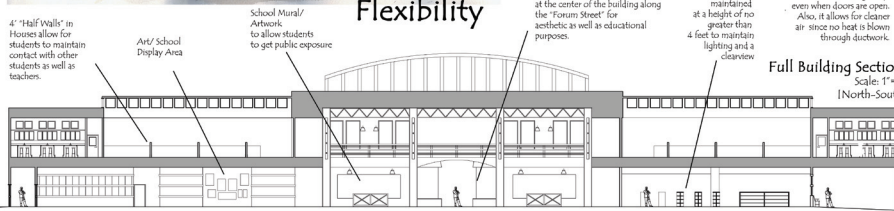
Borrowed Light for the seminar rooms.

Aquariums are placed at the center of the building along the "Forum Street" for aesthetic as well as educational purposes.

Library Stacks are maintained at a height of no greater than 4 feet to maintain lighting and a clear view.

In Floor Heating maintains building temp. even when doors are open. Also, it allows for cleaner air since no heat is blown through ductwork.

Gaining Flexibility



Full Building Section Scale: 1" = 8' [North-South]

4' "Half Walls" in Houses allow for students to maintain contact with other students as well as teachers.

Art/ School Display Area

School Mural/ Artwork to allow students to get public exposure

Fig. G8 Final Process Boards



Fig. G9 Photo: Final Presentation Display



Final Models

Fig. G10 Final Site/
Context Model





Fig. G11 Final Building Model



Title:**A New American High School
Farmington, Minnesota.****Building Type:**

My thesis project is an educational facility for secondary learning, grades 9-12, in the growing community of Farmington, Minnesota. The organization of the spaces within the building will take on a newer non-traditional configuration, in response to research findings demonstrating students' increased benefits from a more community-like environment.

Conceptual Basis or Unifying Idea:

Student: an attentive and systematic observer.

Architect: the one who plans and achieves a difficult objective

Teacher: one who instructs by precept,
example, or experience.

Not only do architects have the privilege and the responsibility to protect the health, safety and welfare of the public, but also to promote, enhance, and ensure those rights. As architecture creates experiences through buildings and environments it becomes a lasting teacher to all those who interact with its products. A school is defined as an organization that provides instruction, and its physical environment can either enhance or inspire the instruction of the students. In recent years the idea of what a school is in America has been changing. "Public schools have been notoriously resistant to imaginative design...Even now, creativity is the exception" (Carrens, 1997). This thesis is an attempt to push the design of a public school towards becoming an environment that will inspire. My focus will be on the quality of spaces and their affect on the organization of the students and staff. The concept for this project will be to invoke a strong sense of community and place by means of spatial arrangement. The building's design in scale can create a sense of community in which the students and staff will feel more at home, rather than lost in space. "(They'll) care because they feel cared about" (Toch, 2003, p.21).

Project Justification:

The city of Farmington, Minnesota is ideal for the development of a secondary school facility. Currently, there is a plan to build a new high school by the year 2008, due to increasing population. In the past 10 years there has been a constant shuffle of students from one facility to another, as the district is experiencing growing pains. Farmington's high school was reduced from four grade levels (9-12) to three, moving the 9th graders to the middle school facility. The middle school (west) facility, which now houses 8th and 9th graders, was outgrown 6 years ago resulting in the construction of the new middle school east on the same site, merely 100 yards from the west building's front door. The newer facility houses 6th and 7th grades.

Demographics for the community are showing signs of projected growth in the upcoming years.

School	Number of Schools	Grades	Enrollment
Elementary School	4	K-5	2,820
Middle School	2	6-9	1,617
High School	1	10-12	944

Table x School Enrollment Figures

Looking at the upcoming population growth there is a need for more space in the high schools and middle schools. Therefore a secondary school is justified.

Emphasis:

- Relationship between students and their environments
- The function of space and its integration within the curriculum
- Environmentally and Socially driven design
- How quality of space determines the type of education a student perceives

Site Information:

The site for this project is located in Farmington, Minnesota 25 miles south of St. Paul, Minnesota. Population totaling 12,365 is evenly split between male and female. One third of the population is under the age of 18 and the median age for the community is 30. The coldest average temperature is reached in January at 12.7 degrees Fahrenheit, while the warmest is reached in July at 72.1.

The particular site is proposed for a plot of land just south of the current high school on Denmark Ave./Akin Rd at its southwest corner of 220th St. W. This site was chosen for its proximity to the existing school facilities so as to utilize previously existing amenities, such as sports facilities, and other extracurricular organizations.

“Farmington is situated on the Vermillion River, about fifteen miles from Hastings. This place is rightly named, for it looks like a village of farms. Good soil, good water, good timber and intelligent citizens is their wealth.” (www.ci.farmington.mn.us)

Situated near the Vermillion River, the history of the town is rooted firmly in farming. Hence the name; Farmington. It is also the home of the Dakota County fairgrounds. Every year for the past 135 years the fair grounds have been hosting the latest and greatest in technology, craft, and equipment for the region.

Major Project Elements:

- Classrooms (units to be determined by further inquiry)
- Team teaching areas
- Private classrooms
- Science Labs
- Bathrooms
- Lunchroom
- Library
- Storage
- Mechanical
- Parking
- Administrative Offices
- Teachers offices
- Kitchen
- Forums for large group activities/presentations
- Audio Visual room
- Art studio
- Exterior Planting Spaces (planning for future development of site)

User / Client Description:

The users of this building will include the students, faculty, and staff of the school. Secondly, there will be users that extend beyond the day-to-day student body, as the space will be designed for use as a community education facility as well. The building is intended to function as a base for the students, for their interaction with community professionals, while at the same time creating a space for the local community members to carry out continuing education and/or public meetings.

Ultimately, the client will be the State of Minnesota and School District 192. They will be the source for the funding of the project.

My intention is to design a school within the following parameters (the final size depends on feedback from research in progress):

- 400 - 800 students
- 16 - 32 faculty
- 1 - 2 counselors
- 2 administrative assistants
- kitchen staff of 3-4
- 1 principle
- 2 facilities maintenance persons
- Parking for 300 (not all students will be driving and there will be alternate means of transportation provided to keep parking space minimized)

Design Methodology:

Research methods for this thesis design will include a great deal of reliance on professional and practical advice. Interviews will be done with each of the client and user types, case studies completed encompassing a wide range of educational facilities from the region, and research done through examination of literary publications on the issues will provide the bulk of the information.

Realization of the Design Method in the Design Process:

The design methods used are evidenced by synthesis and analysis of collected data and feedback. A primary contributor for my design will be the real life reactions and opinions people have about learning environments. The feedback will be sought from qualified and experienced professionals as well as from students.

Documentation of the Design Process:

Throughout this project the most important issues to document will be the feedback from consulting parties. I have a notebook/journal/sketchbook that contains any and all observations I have made from the very beginning. There is also a binder that will contain any printed or copied material for future reference. Each of these sources will be filled in chronologically and by subject matter.

Resources

Books:

Architecture for education. (2002). New school designs from the Chicago competition. Business & professional people for the public interest. Chicago.

Coates, G. (1997). Erik Asmussen, architect. Byggforlaget; Sweden.

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Journals:

American School Board Journal. (Issue 13/2004). Learning by design.

Klein, J. (1999). Architecture. Guiding light to energy efficiency. (issue 2, pp 126-8).

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Minot High School website, (nd). Photos. Retrieved November 20, 2004, from <http://www.minot.k12.nd.us/mps/cc/>

Heritage High School website (nd.). <http://heritage.nn.k12.va.us/aboutheritage1.htm>

Apple Valley High School website, (nd). <http://www.isd196.k12.mn.us/avhs/>

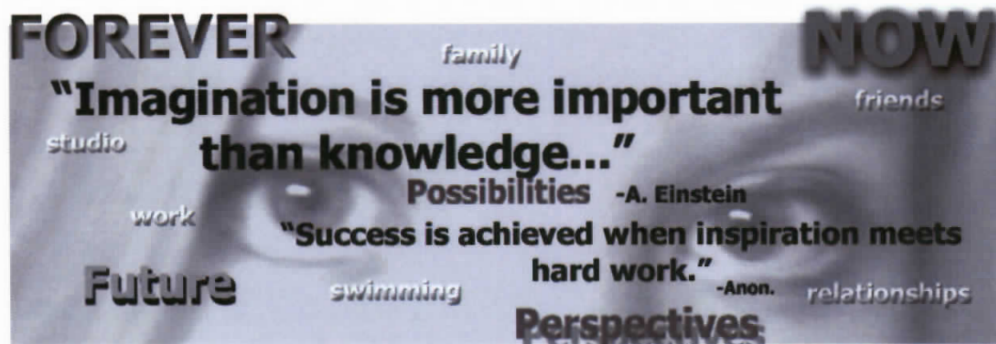
Rogers High School website. (nd). <http://rogerssh.elkriver.k12.mn.us/home.html>

U.S Department of Energy website: <http://www.eere.energy.gov/buildings/info/design/integratedbuilding/sustainable.html>

W.M.E.P Interdistrict Downtown School website: <http://www.idds.k12.mn.us/index2.html>

F.A.I.R School website. (nd). <http://www.rdale.k12.mn.us/fair/grades.html>

Minnesota Office of Environmental Assistance website: <http://www.moea.state.mn.us/greenbuilding/examples-mn.cfm#applevalley>



Dedicated to:

Each and every person who has touched my life with their support, their wisdom, and the willingness to let me make mistakes and help me learn from them. The best way to learn is by experience. Thanks for all the great lessons, I'll be seein' ya.

Rachel M. Riopel