Nick Miller

Connecting a Rural Public School

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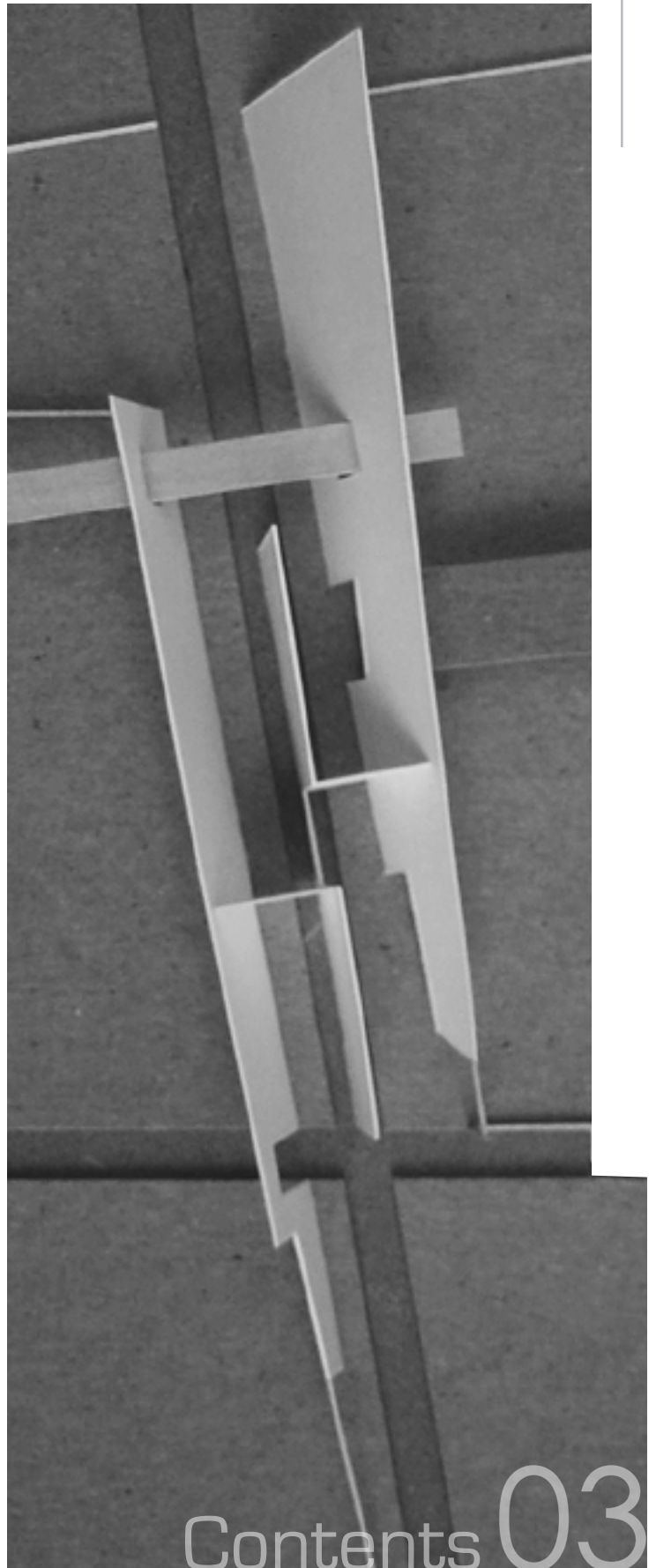School of Architecture
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Abstract + Connecting a Rural Public School

Currently the stock of buildings in American school districts is becoming old and is no longer suitable for learning. When these buildings are gone will the same type of building replace them? Or will people step up and design new schools with current ideas that will allow the public school to provide the most that they can for their communities?

This thesis investigates current issues in rural public school design and looks into ideas to remedy them. Current and contemporary schools still use building ideas and teaching styles from the 1900's, but in the present time these are obviously no longer acceptable or relevant. America, even though it is a powerful nation many schools lack money to even support art programs or sports teams. Something needs to be changed so that new, well designed, schools are thought of as a necessity.

Public schools need to find new and contemporary ways to solve public school problems such as lack of money, lack of community interaction and lack of indoor-outdoor relationship. In this paper an idea of connections will be investigated to remedy the current situation of public school and attempt to make American schools relevant again.

Current Issues in School Design:

In America, public schools have been utilized since the mid 1700's to teach the American public.[1] In the process they have became the cornerstone of both urban and rural communities. The schools system, and its districts, have grown into major proportions and are responsible for about:

$1 trillion being spent nationwide on education at all levels for school year 2007-2008, a substantial majority will come from State, local, and private sources. This is especially true at the elementary and secondary level, where just over 91 percent of the funds will come from non-Federal sources.[2]

Therefore 91 percent of the money to pay for public schools will come from Americans' pockets. Currently, most school district buildings in America are between thirty to sixty years old. With buildings this outdated how does American education keep up with the current ideas in curriculum: it doesn't. Even though large quantities of money are put into the education system many districts are still unable to build new buildings and some are almost bankrupt.[3] When new school buildings are built most fall into the same traps that existing buildings do, therefore rendering them almost useless. The American school system is in a hiatus with design and implication of technology, so how can America connect the students back into the school making a building susceptible to today's technology, curriculum, and making a connection to the community that allows all residents to use the facilities of the school.

The majority of the current school building stock in Michigan, as said before, has been constructed in the time frame of thirty to sixty years ago which brings up some problems in the pres-ent. Due to this age the schools are unable to integrate new technology as useful as a new school with proper design would be able to do. Currently:

the architecture and physical setting of most American schools is deplorable. It almost always follows the passive 'egg crate' closed classroom format of 200 years ago, and all too often it is more like a prison than a place of discovery, wonder and creativity.[4]

This type of design is restrained by the ideas of the 1850's. Why haven't the current school districts tried to escape from this grasp from the past? How can current districts look past this into a new design with the help of an architect and the proper use of the people residing in the community?

Even though large quantities of money are put into the education system many districts are still unable to build new buildings and some are almost bankrupt.

In rural areas the schools are almost always the largest structure in the community due to the numbers of people they serve. Being the largest building in town, it is evident that schools always take a large quantity of funds to construct. Where does this money come from? It usually comes from bonds because they "place very large sums of money into the school district at one time."[5] When the bond method is chosen the school goes to the voters to pass whether they will accept the new bond. But, "in today's world of taxpayer revolt, many school districts have trouble getting bond issues passed."[6] If the taxpayer is an adult and has no children expected to go to public school why would they want to see their taxes used on a school? They are expecting that a new school would hold no importance to their life. To reconnect the school to the residents of the community, a position must be constructed that includes these people that do not use the school, but do eventually pay for its construction.

Community connection through public schools is also strained by the current idea that schools should be left on the outside of the town that it supports. Currently most rural schools have no connection to the center of the town. This lack of connection keeps the children more secure from people coming to the school, but at the same time it alienates the residents of the community from their tax money. If the school was put into town security could be manipulated so that it worked with the safety issues, but this new distance would allow people from the community to have easier access to the school and its uses. Not only will this allow the adults to better connect, but it would also let the students ride bikes, or walk, instead of riding a bus or having a parent bring them in the morning. Many rural American towns have the ability to go without school bus systems inside the city limits due to the small size of the towns, therefore saving gas money.

Other issues regarding current school design include aspects from security to safety. Recently, American school security has become a major issue and spending point. With the additions of cameras and metal detectors, before and mostly after Columbine, the public school system has spent much more money in the realm of security. Are metal detectors and cameras necessary in a school? Or, does doing this just treat our children as though they're in a jail? Putting extra security devices in a contemporary school only increase the initial cost which brings down the cost spent on regular school necessities. Instead of a camera can "a well-planned facility and grounds can significantly enhance the safety and security of students..?"[7]

Many questions have been asked while many still remain. How will a school be designed in a way that fits all of these principles that currently effect schools? Current American schools are inadequate, so how can these schools that do not work, form a generation of buildings that will work? Also how can this not only fit in America, but how can it fit in Merrill, Michigan, the site of this project, and connect to the rural community that enjoys almost no commercial buildings and no extra space for the residents to use?

Putting extra security devices in a contemporary school only increase the initial cost which brings down the cost spent on regular school necessities.

Rural Areas:

Rural American schools have the largest footprint of their community which allows them to easily be at the core components of their town. Towns that are less then 1,000 residents usually have more people from the surrounding community enrolled in the school than live in the town's limits. Towns of this size also have minimum commercial space and lack most things that larger towns and cities take for granted. Small communities do not have gyms for working out, they do not have spaces large enough to hold special events, they do not have places to hold conferences, and they do not have performance spaces. Towns like this only employee the necessities when it comes to buildings. The spaces that are lacking in towns can be executed if they are shared with other actions because they would be cost effective. A school could hold these spaces that act as two different uses therefore allowing the money spent on the school to be used in two ways: the community and the students.

Problem Summary:

Since current schools are not aligned with current concepts in curriculum, building design, or community involvement how do the schools of the near future get constructed in a way that will allow a school to have the most contemporary ideas? The way to do this is thru connections. The problem with public schools today is that they lack connections: connections between the community, connections to the outdoors, shared spaces that connect adjoining parts of a school as well as many others. If we implement an idea of reconnecting schools it will allow for the school districts in the future to have buildings that are more suitable for their community members and students. These connections will eventually save money for the district, the people attending, and the taxpayers.

The absenteeism of connection is the current state of the public school. Most are so disconnected from the community and each other that it is not clear to the community and school members that a school can be connected. The idea of connecting a school as the problem of current and new contemporary schools will cover a lot of the problems that exist in public schools, but it can obviously not fix all of the necessities that are needed in a school. The following paragraphs speak of the largest connections that schools are lacking.

Community Connection:

Communities are the biggest spenders when it comes to the creation of a new school, but as stated before only a select number of the community's residents gets to use this public institution. Since the community, especially in a rural setting, pays taxes for this construction it should be the case that the community is allowed to use the building for activities that the community allowing them to feel ownership of the building they paid for.

Another aspect of schools that does not allow rural residents to enjoy their community school is the separation between current schools and the town it resides in. Many current schools reside at the outskirts of town secluded from almost all actions that take place in the town. Some communities have schools that at one time where outside of the town, but now are surrounding by homes and other building types due to growth. Both of these examples are still unconnected form the community because their connections are an afterthought and do not allow for the necessary spaces and design ideas needed for a clear connection. For a school to be connected into the community and allow for effortless sharing of spaces it must be near the center of the town and must have links to major thoroughfares and sidewalks. This will allow the school to actually become a part of the city and not an outsider.

If the whole school is to be connected with the community it would also be necessary to have the three schools: elementary, middle, and high to reside in the same location. Current school districts are spread throughout the community lacking connection. To put all of the schools together would connect the students and administration allowing them to directly converse and socially interact.

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With the connection to the community, schools in rural areas should be able to be built easier, due to the easier passing of bonds, and have more relevant uses therefore saving money for the community. A problem with the idea of community connection will be security from one use type to another, but with an intelligent design this would not be an issue therefore making the connection will be beneficial to the school district and the community.

As stated before, security in schools is very tight in many places of the nation. Rural and urban areas have the same issues as well as some differences. Security in schools, especially ones connected to communities, has to be tight but should use social security instead of a physical security. Social security involves the students and faculty knowing who is supposed to be in the school and alerting faculty or police if someone is suspicious. This would work superior to cameras because cameras are not watched 24/7 therefore they do not stop a person from committing crime. With the use of natural surveillance the security of the school should work well without mechanical measures. Security also appears in other forms. Keeping students secure from each other is also a current issue in contemporary schools. Natural surveillance, which involves "windows, lighting and landscaping to improve your ability, and everyone else's ability, to observe what is going on inside and around"[8] a school, will be a deterrent without the use of mechanical products. Teachers with the knowledge of each student's mental situation will also be a major security implication. A school that combines kindergarten thought twelfth grade will have to find a new ways to secure the spaces between these students. The use of separated spaces with intelligent design that does allow visible but not physical connections can remedy the needed separation. It is possible to construct a school that is not a jail, with the right design ideas and implementation of programs used by the teachers a school can break the current mold of an abundance of electronic deterrents therefore saving the money and using it else where.

Shared (Spaces):

Rural schools, like urban, are usually broken up into elementary, middle, and high. Unlike urban schools rural schools districts usually hold less than a thousand students. Currently the schools that hold these students are housed in buildings placed across the city in no particular order, and usually do not have a relationship to one another. Why not put all these schools in the same area of town therefore saving site space as well as money on constructing on only one site? This would allow the town to save space and it would also allow the administrators of the current school districts to have an easier way to communicate with each other. Connecting the schools will allow for certain spaces to be shared by two schools therefore eliminating one space form the final program.

Sharing space in schools has been used before but not as often as it is possible. Sharing "spaces (has) a significant impact on the original cost of schools, especially the HVAC capital cost, and also on the cost of fuel and electricity."[9] The benefits also include saving square footage, money, and materials therefore freeing up money to use in other areas of the school. If the three schools where to physically connect the schools could share these spaces. At the same time these spaces would have to be safe for the people that use them. If shared spaces are to be used with the community a new building or separate area will have to be constructed so that the space is secured from the academic part of the school. This building or section could also hold other support rooms, allowing the academic areas to be free of unwanted rooms. Sharing spaces therefore unfreezes a lot of money that can be used in other spaces in order to improve them. Due to the need of an area separated from the main academic portions of the school, why not add the community spaces into this area. This separation will not be drastic, but will be socially recognizable so that it deters people from entering the academic areas. Shared community space can also serve as a buffer between the academic part of the school and the main community entrance into the school.

Indoor (Outdoor):

Children of all ages learn from our natural environment. When at home children learn not only from their parents but also from their surrounding inside as well as their environment outside, therefore they have a good balance of both which is necessary as a human being. Therefore, "teaching in natural situations offers a context in which no textbook or computer-based learning environment can complete."[10] Children, in the first years of their schooling should be able to learn about 65% in class and 35% from nature. In current schools the inside learning is set at about 100% of the learning while a small percentage is spent outside on recess which develops social skills, but it is not much of a learning experience.

Schools, especially elementary, should invest in more time outside with their students in gardens or on nature hikes therefore teaching the students how to care for and learn from plants and nature. Doing this will not only allow students to learn in diverse ways, but will also allow students to think green at early ages therefore giving them a head start on saving energy. If the students live in urban or suburban areas the school can also introduce them to a bigger aspect of the great outdoors through field trips.

To implement these ideas architects should design ways that allow each classroom to have individual space outside, and a threshold that connects them. With elementary schools a garden should be used for every classroom and allow space for every student to grow his or her own plants. This will allow the students to care for and watch their plants grow. For the middle school certain classes should have gardens but they do not need to be used for all classes. In the high school the garden should be placed around the science wing and allow space for a green house to be connected to the biology room. This will allow the high school students to be more specialized in what they grow. Growing these plants can also be used for other things such as eating, and or using them for experiments.

During the winter months these gardens can be used for other experiments and be used for other ideas. Overall the indoor / outdoor connection will be very important to the schools overall design because the connection between the two will have a big effect on the students learning.

Layout:

After looking through all the connections it is inevitable that these ideas will greatly shape the final school in the early stages of design. The school will be connected through physical feature and have a major emphasis on visual views. To connect the schools and core building together it will be necessary to find a way of connecting that is secure. Connection through visibility can unite the schools and the students in them. This would allow the kindergartners to see the twelfths graders and vice-versa. This will allow for a school that is aesthetically pleasing as well as day lit due to the views that are inevitability going to be through windows and voids. All schools will also have layouts that play off of one another due to the use of views and the shared spaces. This will have the necessity that the schools should be similar in design because they are almost the same building. To keep the schools noticeably different it is also necessary to allow for some variation in design which will allow for different aspects. The variation will also allow pride between the students of a particular school and give the ability for a student to recognize a sense of ownership of their building. The simplest way to separate different schools is entrance design. The entrance design will be the most discerning factor of which school is which. It will also allow more pride for the students entering through the threshold of their own building. The layout of the school will be manifested from the ideas mentioned above, the previous ideas of connections, and the site that is occupies.

Closing:

A rural school district has the ability to connect schools into a centered complex and hold activities and rooms that are not normally held by a school. This idea of a school is beneficial because it will save space, money, and time for the people of the community. It is obvious that the four connections mentioned above are not the only aspects that make a rural school a great school. Many more ideas are needed to produce a usable school. The connections will offer an initial point to start from that will in the end produce a school that is friendlier to the community and better connected to the outside environment. These ideas will not work for every type of environment, but for a rural community it will have the greatest chance of success.

The rural American public school will eventually need revamping due to the age of the current buildings. In the near future many new schools are going to be built to replace decrepit buildings that can no longer withstand the age of their materials. When these new schools are built, the American education system will most likely be lacking money and therefore have to construct schools that are not up to par with current ideas and technology. By connecting with the community and sharing spaces, money can be saved and the occupants of the city will feel that they own a part of their schools. When the time comes and the old methods have become outdated, the new school described in this thesis paper can be implemented to fix the current issues that schools embrace.

Precedents:

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Bay City High School + Perkins & Assco. + 1922 + Bay City, Michigan

Bay City High was completed in 1922 and still stands as a high school today. The strength of schools from the past come from their ability to be well organized and strength in materials. In the era that Bay City High was built architects were still interested in buildings that would out live them. Bay City High is important because like most schools it uses halls to transverse the school in a very simple and effective way. At the intersections of these axis the addition of extra space is used to create a interaction space for students.

Bay City High's architects Perkins & Assoc., designed many schools before the Second World War. They strived on trying to fit the school into the small communities that they usually work within. Perkins & Associates had three major aspects that they looked into: linear layout, well organized spaces, and strength of materials. The main entrance of Bay City High is well defined and sits just below the tower. Two secondary entrances are also defined and allow the school to have the gym and auditorium to be open without the rest of the school. This allows the community to use the school after hours.

Of all the important aspects of the school the one that is the most important for the well-being of the students is the North facing courtyard. About 80% of the classrooms are placed along the courtyard. This allows the students to interact with the outside and with the occupants that are outside. The courtyard also offers a secure place for the students to sit and interact. The courtyard also lets the ambient light in which will allow classrooms to save energy.
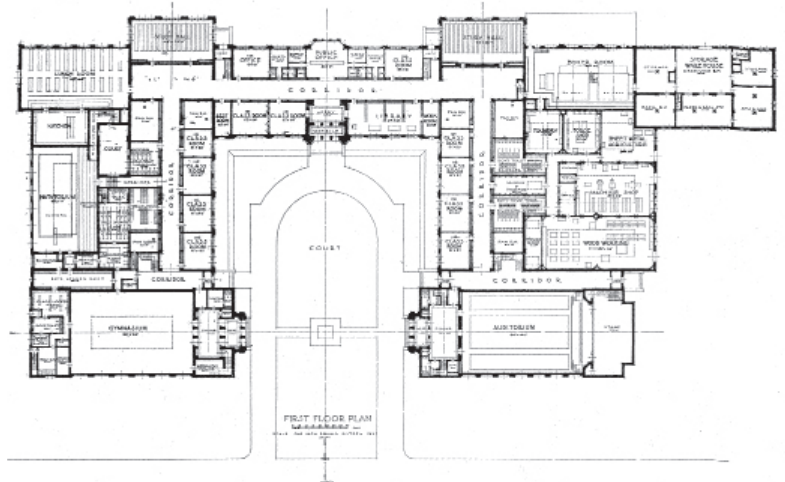
Perkins & Associates had three major aspects that they looked into: linear layout, well organized spaces, and strength of materials.

Bay City High School + Perkins & Assco. + 1922 + Bay City, Michigan

Some aspects of Bay City High that may be less inviting to a contemporary school design. The school was constructed about a hundred years ago and it is almost impossible to construct a building the same today. Technology today has changed so much that we can try to get to the same end, but the means would be tied to today's standard. Also the detail of that time was much more elaborate. Today this is almost unacceptable, but it can be put into new designs through detailing.

In conclusion the best things to come out of Bay City High that will influence new designs are important to the wellbeing and safety of schools. The courtyard, layout, and strength of materials are the most important pieces and should have some what of a presence in modern school design.
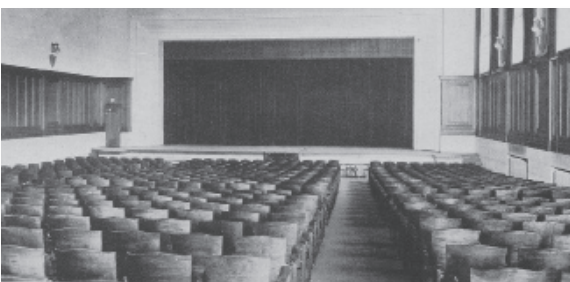
Troy High School + Perkins & Will + 1992 + Troy, Michigan

Perkins and Will have designed many Midwestern schools in the past decades. Most of the firm's schools have the same feel no matter what site they occupy. Troy High School was constructed in 1992 just far enough from Metro Detroit that it sits on somewhat of a rural site. The architect used this space to sprawl the school out over the landscape. Overall the school has been laid out well, but still leaves things to be desired.

The layout of the school has been used before in many school since World War Two. The "finger layout" allows for pockets of courtyards and a good space for light to be let into all classrooms. Even though the finger layout works in most schools the Troy School seems to be to large for this idea. The sprawl of the schools is to massive over the landscape. The ability to transverse the whole building would seem to be difficult because of the size of it. After looking into these aspects it would be better if the school was built up or had a different idea for layout that did not sprawl.

A few aspects of the building that make it interesting regarding school design are its outside aesthetic and the prominent entrance. The building is lined with patterns of white brick that give the school a horizontal feel. This allows the school to fit into its Midwest setting. At the entrance we see that a vertical element is added. The design still allows this to fit into the style. This entrance as in the Bay City School is prominent in the design to show the threshold that you enter in. Both entrances have the ability to easily draw people in.

The difference between Troy and Bay City School is, among other things, that the layout of Bay City is more compact and organized. Troy is almost like a maze of corridors. The finger layout is a good design idea, but the design team of the Troy High School could have made different choices to make the school flow easier for the occupants. The school needs to be simplified.
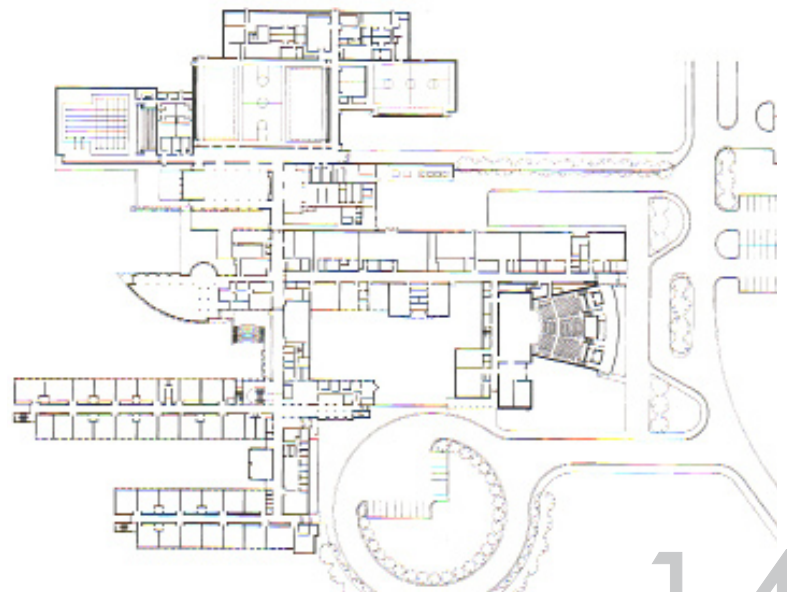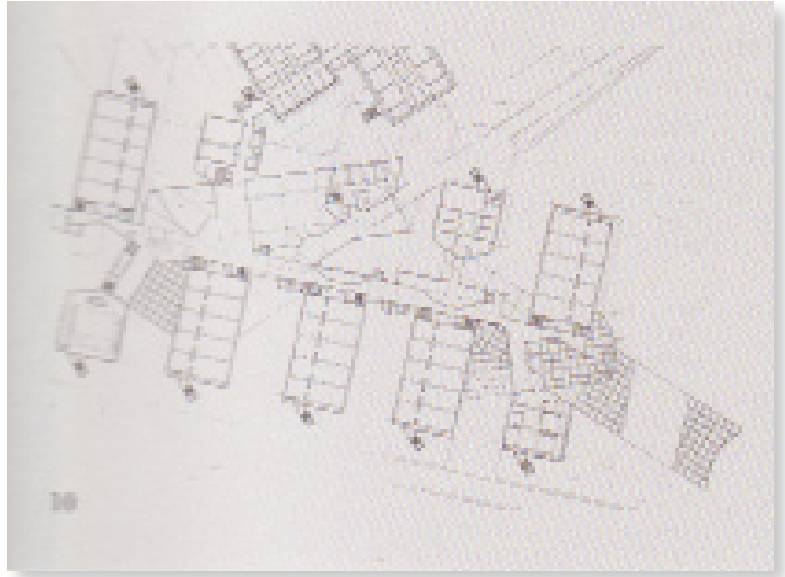
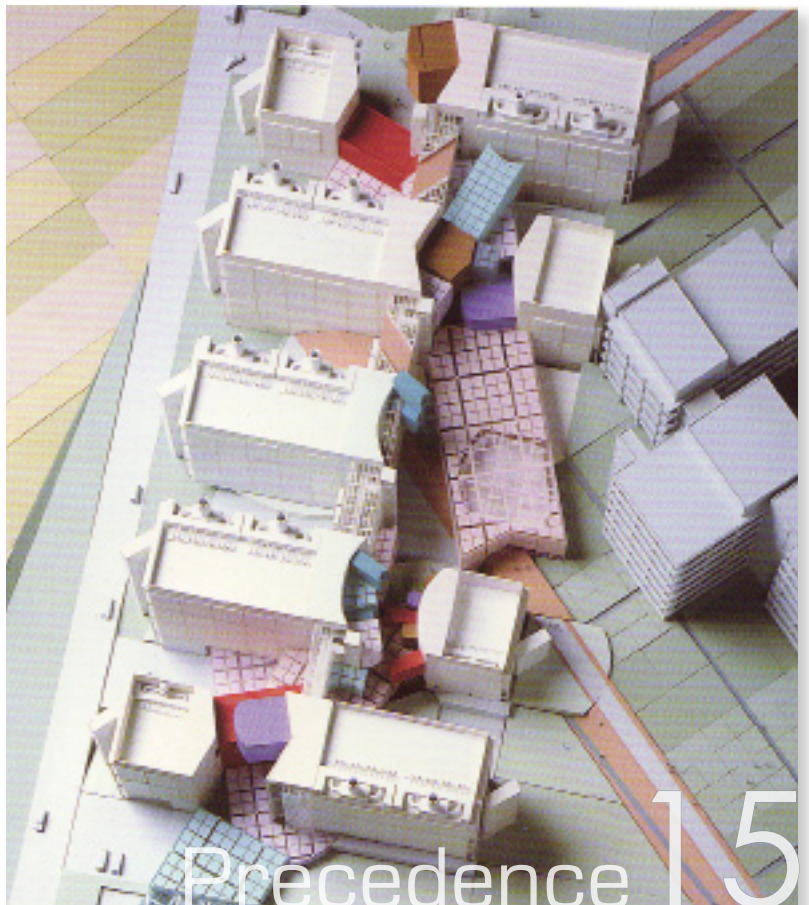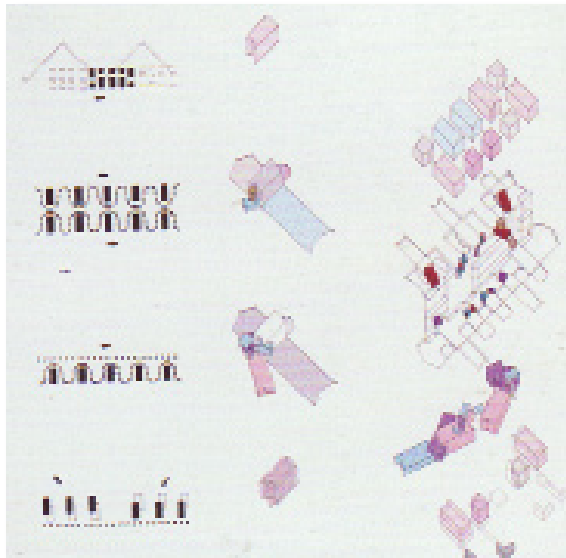# Biocentrum + Peter Eisenman + 1987* + Frankfurt, Germany

Peter Eisenman has been criticized and praised for many of his works. Of his earlier works many were not built, but served as an important progression in his career. His Biocentrum uses symbolism as well as intelligent design to make the building well organized and able to fit into the surrounding landscape.

Eisenman designed the Biocentrum for Frankfurt College in Germany. The College was in need of expanded space for its science program. The building would be used for the science department as well as scientist studying at the college. The building occupies a lot of space that is well planned .

The Biocentrum is symbolic of a strand of DNA sequence. The buildings are set along a main axis that splits the complex into two slides. These sides are from the two sides of a double helix. Using the sequence of DNA allows the building to be forever expanded on a logical grid because of the sequence of DNA. A grid skewed from the DNA was added to represent a virus that is attacking the DNA. This skewed grid allows the building to have a main entrance that is easily accessed by the occupants of the existing science building. It also allows for the design to be split up from it orthogonal grid. Both of these grid allow for easy transversals paths as well as places were the occupants can sit and relax.

The Biocentrum is symbolic of a strand of DNA sequence and a virus that runs through it

Biocentrum + Peter Eisenman + 1987* + Frankfurt, Germany

The Biocentrum, like the previous school, uses the finger layout to get light into the buildings. This layout also allows green spaces between each of the buildings. This design idea will let enough light into the floors that it will be able to save energy on lighting needs.

A few things of the Biocentrum could of used another look at. The well designed axis even thought it is a very important part of the project it looks very clutter on the top of it and around it on the outside. DNA is complex, but it is also simple. Eisenman made the axis more complex than the DNA and it almost looks sloppy. The stairs on the end of the building also looks sloppy for where they sit. They look like they were added after the design was finished. Also it looks as though that not all of the green areas were used to their full potential. No doors go to some of the spaces between the fingers of the building. These spaces would allows people to relax and be outside.

Overall the Biocentrum is a building that does a lot of good things no matter what architect designed it. Its ability to be symbolic, but at the same time be well organized is a testament to Eisenman's intuition and design.

Precedence 16
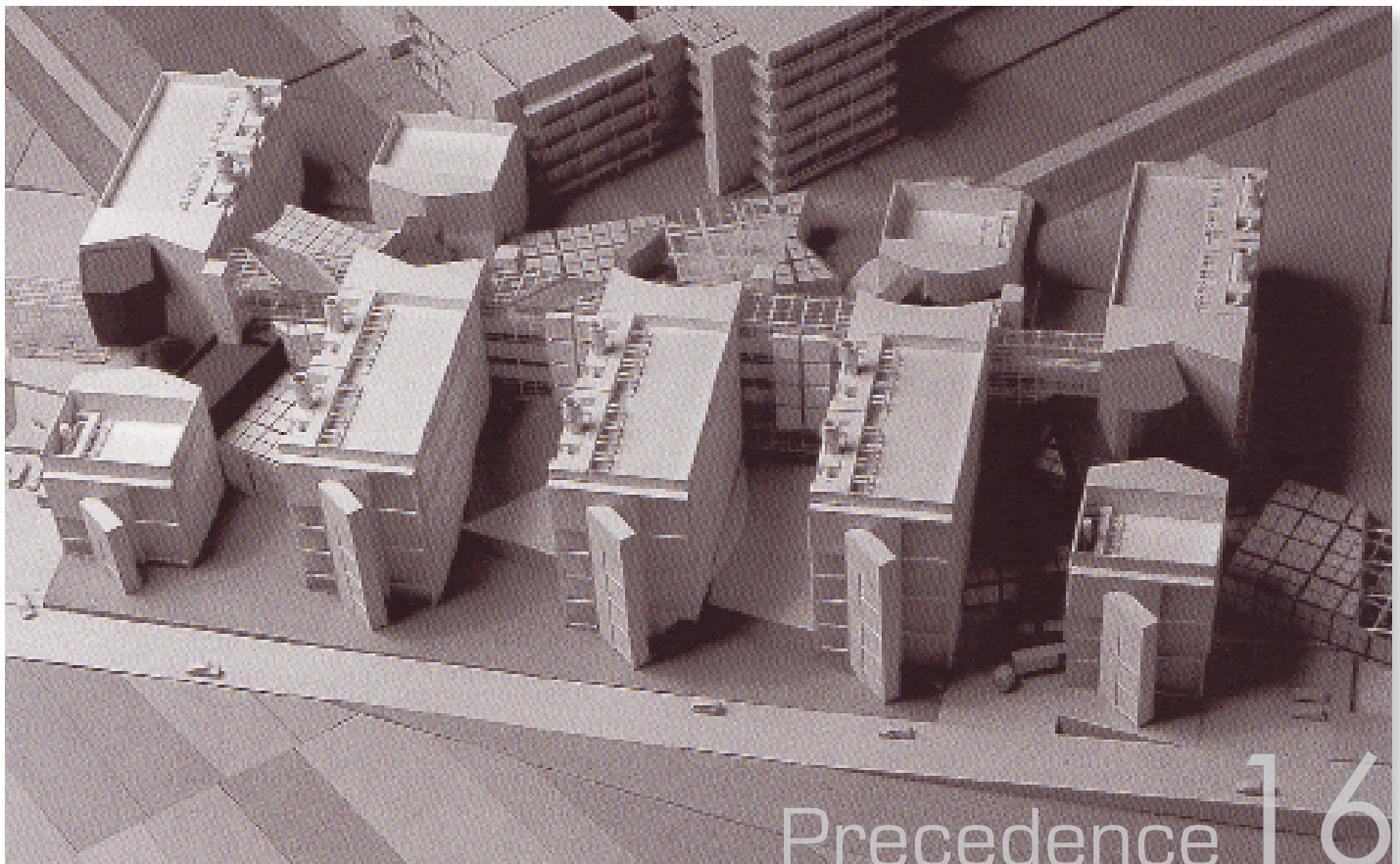
Toryo High School + Yasufumi Kijima + 1990 + Kumamoto, Japan

Yasufumi Kijima is a lesser known Japanese architect that has done projects throughout Japan. His Toryo High School was one of his last projects that he completed. The High school is based on two grids and has a mix of public and academic buildings.

Toryo High School was constructed in 1990. Its blue roof and skewed grids make a stick out and serve as a community icon for the area of the city it resides in. The building is sprawled like Troy High School but at the same time this sprawl is better organized and still allows the amount of light and outdoor space that Troy received.

The Toryo High School is based on two grids. The one that is parallel to the road, houses all of the public spaces. These spaces house the administration, the entrance building, and the school gym. After hours the people of the community can enter into these buildings because they have the community events in them. The main axis connects all of these buildings and allows for a corridor that connects all. The grid that is skewed from the road is the academic grid. Along this are all the classrooms and other structures like the art building. These buildings also have axes that connect them to each other and back to the public buildings.

With all of the skewed axes cutting up the school they leave open spaces between the school's buildings. These spaces have been used as very effective courtyards. Green plants also line the courtyard to allow for shade. The vegetation also allows students to learn about the outdoors. These courtyards allow students to stay within the confines of the school walls when they have breaks. This leads to a security that is very easy to control because the buildings are the fence. The courtyards are easily accessible because the paths throughout the school are open to the air. The ability to open the design to the air would not work as well in Michigan because of the changing weather.

This leads to a security that is very easy to control because the buildings are the fence.


Precedence 17

Toryo High School + Yasufumi Kijima + 1990 + Kumamoto, Japan

Like Troy High and Bay City High, Toryo has a prominent entrance. Like Bay City a courtyard envelopes the person entering the building. The entrance on Toryo High is also used for security. The Administration building is at the entrance and anyone entering the school first has to pass thought it. This allows administrators to check anyone that passes into the building.

After a person gets past the Administration buildings they are in the academic and public part of the campus. The skewed grids are lined with corridors that allow easy circulation to any part of the building. This circulation is located on three floors of the building. The biggest aspect about the skew grids is probably the ease of circulation the it allows when transversing the building.

Overall Toryo High School is the best planned of all three school precedence. It incorporates the finger plan in a modified conception. It also has a circulation plan that gives students the ability to move through the campus relatively fast. The skewed grids also allow for a security systems that are incorporated into the building. The Toryo High School is the most successful because it uses the idea of skewed grids to accomplish a lot of problems that are programmed into most modern schools.

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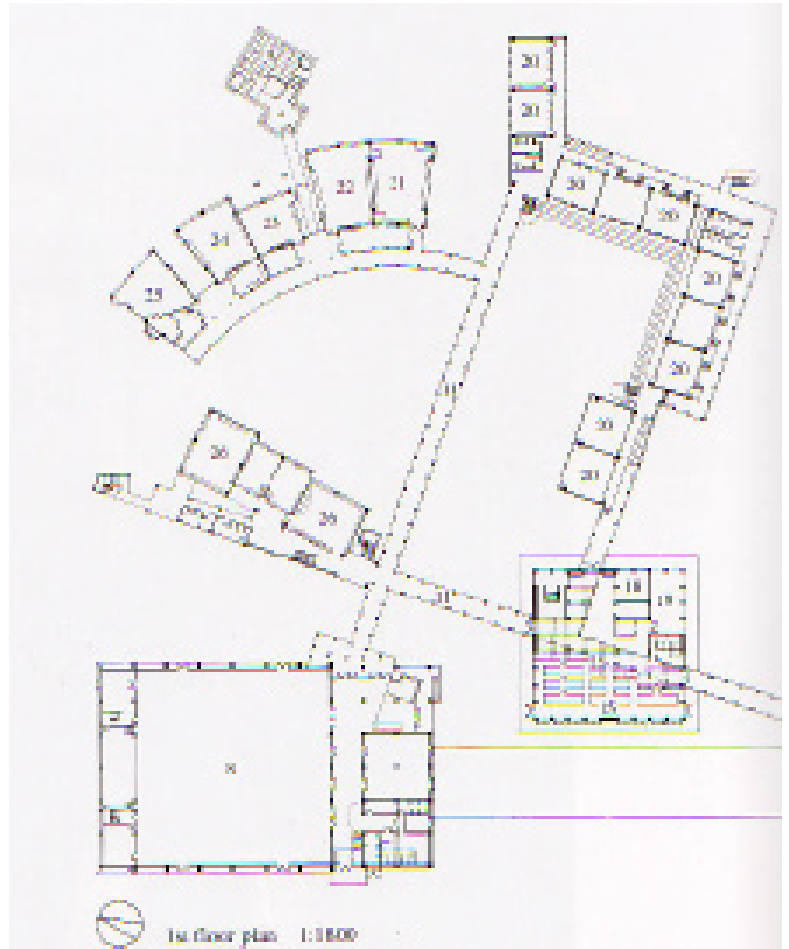
Diamond Ranch High School + Morphosis + 199? + Diamond Bar, CA

Diamond Ranch High School like Toryo High School is well designed because of its lay-outs of rooms and its solid and void spaces.

Diamond Ranch is different than the previous schools in that it almost completely separates the learning area from the rest of the campus. Near the entrance is the administration, gym, and other public areas. While the back behind these areas are the classroom pods. This is relevant because it helps control security.

The use of solids and voids in this project also allows it to be very intriguing. This aesthetic quality is said to make the students work better in their studies. The voids also allow outdoor spaces that are protected by the walls of the school. These outdoor spaces allow students to interact outside by being involved in sports.
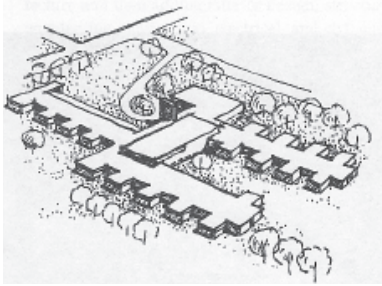
The best idea to come from this school is most likely the axis on which everything in planted on. This axis allows the students to go straight to class or to stop at the gym. It is the main artery of the school and its location outside makes it very interesting .

1950's

The new schools in most parts of the nation were no longer classical, traditional, colonial, Georgian, Gothic, or eclectic but were "modern," often meaning that they were one story and flat-roofed with glass and metal window walls and brick or concrete walls. The period was the beginning of a new age of innovation in education architecture. Standardization was implemented in many designs.

1960's

Studied and promoted the use of an open plan which used folding and movable walls to gain the advantages of flexible space, investigated and funded examples of "systems" building components to build schools faster, cheaper, and better, explored the use of new media, especially television, and studied how they might influence school design, and encouraged trying new ways of teaching such as team teaching. EFL – Educational Facilities Laboratories was created. EFL researched school design.
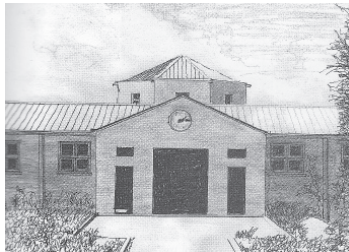
1970's

Many school are designed with the intent of being used by the community. Designs started to be laid out like villages. Flexible spaces were still widely in use. Middle schools start to grow strong in use for school systems. Many schools are tore down or reused as a different use.

Design must be flexible just in case building was to be re-used. School buildings start to decline in amount being built as well as the well keeping of the ones already present.

1980's

A boom in the birthrate added the need for more schools. Many new groups helped architects plan schools such as the AIA. The "house plan" is adopted as a new layout style. It involves the plan being put into clusters. Computers start to enter schools which leads to new design issues.
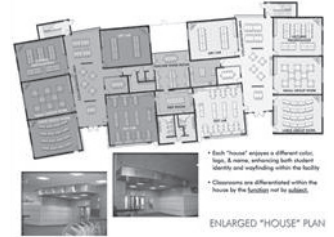
1990's-Present

Computers have become a major part of schools. New materials have also influenced new ideas in school design.

Site:

Merrill, Michigan*
Coleman, Michigan

Coleman, Michigan + History + Founded mid 1900's

Coleman was established in the mid 1800's and the Pere Marquette Railroad was added around the 1870's. Coleman has a population of 1,296 residents. The current school holds about 1,000 students in three separate buildings. The high school was constructed in 1975. The middle school in 1951, and the elementary school in 1957 with an addition in 1973. Currently no rail runs through Coleman. The tracks have been turned into concrete trails for the residents of the surrounding community to use.

Coleman was not chosen as the site because the district was two large and the physical city itself seemed too inclusive to let a new school into the city limits.

Site 22
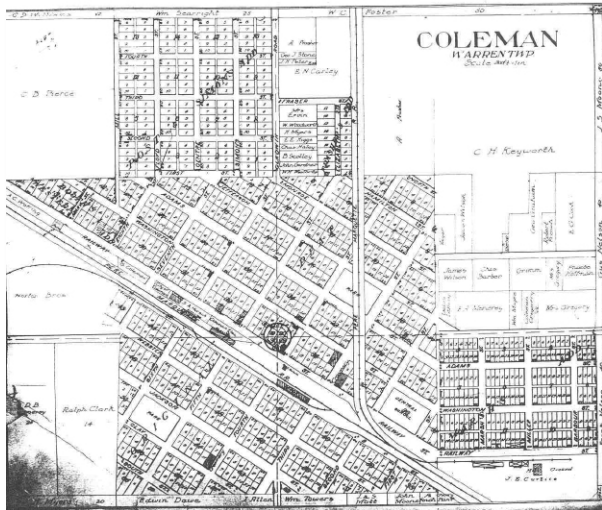
Merrill, Michigan + History + Founded 1889

In 1872 Merrill, Michigan had not received its name, but railroad tracks came through town. In 1875 the first sawmill was constructed in town, and in 1881 Merrill was established. It was named after N. W. Merrill, a man that helped rebuild the town after a major fire destroyed most of the town. In 1889 Merrill was incorporated. In its 125 year history it has been through a lot, but still has the feeling of small town America. Merrill is located in Saginaw County about 20 miles west of Saginaw, MI. Currently the population stands at 800 residents. About 97% of the population is white. The tracks that came through town were used to transport the lumber being cut in Northern Michigan. The tracks ended in Saginaw, MI. After the lumber dried up, the tracks were used for agriculture needs. They transported sugar beets as well as other things. Today the tracks are used for the same thing. A grain silo is still located near the tracks. The first school was constructed in 1872 out of logs from the local area. After a slew of other schools the current schools were constructed. The elementary and high were both constructed in 1952. Due to the growth of student population in the early 1980's a new middle school was added in 1987. The three schools are located on the outskirts of town. One side has a few residences while the other is farm land. Currently the school has a basketball court and a baseball and football field.

Site 23

Merrill, Michigan + Physical Site + Model

Merrill is located twenty miles west of Saginaw, MI. It sits at 670 feet above sea level. The layout of the town has occurred over the years and has inevitably been shaped by the railroad that split the town. The railroad runs straight east to west. The town has a North-South axis but this axis is split by Saginaw Road which has influenced most other roads of the community to become skewed with it.

Merrill is the epitome of small town America. It has a few commercial buildings in a small downtown area and has older houses that surround it. Merrill is also laced with many trees that are able to shade most of the city. The current school district has not used trees to shade it.

Most buildings in the town are more then 50 years old. New construction is very small to none in the town itself. Most commercial buildings were constructed in the late 19th century or the early 20th. The current schools were constructed in the mid 20th century. As with the schools most non -residential buildings have been built with brick. The brick has occasionally been covered by vinyl siding. Most homes are vinyl siding or brick.

For a new building to fit into the existing school site it will have to fit with traditional ideas and be constructed with a material the has the ability to fit in a context where brick is prevalent.

SITE

Site 24
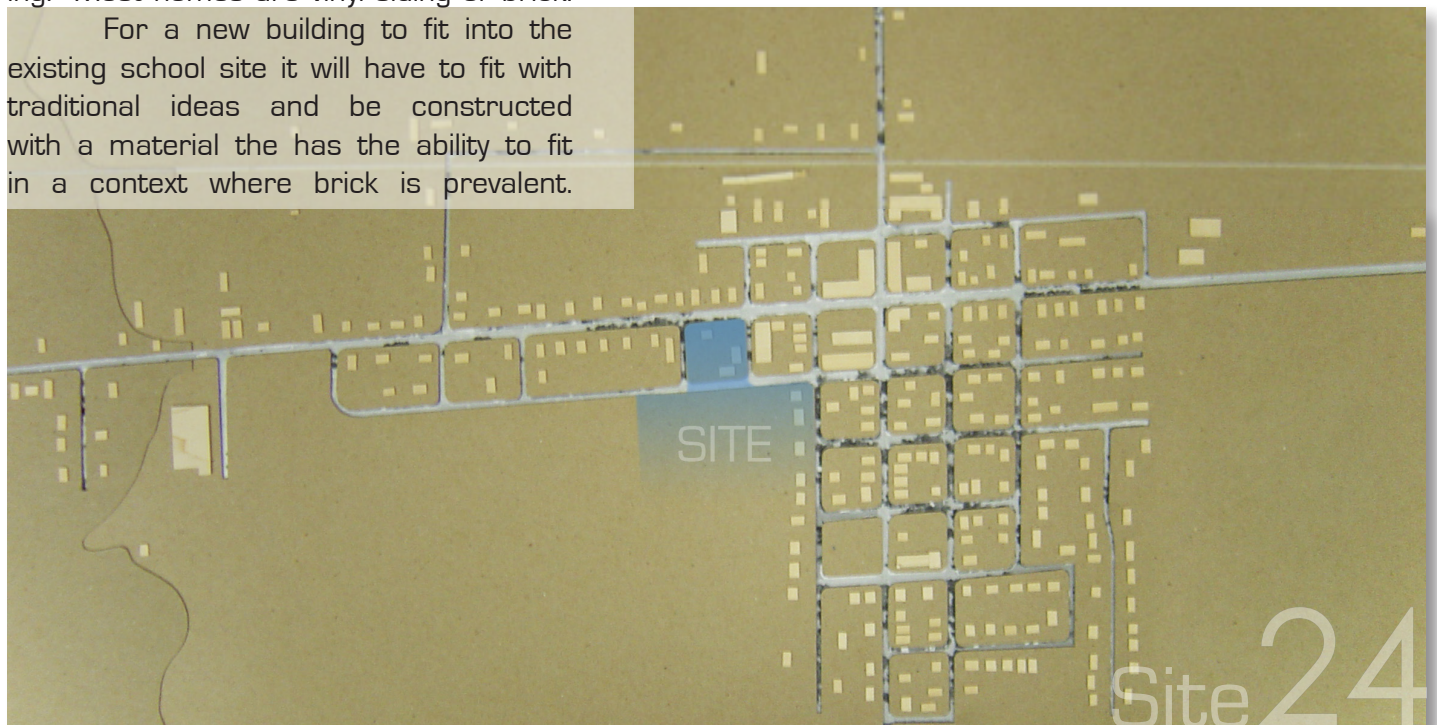
Merrill, Michigan + Climate + Vegetation

The climate in Merrill as well as all of Michigan is temperate. This has the necessity of designing a building that is economical and ecological for all months of the year. The climate in Merrill is also consistent with Mid-Michigan in that it fluctuates all year long and is doused with a good amount of precipitation as well as some sunny days.

Merrill has a average temperate that stays between about 20 degrees in the winter and 75 degrees in the summer. Winter is the most difficult season on building design because of the wind, clouds, and precipitation. The city's location in the center of flat Michigan gives it a placement where a lot of wind can build up. This wind sometimes translates into tornados. Lake Michigan also influences Merrill, many clouds travel from the lakes to cover the city with overcast skies. This happens mostly in the winter. During this time the city has about 30% of non cloudy days. Merrill does not receive lake effect snow, but like most of Lower Michigan it gets about 10-15 inches of snow a year, which can be considerable on a building's load.

A sun chart of the city shows that Merrill receives sun from the East, South, and West. The North sides of the buildings allow ambient light to enter, but not direct light like the other sides. This gives the building the advantage to design different responses to different sides of the building.

Temperature

Clouds
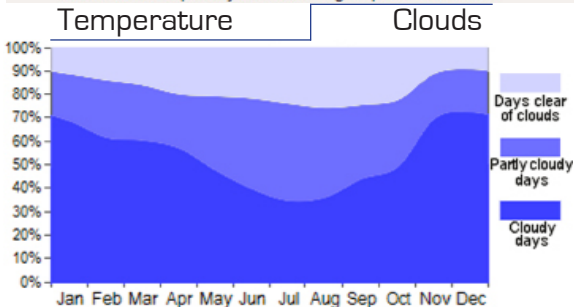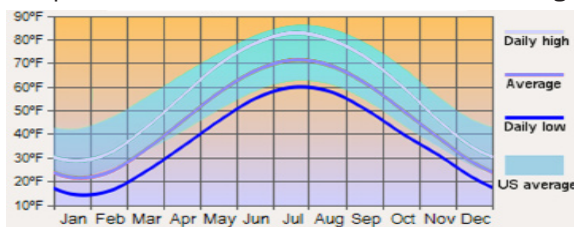
Trees envelope the city of Merrill. About every house that resided in the city is shaded by a tree(s). The current school as well as the grain silos on the railroad tracks are the only buildings that do not have natural shade. This shade is such an advantage because it is free. If one looks at a map of Merrill it is very noticeable that there is a cut-off of trees when one looks at the school.

The landscape of the current school is very minimal. The only thing that is landscaped is an area in front of the Elementary school that is a garden most likely for aesthetic reasons.

Site 25
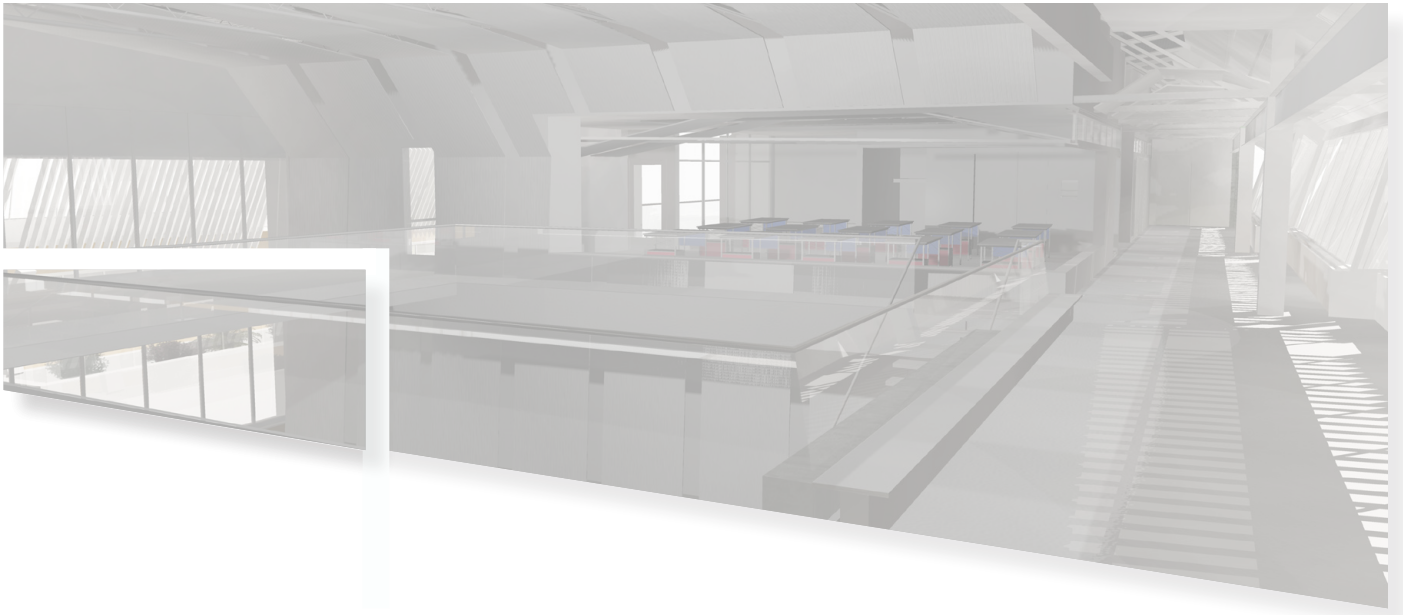
Program:
K-12 Rural Public School

Project Program Summary

The program for this school is defined as a kindergarten through Twelfth grade school. This is not three separate schools that are loosely joined, but rather a complex of schools that are connected physically to one another. A lot of issues are raised in an idea like this. How many cafeterias are necessary? How do we separate the 1st and 12th graders and so on.

Currently the school houses 866 students and about 70 faculty. The elementary holds 371 students. The middle holds 229 and the high schools holds 269.

This schools program will be like current schools, but have additions that include community portions. It will also have subtractions such as one less gym or one less library to save money and space. Being one space less will not be a problem as long as class schedules are timed accordingly.

The program is broken down into four separate but connected areas. The elementary school will house all of the K-5 classrooms as well as support rooms. It unlike the middle and high school will house its own gym and library. This is due to the fact that there is a bigger safety issue with younger students. The classrooms of the elementary school will be larger than the other school's classrooms.

The Middle school will house 6th through 8th grades and be relatively smaller than the two other schools. The buildings itself will only hold classrooms and support rooms. The school will also have it's own art room and computer lab. To make up for specialized classrooms the middle school may share some rooms with the high school.

The high school will be the building with the most specialized rooms. It will house the 9th through 12th grades. Besides classrooms the building will hold a shop, computer lab, art, and music room. It will have the most classrooms and be the most open building. The gym and other spaces will be shared with the community. Most spaces will be accessible to the community at certain times of the day. The gym will be limited in use when the school is not using it. The core building will house many school spaces including the gym, auditorium, and library for the middle and high school. It will also hold the cafeteria for both schools. This will keep the space for a kitchen to a minimum. Other rooms will be a weight and fitness room as well as extra classroom spaces. The spaces that are used for community will be the above listed rooms with the addition of conference rooms that will be used for small conferences and/or family get together.

Outdoor spaces for the schools will also be a major portion of the schools property. Gardens for the students to learn in will take up much space while playground areas also will. These areas may be put in courtyards to keep them safe.

Other outdoor areas will included parking, a football field, a baseball field, a softball field, and all the support that comes along with these areas.

Parking will also take up a large area of land due to the number of students that will be driving to school.

Program 27

Space Summaries

The rooms held in the schools buildings will be separated into five major groups and a couple minor groups. This summary will look into these spaces as overall generalizations while details summarize will look into each room individually.

The major room types are: Classrooms, Special classrooms, Administration, Specialty room, and Community rooms. Minor spaces will include support rooms.

Classroom:

The classroom is what a school is built for. It is these rooms that will be used the most by the students attending the school. These spaces need to satisfy the students as well as the teachers. The classrooms for each building will be drastically different from one another, but they will also have thing in common. Most will have an outside door as well as using an L shaped room to promote unorganized learning. Also, classrooms, depending on grade level, will have to be equipment with the proper necessities. Overall a classroom should be the room in the school that represent the students the most and be able to be versatile and have the ability to change throughout the years if necessary.

Special Classroom:

The special classroom is a space that can also be used as a classroom, but has equipment and or other objects that allow it to be independent with its use. This type holds such rooms as the computer lab and the art room. These rooms all have their unique ideas on design and they also have their own equipment that fills them up. These rooms will naturally be bigger than normal classrooms and will also be able to support classes through the day. These rooms will strive for the north face of the building due to the need for diffuse light.

Administration:

Administration rooms are and will only be used for administrative purposes. These rooms will be used to support the school's functions and support the people that work and study in the schools. The biggest restraint for the administration will have to be location. All administrative offices have to be located near the main entrance of a building to let in the guest. Overall administration will play an important roll in the creation of a safe and well functioning school.

Specialty Room:

Specialty rooms included the Library and the gym. These rooms also support other functions, not only the schools, but also the communities that surround them. Both the library and the gyms will be available to outsiders. Due to this these portion of the campus will have to be more secure. The rooms in general should feel the same but look a little different due to the usage of each.

Community Room:

Since the community will play such a big part in the school, rooms should be set aside for the community. The community rooms will be classroom size incase extra rooms are needed in the future. These rooms will all be able to have greater technology hook-up if someone wanted to use them.

Support:

Support rooms will include bathrooms, custodial spaces, mechanical spaces, and corridors and lobbies. These space will set a big influence on how people off the street experience the school. These spaces will have to be design with strong material if these spaces are visible to outsiders. Support rooms will overall have to be their to run the school..

Program Quantitative Summary + Elementary School

Room Name	Quantity	Size
Classroom		
Classroom	14	1050
Kindergarten	4	1200
Gathering + Storage		8000
Bathrooms (combined)		
Girl's		1000
Boy's		1000
Specialty Classroom		
Music		1200
Art		1200
Speech		400
Parent Place		400
Pre School		1000
Testing Room		300
Specialty Rooms		
Library		3500
Library Storage		600
Library Office		250
Reading Recovery		250
Remedial Reading		250
Reading Entry		300
Computer Lab		1200
Gymnasium		5000
Storage		500
Administration		
General Office		500
Principals Office + Toilet		200
Principals Conference		150
Principal's Secretary		200
School Secretary		400
Reception Area		300
Supply / Storage		250
Records / Vault		100
Copy / Mail Room		300
Counseling		250
Faculty Support		700
Counseling Office		150
Counseling Waiting		400
Rest room		500
Teachers Office	10	200
Faculty Lounge		500
Kitchen/Cafeteria		
Cafeteria		2500
Kitchen		1000
Support		
Health Service-Nurse		300
Closet	2	75
Maintenance Storage		500
Other		
Corridor/Stairs		24000
Lobby		1500
Mechanical		5000
Outdoor Area		*
Parking		*
Total		**85825**

Program 29

Program Quantitative Summary + High/Middle Schools

Room Name	Quantity	Size
Classroom		
English	5	1150
Math	4	1150
Social Studies	4	1150
Foreign Language	1	1000
Computer Skills	2	1500
Other Business	1	1150
Study	2	1500
Testing Room	2	300
Science	1	1200
Biology	1	1300
Chemistry Lab	1	1300
Gathering + Storage	1	6200
Bathrooms (combined)		
Girl's		2000
Boy's		2000
Specialty Classroom		
Art Room	1	1500
Drafting	1	1000
Shop	1	3000
Life Skills	2	1500
Music Room		1800
Band Storage		200
Practice		70
Practice		70
Specialty Room		
Computer Lab	2	1500
Administration		
Storage / Supply		250
Copy / Mail Room		300
Reception Area		300
School Secretary 2		500
Conference Room		200
Principal's Office	2	300
Principal's Secretary	2	200
Break Room		100
Guidance Office		150
Athletic Director Office		180
Counseling	2	150
Counseling Waiting		300
Teachers Office	12	200
School Officer		150
Records / Vault		100
Work Room / Lounge	4	400
Support		
Health Service-Nurse		300
Closet	4	75
Maintenance Storage		500
Other		
Corridor + Stairs		20000
Lobby		2500
Mechanical		6500
Outdoor Area		*
Parking		*
Total		**90770**

Program30

Program Quantitative Summary + Core and Totals

Room Name	Quantity	Size
Kitchen/Cafeteria		
High/Middle Cafeteria		4000
Kitchen		1000
Serving Area		700
Food Storage		800
Receiving Room		200
Dish wash		200
Gym		
Gymnasium		12000
Officials Locker Room		600
Girl's Locker Room		2000
Boy's Locker Room		2000
Weight Room		1000
Storage		1000
Auditorium		
Auditorium		5000
Stage		1000
Drama		2000
Storage		500
Pool		
Pool		4000
Support		2000
Library		
Library		5500
Lab		1000
Administration		
Superintendents Office		500
Secretary		400
Community Space		
Conference Room	4	500
Support		
Corridor + Stairs		7000
Bathrooms		800
Custodial Office / Workshop		600
Maintenance Storage		500
Closet	2	75
Mechanical		4500
Total		**63950**

Final Totals

Elementary: 85825
High/Middle: 90770
Core: 63950

Total: ~240,000

Program Diagrams

ELEMENTARY
MIDDLE
HIGH
MIDDLE / HIGH
COMMUNITY

N-S BUILDING SECTION
CLASSROOM SECTION

KEY PLAN   SCALE 1/64" = 1'

ELEMENTARY
MIDDLE
HIGH
MIDDLE / HIGH
COMMUNITY

Space Detail Summaries + Classrooms

A. Qualities

>20 person maximum occupancy.
>
>35 classrooms
>
>1,200 (average)
>
>35 X 1,200 = ~42,000 square feet

B. Purposes/ Functions

>The purpose of the classroom is to provide space for the students to learn and study. It is the main learning area for all students whether the class is for first or twelfth graders. It can also function as a home room depending on the grade. The relationship to the complex as a whole will be using the rooms as the main academic areas.   The hall space that borders the classroom will be used as a connector between the rooms.

C. Activities

>In these rooms learning will be the biggest use. In some grades naps may be taken while in others there may be science experiments or cooking. Gardening will also take place in rooms equipped for outdoor activities.

D. Spatial Relationships

>The largest relationships will be the inside/outside connection as well as the inside/hallway connection. These connections will involve glass for daylighting. Classrooms will be related to each other by the use of "L" shaped rooms to allow rooms to have varied area for unorganized learning. The "L" will allow the rooms to be pieced together.

E. Qualitative Consideration

>Most classroom will use a large amount of daylight. Also this daylight should travel through the room to the hall by the use of transom windows. A 1,200 square foot classroom is large for a school. Large rooms are used to promote openness and allows a positive impact on learning*1.

F. Equipment/ Furnishings

>Each room will have about 20 chairs and desks that are correctly scaled to size for the occupants. Rooms will also contain coat racks and causal seating. Science rooms may contain tables and other lab accessories.

G. Behavioral Considerations

>Rooms need to be scale to their prospective occupants. All doors need to be lockable.

H. Structural Systems

>Classrooms will be bar and joist constructed ceiling. They will have metal stick walls.

I. Mechanical/Electrical Systems

>All classes will be wireless and some will have projectors and built in computers.

J. Site/ Exterior Environment Considerations.

>Classrooms will connect to the outside through the gardens that they occupy. Each garden will have a door that the room can exit from. The door will be glass and fit into a wall of glass that allows views to the outside environment.

Space Detail Summaries + Bathrooms

A. Quantities

Occupancy varies between 1 and 6 users

1 bathrooms in each elementary room

6 in total throughout the school + locker rooms

6,800 square feet

B. Purposes/ Functions

The bathrooms will be used for shittin'. The bathrooms will also be used as buffers between spaces.

C. Activities

This is obvious.

D. Spatial Relationships

The bathrooms in the middle/high school and the core area will be placed at nodes in the building. Some will also be placed by the large meeting areas such as the gym, lobby, and administration. These bathrooms will use maze entrance to relieve the use of doors which may cause security issues. The bathrooms for the administration in all buildings will be placed on the interior of the offices. The bathrooms for the elementary school will be located in the rooms. This will provide safety and will allow the teachers to keep a better eye on the students.

F. Equipment/ Furnishings

Each room will have, depending on the sex, toilets, urinals, sinks, and dispensers. All units will be properly scaled.

H. Structural Systems

Bathrooms will be bar and joist constructed ceiling. They will have metal stick walls. Plumbing walls will be larger.

I. Mechanical/Electrical Systems

Common mechanical and electrical systems will be used.

Space Detail Summaries + Corridors + Stairs

A. Quantities

      50,000 square feet

B. Purposes/ Functions

      Corridors are usually bland expanses of emptiness that do not let the owner of spaces behind the corridor walls to leave their mark.[11] For this school the corridor will be broken up with materials and in section. The corridor will not only be a connection down the length, but also the width. The corridor will also allow the students behind the wall and glass to connect with the people out side through bulletin boards. The corridors will be more open with glass that will also provide natural surveillance which is very beneficial in school design.[12]

C. Activities

      Corridors will be only used for movement. People will obviously converse in them, but no seats will be provided. Seating will be provide at the nodes of corridors where space is permitted for them. Stairs may have areas that can double as seating for impromptu public meetings.

D. Spatial Relationships

      The corridor will be spatially open due to the glass that will be on the walls. This will also allow a connection between the people on the inside as well as people on the inside. This will also allow for natural light to reach the corridor.

E. Qualitative Consideration

      Daylight will be maximize through classrooms and possibly skylights.

F. Equipment/ Furnishings

      Furniture will be placed in areas deemed necessary. Lockers may be designed to fit in the corridor, but this has yet to be resolved.

G. Behavioral Considerations

      Corridors need to be scaled to the people who occupy them.

H. Structural Systems

      Corridors will be bar and joist constructs. They will have metal stick walls inset with glass.

I. Mechanical/Electrical Systems

      Corridors will have outlets, and lights.

J. Site/ Exterior Environment Considerations.

      Corridors will use connections to the outdoors that are open and spacious. The section of the corridor may rise near the entrance.

Space Detail Summaries + Lobbies + Mechanical

Lobbies

A. Quantities

12,000 square feet shared

B. Purposes/ Functions

The Lobbies will be used as a connection and buffer space between the outside and the interior portions of the schools.

C. Activities

The lobbies will hold non curriculum activities like military and college recruitment. They will also hold a cafeteria and concessions for the sporting events. The lobby can also be used as a display place.

D. Spatial Relationships

The lobby like the corridors will be open to the rooms that surround it. This will allow for a space that feels more open while staying separated. The lobbies will be surround by spaces that are more public than classrooms.

E. Qualitative Consideration

Lobbies have to be lit by skylights during the day and artificial light in the evening. The artificial light will be very bright, in the lobby that borders the court, to allow for people of all ages to use the spaces.

F. Equipment/ Furnishings

Spaces for chairs should be stored near the sports lobby to hold chairs that can be used for gatherings.

H. Structural Systems

Corridors will be bar and joist constructs. They will have metal stick walls.

I. Mechanical/Electrical Systems

Special lighting will be used.

J. Site/ Exterior Environment Considerations.

Must have a simple connection to the outside which allows the users a safe and easy entrance.

Mechanical

A. Quantities

14,000 square feet shared

B. Purposes/ Functions

To provide mechanical space for the complex.

C. Activities

Checking of equipment.

D. Spatial Relationships

The mechanical room will be located away for the academic area of the building so that it does not cause noise or vibrations in classrooms. It will have easy access from a drive. The supporting room throughout the building will be located on interior walls unless they need to have vents to the outside. If vents are needed they will be located away from public space.

F. Equipment/ Furnishings

Mechanical equipment will be located in the rooms.

H. Structural Systems

Corridors will be bar and joist constructs. They will have metal stick wall.

Space Detail Summaries + Administration

A. Quantities

   10,000 square feet shared

B. Purposes/ Functions

   The purpose of the administration is to make sure the school runs smoothly. It will be placed be
   tween the academics parts of the building and the entrance as a buffer for unwanted
   guest. They will function as a line of defence for the students.

C. Activities

   This is where the school will be operated from. All of the non classroom activities will also take
   place here such as counseling and mail. The principles will have offices in these areas as well as
   their secretaries.

D. Spatial Relationships

   The administration will be connected with glass to the outside as well as the lobbies. This will allow
   the administrations to watch the halls and courtyards like the teachers can from their classrooms.

F. Equipment/ Furnishings

   Furniture will be needed for all the people located in the office. Cots will also be used for the school
   nurse. A safe and mail equipment will also be placed in one of the administration offices.

H. Structural Systems

   Administrative areas will be bar joist constructed ceiling. They will have metal stick walls.

I. Mechanical/Electrical Systems

   Administrative areas will be wireless and have computers in most rooms.

Space Detail Summaries + Kitchen + Cafeteria

A. Quantities

300person maximum occupancy.

2 cafeterias, 2 kitchen

(Elementary 2,500) (High/Middle 4,000) (kitchen 1,500x2)

~10,000 square feet.

B. Purposes/ Functions

The kitchen and cafeteria are included for obvious reasons in use. The function of the cafeteria in this school will be used for lunch as well as an open space for other activities. This space will be shared with the major lobby at the gym entrance. The kitchen will also be used to cater events

C. Activities

Lunch, meeting, ceremonies, and other gatherings will happen in the cafeteria/lobby area.

D. Spatial Relationships

The cafeterias will connect with the other rooms through the openness with the windowed walls that will border it. It will also relate to the outside to give the students a view while eating. This connection will promote students to eat outside. The kitchen will border the cafeteria.

E. Qualitative Consideration

The cafeteria connected to the lobby will use daylight and the other will also use daylight also. The kitchen will be lit artificially and be on the interior of the building.

F. Equipment/ Furnishings

Lunch tables and seats will be necessary for the cafeteria, while a buffet and cooking equipment will be needed for the kitchen.

G. Behavioral Considerations

Rooms need to be scale to their prospective occupants. All doors need to be lockable.

H. Structural Systems

The kitchen and cafeterias will be bar joist constructs. They will have metal stick wall.

I. Mechanical/Electrical Systems

Cooking equipment power sources.

J. Site/ Exterior Environment Considerations.

The cafeterias will have connection outside away from the main entrance to allow for students to have an exit to a safe area to eat outside. The elementary cafeteria is located on the second floor and will have an outdoor ramp to the recess area.

Space Detail Summaries + Art Room + Band Room + Shop

A. Quantities

>   (Art 20-25) (Band 40) (Shop 20-25) - occupants
>   2 Art, 2 Band, 1 Shop - rooms
>   (Elementary Art 1,200/Music 1,200) (High/Middle Art 1,800/Band 2,140/Shop 4,000)
>   11,340 square feet

B. Purposes/ Functions

>   These space are used for specialized classrooms.

C. Activities

>   Each room will occupy obvious activities. This art rooms will also hold small exhibitions while the
>   shop may be able to be used by the community with proper supervision.

D. Spatial Relationships

>   All of these rooms will border visitor areas so that the visitors can see what the school's students
>   are producing and how they do it. It will also be placed in these areas so that it can act like a buffer
>   for the standard classrooms. Rooms will all open up, with doors and windows, into these spaces.

E. Qualitative Consideration

>   All rooms will try to have northern windows for a diffuse light that works well with the activities. The
>   rooms will also have powerful artificial lights because of the tedious work that takes place in the
>   rooms.

F. Equipment/ Furnishings

>   All rooms will need desk and chairs to fit their specific uses. The art rooms will also have exhibition
>   space on the walls for the students to pin up work.

G. Behavioral Considerations

>   Different buildings should have rooms that are scaled differently.

H. Structural Systems

>   These rooms will use bar joist and metal stick walls with glass walls to the north.

I. Mechanical/Electrical Systems

>   Special acoustics will be put into the band room.

J. Site/ Exterior Environment Considerations.

>   Like the inside visitors the outside visitors will also get to see what the students are accomplishing
>   because of the glass walls and boards that the students pin up on.

Space Detail Summaries + Computer Labs

A. Quantities

> 20-30 person maximum occupancy.
> 3 labs
> (Elementary 1,200) (Middle 1,500) (High 1,500)
> 4,200 square feet

B. Purposes/ Functions

> The labs will be use for electronic studies and information gathering.

C. Activities

> The labs will be used as classrooms and at certain times open to the students for information gathering. These computers will not be open to the community

D. Spatial Relationships

> The labs like the previous rooms will be located on a north facing wall. This will allows diffuse light to enter the room. They will be located at nodes in the corridors away from the entrance of the building. They will be located within the classroom space in the building.

E. Qualitative Consideration

> The light either natural or artificial will have to be diffuse and non reflective surface will have to be used to allow the computers to be used without glare. Also the room will have to be air conditioned due to the heat that is put off by the machines.

F. Equipment/ Furnishings

> Computers, tables, and chairs will have to be used for this area.

G. Behavioral Considerations

> The scale of everything will be geared to the age of the students.

H. Structural Systems

> The labs will have bar joist and metal stick walls.

I. Mechanical/Electrical Systems

> Projector for class.

J. Site/ Exterior Environment Considerations.

> The walls will have boards that the students can pin work up on for the outside to see.

Space Detail Summaries + Library

A. Quantities

> 2 libraries
> (Elementary 5,150) (Middle/High 6,500)
> 11,650 square feet

B. Purposes/ Functions

> Libraries are always places where students can find information or read for enjoyment. The func
> tion of the elementary library will be to support the elementary school. The function of the middle/
> high school will be used not only for each of them, but also for the community at specific times.

C. Activities

> The libraries will hold activities such as reading areas, computer areas, and an area with the stacks
> for book checking out. Tables will also be placed in the library for when classes are using the room.

D. Spatial Relationships

> Both libraries will be located on major nodes for ease of use. They will both be some of the open
> est rooms in their respective buildings. The elementary school will be scaled to the size of   its
> occupants and also have more colors for the younger users. The upper classmen/community li-
> brary will be larger due to the amount of people that will use it. It will be located off of a main   lob
> by in the core building. It, unlike the elementary school, will be broken up into areas. These area will
> hold school books, historical books, and adult books in different areas. It will still allow anyone to
> borrow any book. The middle/high library will also be very open due to security with the community
> using the same space.

E. Qualitative Consideration

> Natural light and quiet mechanical units will be necessary for the libraries. They will also have to
> have areas around the library that are used as quiet reading areas.

F. Equipment/ Furnishings

> Computers, tables, and chairs will have to be used for this area. Racks for the books will also be
> used. Lounge furniture will also have spaces in these places.

G. Behavioral Considerations

> The scale of everything should be geared to the age of the students. The room sound give a sense
> that the user needs to be quiet. The room should also keep direct light off of the books and the
> computer screens.

H. Structural Systems

> This system will consist of bar joist and metal stick walls.

I. Mechanical/Electrical Systems

> Unknown. May include projector for class. Has to be relatively quiet.

J. Site/ Exterior Environment Considerations.

> Connection to the outside will be very open so that students, if wanted, may take books outside to
> read.

Space Detail Summaries + Auditorium

A. Quantities

325 person maximum occupancy.

1 Auditorium

6,500 square feet

B. Purposes/ Functions

The auditorium will function as a gathering point to watch productions of drama and other art. The community will also be able to use it when the school is not.

C. Activities

Plays, community events. ceremonies, movies, and other activities will take place in the auditorium.

D. Spatial Relationships

The auditorium like the other parts of the core building will be located off the main lobby so it is easily used by everyone. It will also be located on a major outside wall so that it can be naturally lit, but will also have shades if darkness is desired. These windows may be at street level so if people want to look in from the street. The stage will also be adjacent to the drama room.

E. Qualitative Consideration

The Auditorium should be able to be dark when needed, but can also use natural light during practice sessions or certain types of activities. The room also needs to be acoustically balanced for preformances.

F. Equipment/ Furnishings

Chairs and lights will be the only furnishings needed. Also a stage will be necessary.

H. Structural Systems

Trusses will support the long span.

I. Mechanical/Electrical Systems

Theater equipment, because the town lacks theater. Has to be relatively quiet.

J. Site/ Exterior Environment Considerations.

Connection to the outside will be windows may give people at street level a view into the school during events.

Space Detail Summaries + Gymnasium

A. Quantities

> 30 person classes
> 2 Gymnasiums
> (Elementary 5,000) (Middle/High 12,000)
> 17,000 square feet

B. Purposes/ Functions

> The gyms will function as the schools indoor activity center, but the middle/high gym will also be able to get use from the community when it is not in use by the school.

C. Activities

> Sports, sporting events, ceremonies, band concerts, and other activities will take place in the gym. When school is out the gym will also be used for community residents to play sports or exercise.

D. Spatial Relationships

> The middle/high gym like the other core building pieces will be held directly off of the main lobby. The gym will be the first thing in the entrance door. It will also boarder as outside street which will allow natural light into the gym therefore saving money on electricity. The gym will also allow easy access for the middle/high school students from their side of the complex. The elementary gym will also be natural lit. It will be smaller and used for practice by the middle school teams.

E. Qualitative Consideration

> Natural light will be the biggest issue looked at in the gym design. The light will have to come from the north which will allow the gym to be placed right on a major road in Merrill do to its orthogonal roads.

F. Equipment/ Furnishings

> Bleachers and basketball hoops are the largest furnishings needed. The middle/high gym will have bleachers on both sides while the elementary will have them on one side.

H. Structural Systems

> Trusses will support the long span.

I. Mechanical/Electrical Systems

> Lighting systems will have to be strong for night sports. Also HVAC will have to be able to keep the air circulated.

J. Site/ Exterior Environment Considerations.

> The largest connection to the site will be the glass placed at one end of the gym allowing for the gym to receive light, users to see out, and outsiders to see in.

Space Detail Summaries + Conference Room

A. Quantities

      30 person maximum occupancy. 1 large room to hold 100 people

      4 rooms + 1 large

      500 square feet + 2,500 square feet

      4,500 square feet

B. Purposes/ Functions

      These rooms will be available to the community for events or conferences.

C. Activities

      These rooms can hold meetings, graduation parties, visitors that sell stuff at the school, school board meetings, as well as many other activities. They can also be used as auxiliary classrooms.

D. Spatial Relationships

      All conference rooms will be placed in the core building near the lobby for east access. They will all have windows that open to the outside.

E. Qualitative Consideration

      They will also all have artificial lighting as a main source of lighting. The rooms will also be acoustically quiet from the lobby area.

F. Equipment/ Furnishings

      All will have chairs and table(s), some may have projectors while some may have tv's or other electronics.

H. Structural Systems

      The structure will be bar joist and metal stick walls.

I. Mechanical/Electrical Systems

      Electrical systems that can support the electorics needed.

J. Site/ Exterior Environment Considerations.

      They will have windows to the outside, but this will not be a great connection.

A. Quantities

> 20-25 persons
> 2,000 square feet

B. Purposes/ Functions

> The weight and fitness room will be used for the schools students as well as outsiders.

C. Activities

> Working out will be the only activity practiced.

D. Spatial Relationships

> The room will be adjacent to the gym and the locker rooms. It will be open to the students during the day and open to the public before and after school.

E. Qualitative Consideration

> The room will use natural lighting as well as artificial. Mechanical systems can be loud if needed.

F. Equipment/ Furnishings

> The weight room will hold more lifting equipment while the fitness room will hold more exercise equipment like treadmills.

H. Structural Systems

> Bar joist and metal stick walls will be used.

I. Mechanical/Electrical Systems

> Air conditioning will be used to keep the climate cool.

Space Detail Summaries + Gathering Space

A. Quantities

> 5 Spaces
>
> 2,500 square feet

B. Purposes/ Functions

> These spaces are used to bring the classes of one wing together. They are also used to socialize in.

C. Activities

> Group meetings and activities. Are also used for social meetings.

D. Spatial Relationships

> They are two stories tall and located in the middle of each wing adjacent to the corridor. They are also borders by class rooms and have exterior walls on two sides.

E. Qualitative Consideration

> They will natural light penetrate them from each side.

F. Equipment/ Furnishings

> The space will have benches to encourage interaction and they will have pin up boards if students would like to post things or play games on the walls.

H. Structural Systems

> Bar joist will be used to support the second floor and trusses will support the roof.

I. Mechanical/Electrical Systems

> Artificial light will be used in small amounts when needed.

Space Detail Summaries + Pool and Support Rooms.

A. Quantities

> 30 persons
> (4,000 square feet pool) (2,000 square foot support areas)

B. Purposes/ Functions

> The pool is to be used for exercising for students and community members. It will be used as a class room at times. The community will be able to use it in the mornings, nights, and weekends.

C. Activities

> Swimming laps and exercising.

D. Spatial Relationships

> The pool will be located on the educational courtyard and have views to the outside. Also, people will be able to see into the pool from the exterior. A hot tube will also be adjacent to the pool and have its own views out.

E. Qualitative Consideration

> The room will use natural lighting, from a skylight, as well as artificial at night. The mechanical systems can be loud if needed.

F. Equipment/ Furnishings

> The room will need seats in certain areas and a room for laundry. The room will also need things that are pertinent to a pool.

H. Structural Systems

> Bar joist and metal stick walls will be used. A skylight will be used to let in natural light.

I. Mechanical/Electrical Systems

> Systems that are used for pools will be used in this room.

Space Detail Summaries + Outdoor Area (Parking)

A. Quantities

350 parking spaces

B. Purposes/ Functions

The outdoor areas will be a connection between the school and the community as well as a connection between the school and the natural outdoors. Parking will be for students and faculty that use the school.

C. Activities

Outside of the school will have places for eating, relaxing, exercising, learning from the environment. Activities will also be located on a second floor terraces. Sports will also take place outside.

D. Spatial Relationships

The school will have to be grounded by the vegetation meaning the proper use of vegetation will ground the building to make it better fit into its location. Also the building will have to consider its neighbors when considering design. Outside areas will also be a big issue when they are used to connect separate buildings visually. Parking will be pushed away from the building but still allow a connection between the school's entrances.

F. Equipment/ Furnishings

Outside seating will be used in appropriate areas.

Additional Research + Circulation in Schools

The corridors of a public school play an important role in the success of a school. In temperate climates they not only take up a great space of the school footprint, but also provided the greatest area for students to interact even if it consists of unwanted actions. "Many times the only meeting these occupants have is in areas of circulation."[13]

Corridors, when placed inside a building are for the most part in one of three locations: in between sets of classrooms, on one side of a line of rooms, or without rooms only a link between two spaces. All are effective for their task, but each have their drawbacks. Connections can also interact with the outside.

For a corridor to be successful and interesting the design not only has to be broken up on the walls that line it, but also in plan. A long straight corridor reminds one of being in an institution. "Creating central activity nodes that connect short paths is one strategy for maintaining visual supervision without creating long institutional-style corridors."[14] At the nodes could be a place for activity that allows for the students to interact. This allows the students to have a more personal setting than just standing in the hall. This also allows for a place in the corridor that is a threshold to another part of the school.

The corridor is interesting in most buildings as well as schools because they allow the occupants to pass and interact with people that they would usually not have the ability to interact with. A problem that comes up in schools is that these corridors can be a place where unwanted effects could ensue. It is important that a corridor has a design that tries to inhibit the things that a school deems unacceptable. Color is one way to look into corridor design. Certain colors can be used in corridors to keep students calm. Natural surveillance should also be used through out the school.

Natural surveillance is the ability to have an easy line of sight to all parts of the school. The corridor therefore would have to have a design that easily allows teachers and administrators to easily scan over the students. Less violence happens in a rural school of this size. Also a school should not feel like a jail. Therefore these issues should be implemented into the design but not forced upon the students.

A way to make a corridor more accepting, interior or not, is allow natural light to flow into the area. This allows the student to have a sense that he or she is not trapped within the walls. This can be done with clerestories or transom glass in on a double loaded corridor. It is easier to accept light if it is only single loaded.

Other aspects of corridors include termination points, entrances, and how they connect the rooms successfully. Termination of corridors should be placed at a major aspect of the school, stairs, or an exit. A successful corridor is important from start to finish and how it is connected to other corridors.

The corridor is interesting in most buildings as well as schools because they allow the occupants to pass and interact with people that they would usually not have the ability to interact with.

A district that has buildings connected or in a campus layout has the ability to share common spaces. This will lead to a savings of money due to the less space that is required. An example would be constructing 1 or 2 libraries instead of one per each building. The problem with this is how to keep the different aged students separated, but still connected as a whole school. This idea will not work for all districts, but for a small district like Merrill it is possible.

Shared facilities have been investigated in middle/high layout and also elementary/middle layout. Currently Merrill's middle and high school are connected. A K-12 complex will be a new venture, but one that has most likely been examined before. The things that will have to be looked into the most will be the scheduling of the day for each "building." This is not difficult to achieve, but will most likely take some extra time to plan.

This strategy is respectable because it will allow for a major cost savings as well as saved space. "Sharing... spaces had a significant impact on the original cost of the schools, especially the HVAC capital costs, and also on the cost of fuel and electricity."[15] In school districts with three separated schools it is not uncommon for each school to have a gym, library and lunchroom/kitchen. With a rural school of about 1,000 students it would be easy to serve them all from the same kitchen. This would save the space of 2 other kitchens. Also it would be easy to share two gyms and libraries instead of three. To round it out the school could have one auditorium and one media center for all to use. These spaces could also be shared with the community after school hours.

Other things worth sharing include, but are not limited to, entrance, playing field, and drop of points for parking. The entrance to each of the major schools will be designed to represent that portion.

Also the separation of entrances allows the students to feel a sense of pride that they belong to a specific school. For younger students a playground is necessary for recess, but not necessary for upperclassmen. The playgrounds will have to be separated to allow for a safe interaction between only students from the same age group. Also the drop of for students should be separated. This will most likely happen in front of the school entrance.

Connecting these schools and the people in them will be difficult because security between the students will be a major portion of how the plan is laid out. The design will be able to connect the three buildings physically, but connecting the student body will be more difficult. The way to do this is to allow the students to interact with each other without interacting physically. This will be accomplished through allowing the students to watch other students through an opaque material or through a device that does not allow a person through. This will allow the student body to see the things behind them, but also the things ahead of them.

"Sharing... spaces had a significant impact on the original cost of the schools, especially the HVAC capital costs, and also on the cost of fuel and electricity."

"A long neglected aspect of the learning environment has been the opportunities presented by the outdoor surroundings of the building."[16] The American school industry has never really grabbed on to the ability that the outdoors influences learning. American schools, even though a lot of rural ones are in places that hold much vegetation, they seem to be missing an opportunity to let children learn in their outdoor environment surrounding their school. This section will look at how the outdoor/indoor connection can be handled so that schools can have a better look into teaching and playing outside.

Courtyards have been implemented in many schools through out the years. Many of these courtyards have been designed with a good purpose, but never used to their full potential. Especially with younger students we see that a lot of learning takes place when they are at home playing outdoors. Why doesn't this hands on learning experience transfer to the school setting. Present schools with gardens and planting can teach children a lot about science and biology and even about themselves. It also can start to teach the children and the older students about greening the environment and how to take care of the environment. These ideas also work for open spaces not considered courtyards.

When setting up these under used learning tools we should look at some specific ideas. These places should face the south, like a playground, because it is where most of the sun enters from. This means less shadows and more sun for the gardens. These places also need to be secure and kept up to not let a child become injured. The places should be simple enough that a student can understand but also complex that enough different learning techniques can take place. These places can also be used for winter, to show off different types of nature.

The information that comes from real life experience can not be found in a textbook or a digital based machine.

To connect the inside and out would in make sense to have a glass wall between the students and nature, or could we put some plants into the room? Is it possible to have the room open to the outside? Could this outside consist of a garden for many of the younger grades?

Overall the outdoor environment is a place of unimaginable learning possibilities as long as it is kept safe. It can not be found anywhere else and it should be exploited in the contemporary school. "Outdoor space can be used for more than simply 'burning off energy' before the real studying begins inside."[17]

"A long neglected aspect of the learning environment has been the opportunities presented by the outdoor surroundings of the building."

Schools and the occupants of them have to be secure from many elements. They have to be secure inside, and from the outside. The current phase in security is using the new technology of the day. For a school to be simple and well secured it must be well designed. Also a school that wants to connect to the community must have an extra layer of security.

A school is one of the most important places in a community. This is because the parents have their children in the school and want the best protection for them. Contemporary schools in urban areas use lots of surveillance equipment and technology that is not as necessary in a rural area with a school district of fewer students. A rural school does need security, but like all schools is does not need to feel like a jail.

The best way to protect a school is to have access control. The access on the grounds as well as the inside of the school needs to be protected. To keep the students safe during recess a defined area can be used. Also, the ability to use natural surveillance through out the school would allow for a more secure plan. A location that students can hide and be involved with illegal activities is unacceptable.

The inside of the school has to be more secure than the outside, not only from the outside but also from the inside. The schools entrances have to be places that are easily watched. The main entrances should be staffed by a receptionist that can assist visitors. Also when the school is being used for community events the academic part of the school should be shut down to allow areas not in use to be secure. Therefore the public places should be placed near entrances or the main circulation paths as they were in the Bay City High School.

Another was to help with security of schools is community involvement. "Community involvement... Promotes public awareness and involvement with School faculty and student achievements and activities."[18] If we involve the community with the school they will be able to have a safer feeling about their child going to school.

In the history of schools there has been somewhat of a sharing with the community. Gyms and auditoriums are almost always open to the public. Recently, schools have opened up more to a community development. A handful of current schools have seminar rooms and even parenting seminars for residents. A new school is a major investment to any community, so why not included spaces for them in the design? Could the library have the ability to also support the community? Can the community use other sporting equipment besides the gym? The answer is yes. All we need to figure out is how to keep the school safe if this involvement does happen.

A rural school does need security, but like all schools is does not need to feel like a jail.

Schematic Design:

K-12 Rural Public School

Schematic Design + Design Issues + Initial

Schematic design was based off of the programmatic needs that were necessary to design a school. Schematic design was also initiated with models to show the connections of the three schools and core building. The intent of these models was used to look at connections between the school and the core building from a physical connection and views to and from.

Connections between theses spaces and the community then fermented with the creation of more models that focused in greater detail in the four major connections from programming. From these came the final sets of models that represent a preliminary building that shows a culmination of all the connections in the previous models.

In the final models the ideas of connections were also focused on the layout of space and how the schools curriculum would be used. Compared to how spaces where set up.

First model showing ideas of connections between three schools and core.
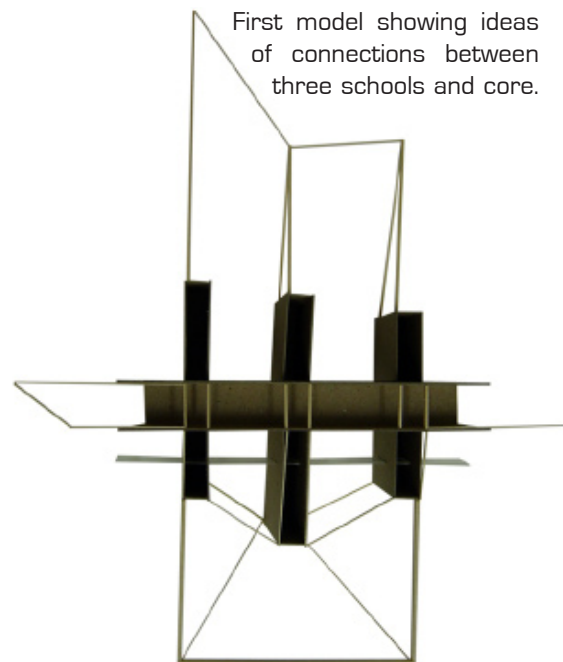
Schematic Design + Primary Models

Most of the primary models as explained before deal with the connections of 3+1 building. In this model the schools are represented by the three tubes while the core is the support piece. The core and schools do not touch. Also cut -outs in the tubes are used to show ideas of takeouts in the schools. These take-outs are also used to show a connection between the three schools.

 The ideas that came from this model deal with the core supporting the three schools but not physically touching them. This allows the school to be visually connected but disconnected due to security issues. Also the cut outs in the tube are used to describe entrance and or other ideas.
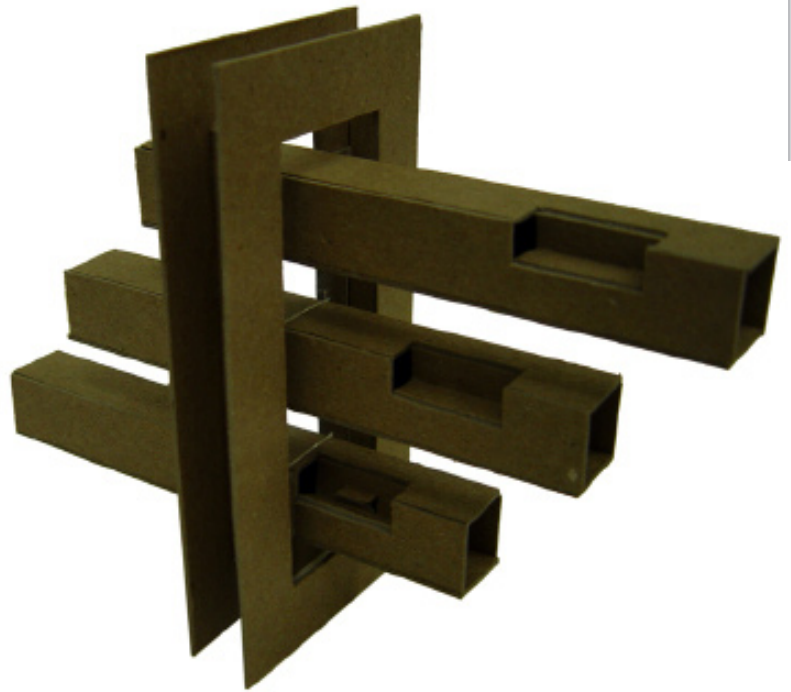
Schematic Design + Primary Models

These models like the previous ones deal with the infant stages of connections between the schools and core building. The core building is located in the middle while the three schools again are connected but secured by the separation. In this model a greater connection between the three schools exists. This is shown as basswood lumber. Also like the last model the schools are kept open on the ends to show the need for daylight and openness.
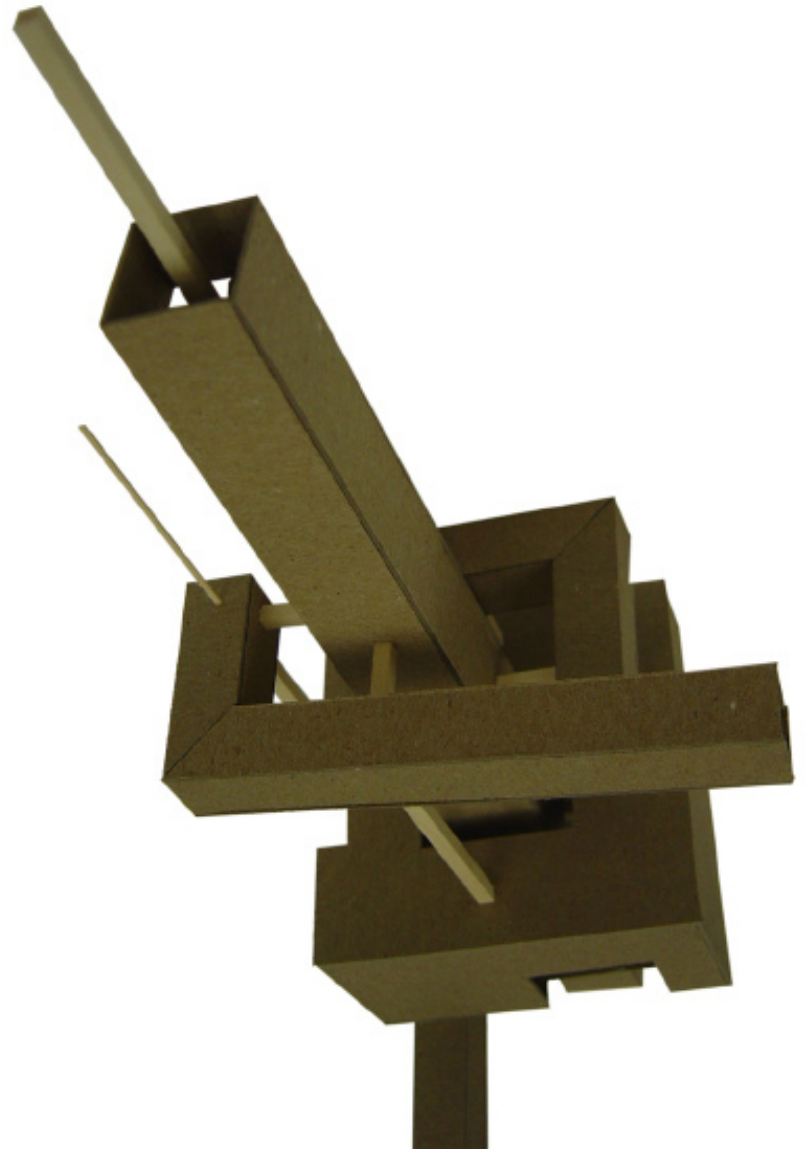
Schematic Design + Primary Models

The bristol board models delve deeper into design ideas. They use a base to show a larger connection with the ground. These two models use the same principle of 3 + 1.   These model focus more on views from a ground level perspective and try to give some initial thoughts on sections.
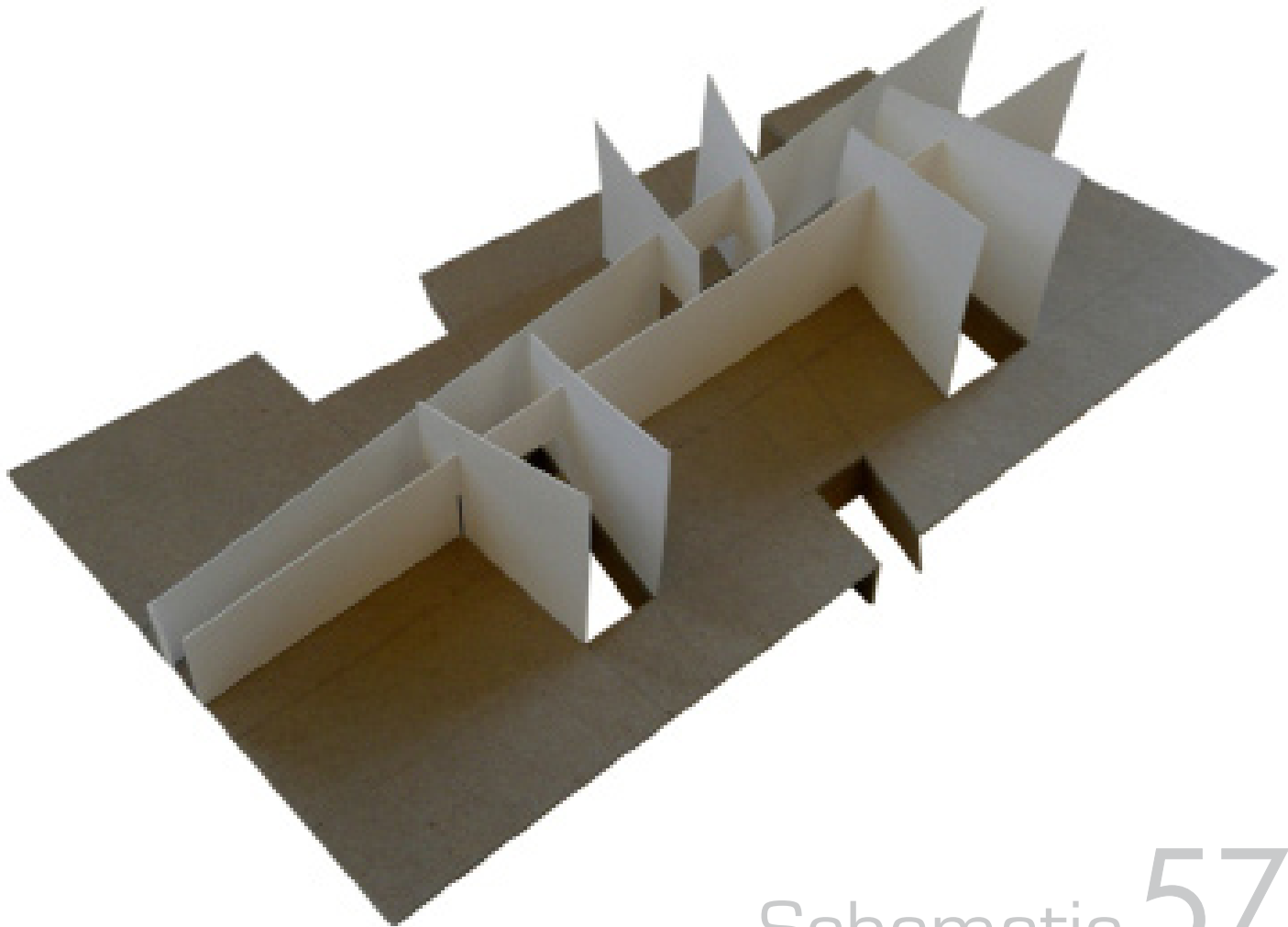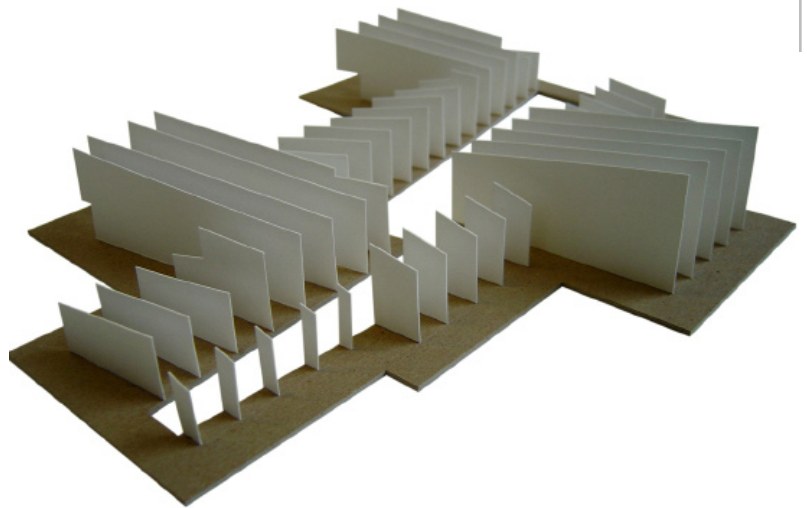
After the initial models the next phase in schematic design became a series. A total of three series of models were made.

The first series deals with connections like the initial models did. All are placed on the same size base and have similar characteristics to how they relate. There is progression in the models but they try not to play off of one another.

Series One
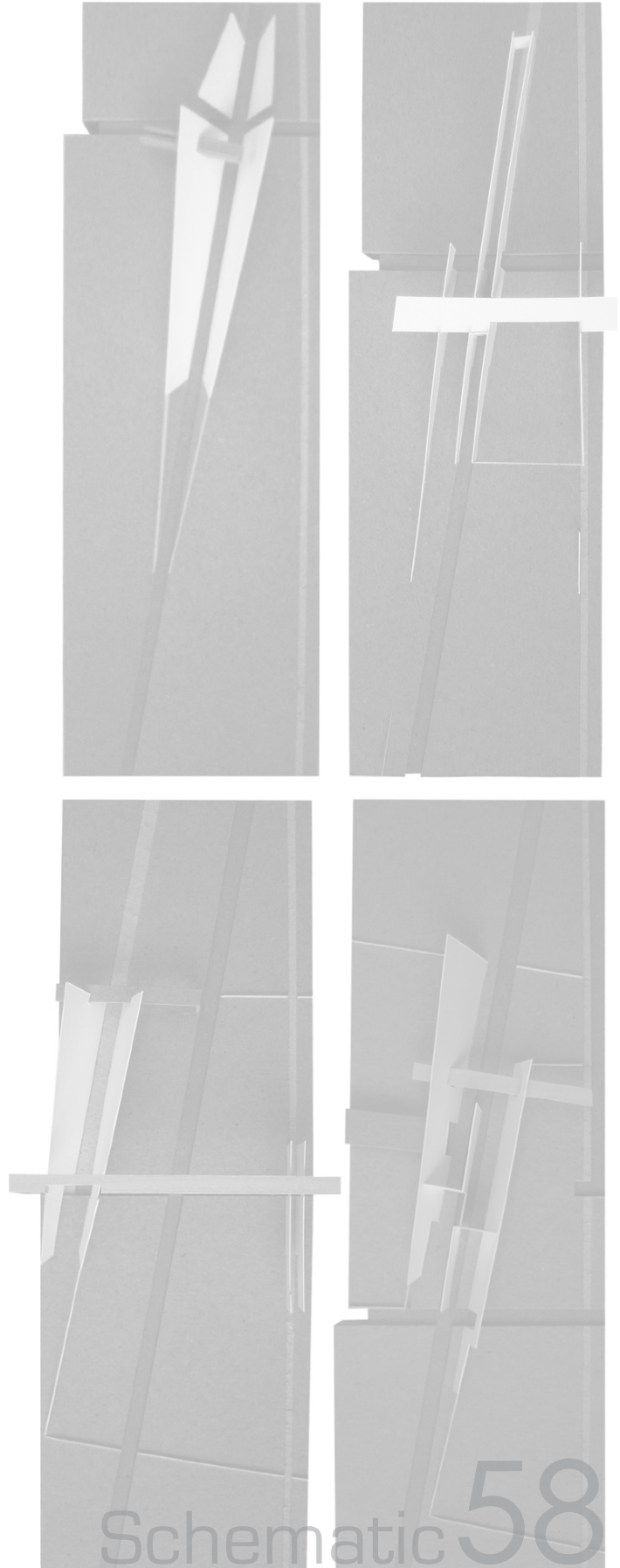
Schematic Design + Series One + Connections

The first of the connection models is simplified, but holds many ideas that influence the thinking for the remainder of schematic design.

The 3+1 from the initial models is still present in the bristol board pieces which allows for a connection to the previous ideas.

In public schools an old idea is being pushed to gain access back into the outside. This idea is the connection between the outdoors and indoors in relation to teaching. This relationship in shown in model form with the use of the chipboard piece sticking out of the bristol board. This chipboard piece matches the material of the ground. Also schools need to become more open to the outside area. What is meant is they need to let more community events take place in their school. This openness is shown with the opening of the bristol.

This model uses some ideas from the last, but also looks into new ideas.

In current schools another major issue is security as it has been for years. To address security this model has a large opening next to the long bristol board pieces. This large opening represents an outside area for the students at the school. This area is secured by the school's own walls, and uses its own walls as protection.

Being in a small American city the school will have to have a traditional, but also modern feel to fit into the site's context. This model shows an orthogonal piece connected to a twisted piece which tries to show a connection between new and old.
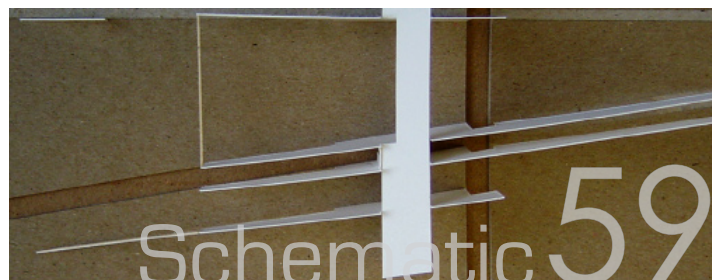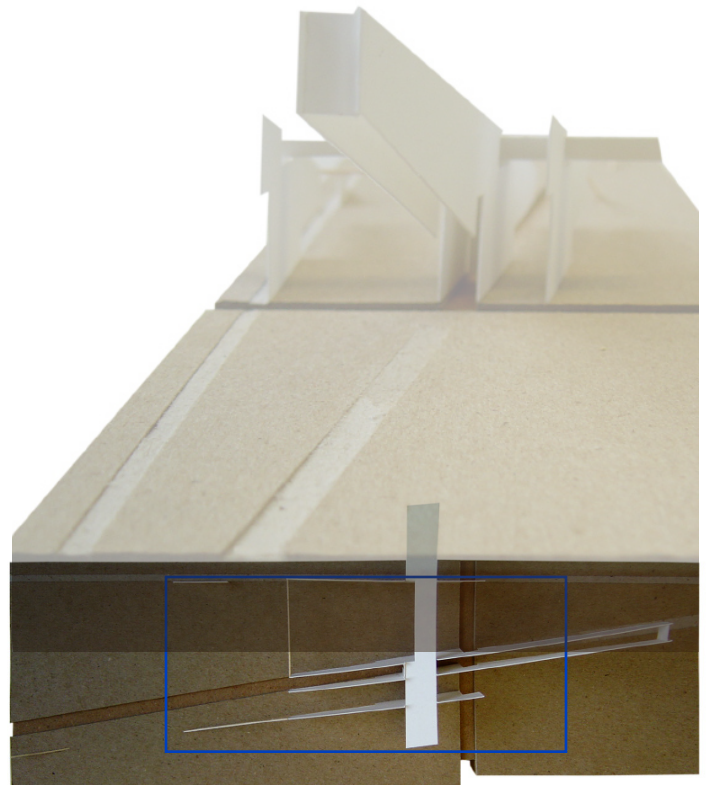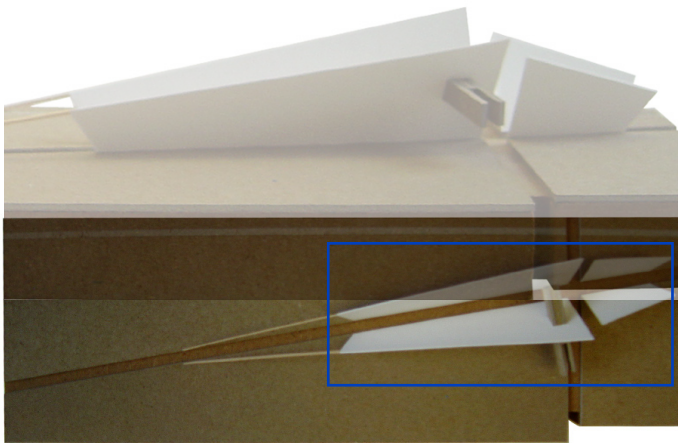
Schematic 59

Schematic Design + Series One + Connections

The third connection model deals more with the connection between the community and the school.   It also deals with the traditional/modern tectonic connection.
      The basswood piece bridges the traditional/modern connection as well as the community/school connection. It represents the major idea behind all the models.   How do we connect these pieces with each other?

The last model tries to take all ideas from previous models and tries to connect them into   one.
      This model deals with all four connections: community,   outdoor,   tectonics,   and   circulation.
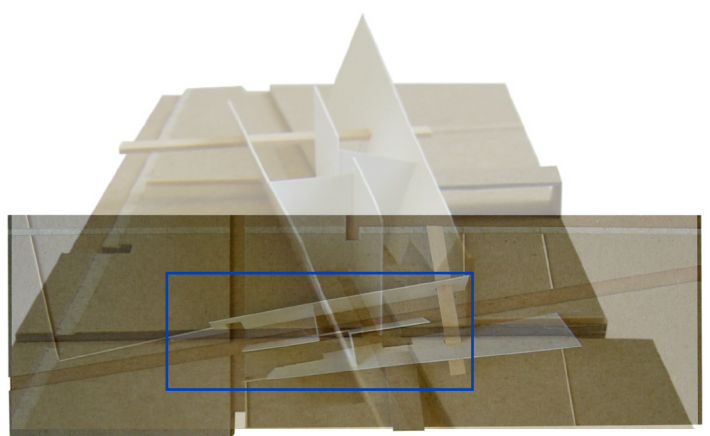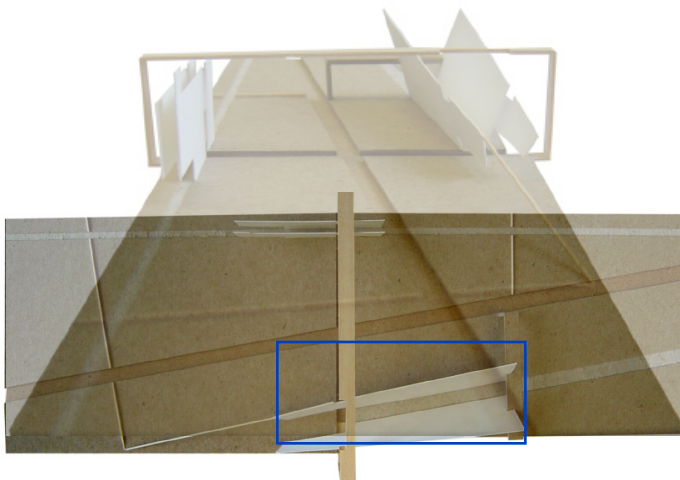
Schematic Design + Series Two + Arrangement

The second series of models deals with the arrangement and layouts of schools and how the connections from previous models can connect to these. All four models deal with a different layout in school design. They all look to the 3+1 idea for inspiration.

North and the side that the city is located on is placed on the side of the model that has the length cut out.

Series Two
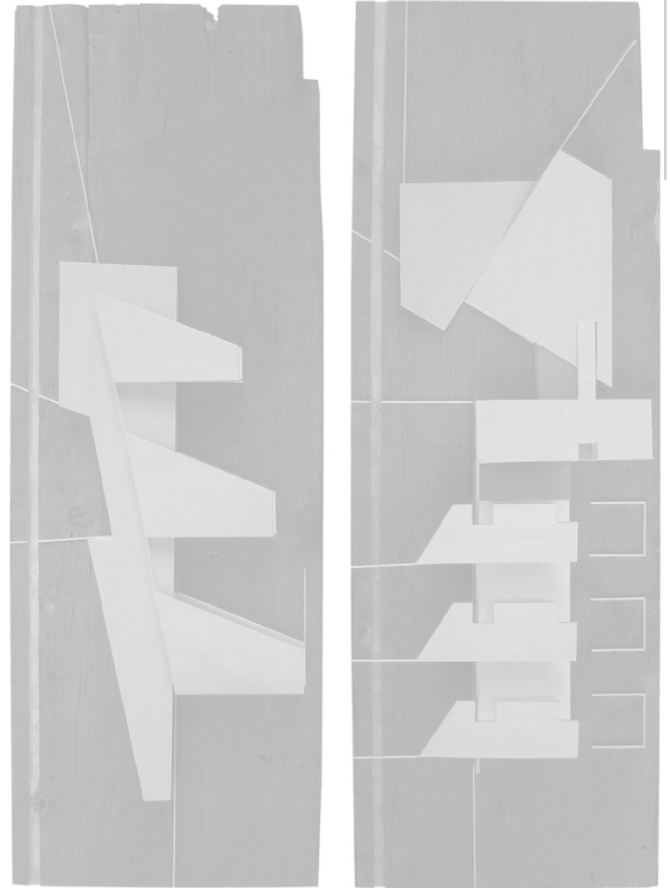
Schematic Design + Primary Models

The first model is set up as a house plan. All three schools are located on the back of the campus for security reasons. The core building is on the front so that it can be located closer to the city. This will keep access to the school separate from the students. The saw tooth pattern allows the schools to have openings to the outside with allows for the protection and the indoor/outdoor connection that where experimented with in the previous models.

The next layout is a separation idea. The three schools are located away form the core building to allow for secure buildings. Also in this design unlike the last the buildings each have their own road frontage. This will allow for students to access the school easily. These pods also hold a place for the outdoor connection in the back of the buildings. The model tries to pull the community into the school by the entrance. The schools try to keep a more closed entrance. The three schools are very similar in their shape, but after building this model it seems that the schools show have different ideas and design.

Schematic Design + Primary Models

The third model deals with a campus layout, The campus allows for buildings that are physically separate, but connected by vision. This allows the school to have a connection, but at the same time each building stays secure from one another. Also the major voids in this design allow for secure outside areas, which allows for students to be outside.

The last layout was a variation on the finger plan. This allows for the classrooms to be aligned to the edges and get large amounts of daylight. The model also allows for the safe area between the buildings.

Schematic Design + Series Three + Design

The final series was used to start building design ideas. The design was started off of views that connect the school to the community and to each other. The design was started from drawings and went into four preliminary models.

Series Three
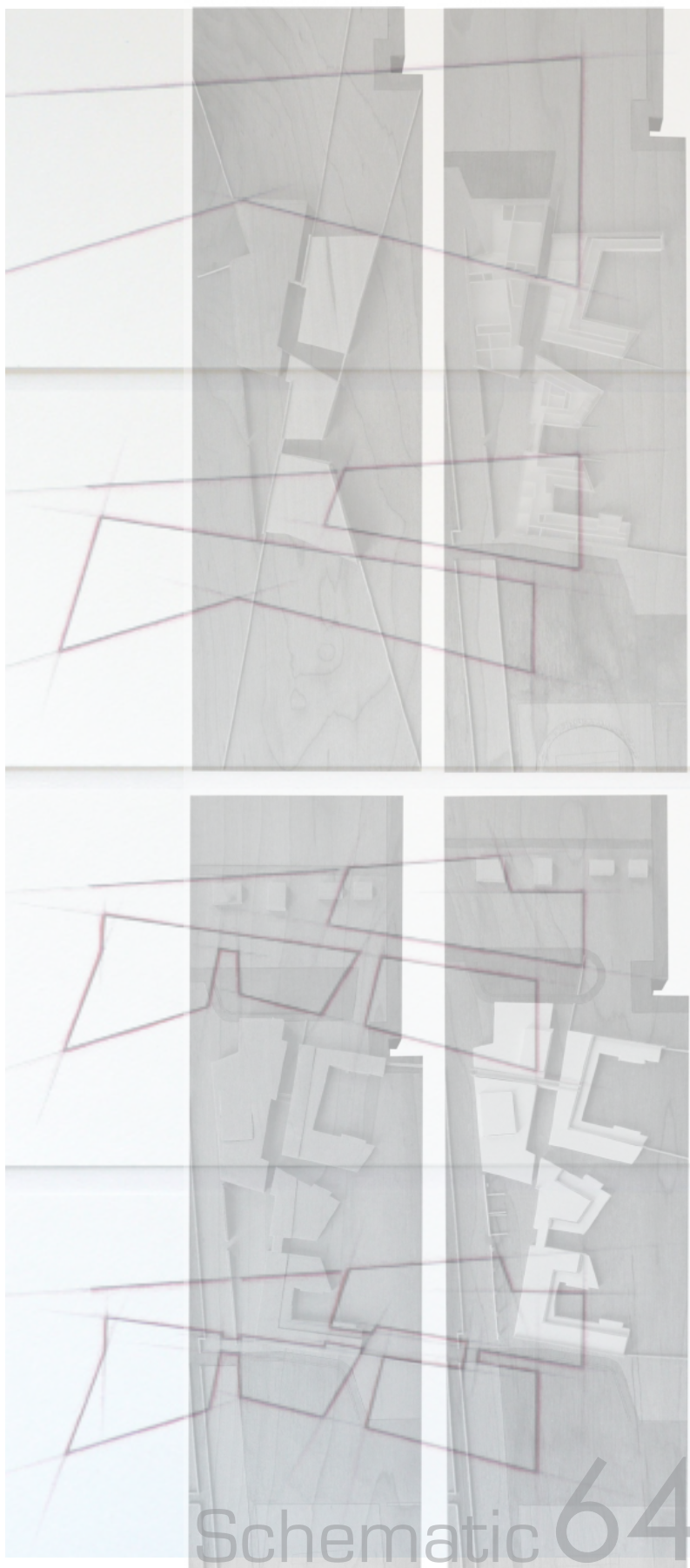
Schematic Design + Series Three + Design

Schematic started out with the drawings to the right. These drawings show the views that connect the school to the community and they transfer to how the schools connect to each other through views.

The top and right side of the first drawing are the sides that connect to the city of Merrill. The south or bottom side is concave to allow for the classrooms that are to be placed on the south side to get the best light and be the most secure away from the school.

The second drawing shows more of a relation between the schools and how the open outdoor areas might be organized.

The third drawing goes in to more depth with the connection to the community with the cut out of the Northeast corner and how it opens to the city. It also shows how the schools may be disconnected from each other but at the same time connected with views.

The last drawing is more of a refined outdoor indoor connection drawing. It try to show more of a refined since of views between the schools also.

After the four drawings, models were made to show how the last drawing could be extruded to make a building connect in three dimensions.
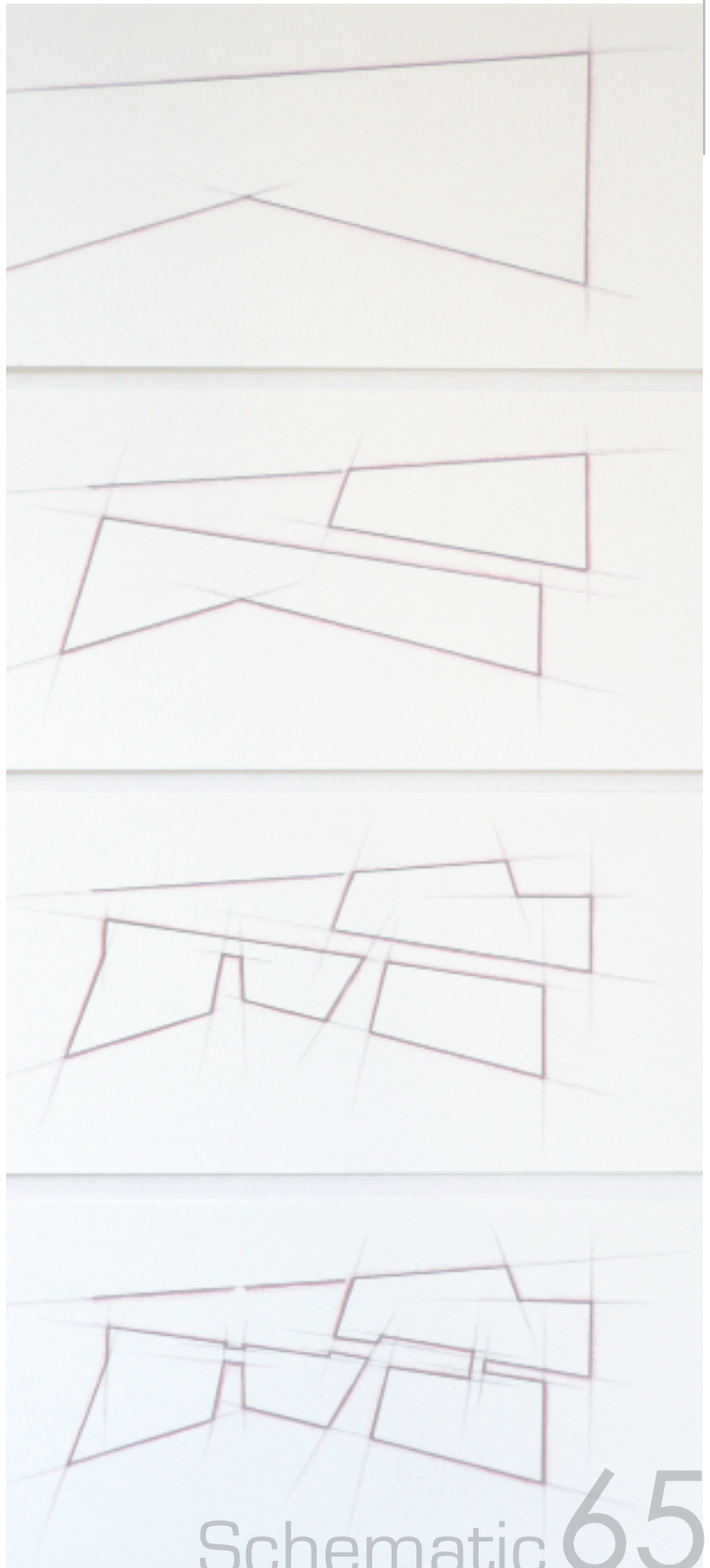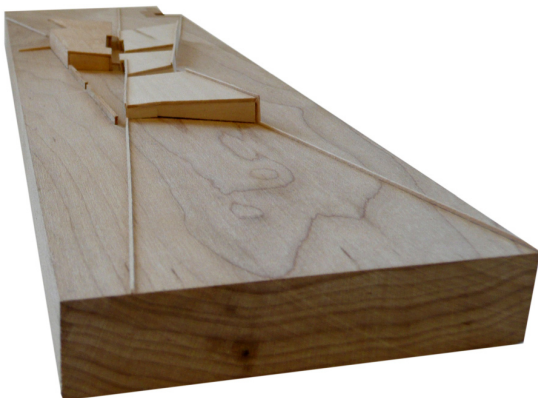
Schematic Design + Series Three + Design

The 3D models look more into the connections between traditional and contemporary, but also look how the height and scale should relate to the city and each other.

The bottom model was a straight extrusion from the drawing. It shows how the school is size in the front and how the size relates to the city. It also try to show a connection between each school.

Two models came between the top and bottom model on this page. The top model which is in both top pictures. The top shows the progression of the models. The fourth model has a finger layout in a campus setting. The fingers are lined with classrooms which will allow the best nature light. These fingers also show interior courtyards that allow for a secure place for the students to play.

The picture on the top shows the openings of the walls of the school. The openings are set back from the road and are mostly located on the school portions of the campus.

Schematic Design + Final Schematic

The final model came from the previous model and the ideas from the beginning of schematic design. This model is different from the previous in that it is spread out more and allows the schools to have safer entrances. This also allows for the school to have greater natural light. This also opens up the courtyards in the back.

Final Ideas

Schematic Design + Site Models

Merrill, Michigan is a small town that can be walked from one side to the other in less then twenty minutes. The model represents the city and the proposed school in white.

The water mark behind the model image shows the school in the context of the greater area. This images was used to show the views from the school and how people would view the school.

Schematic Design + Final Schematic

The floor plan of the campus is divided up into areas. The first and most major areas are the three schools and the core building. From this each area is broken down into smaller areas and eventually rooms. In this layout all classrooms are located on the south side of the campus. The special classrooms like a computer lab or art room are located on the north courtyard side so that they are able to get a more diffuse light and not direct sun. At all major entrance administration is placed. This allows for the school to be more secure and Helps keep out unwanted guest. Other areas in the schools include specialized areas in the high school like a science area, and a library and gym for the elementary school.

The core building is focused on room that both the middle and high school can share. It also houses the community rooms. Some spaces located in the core building include a kitchen with cafeteria space for all students, a gym, an auditorium, and a school/community library. By sharing spaces in the community building a lot of money is saved which can be used in other areas of the design.
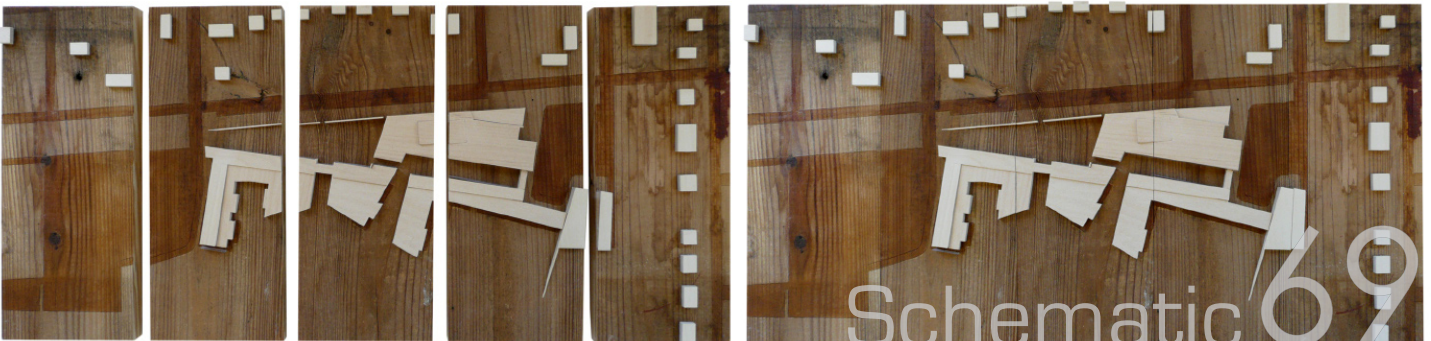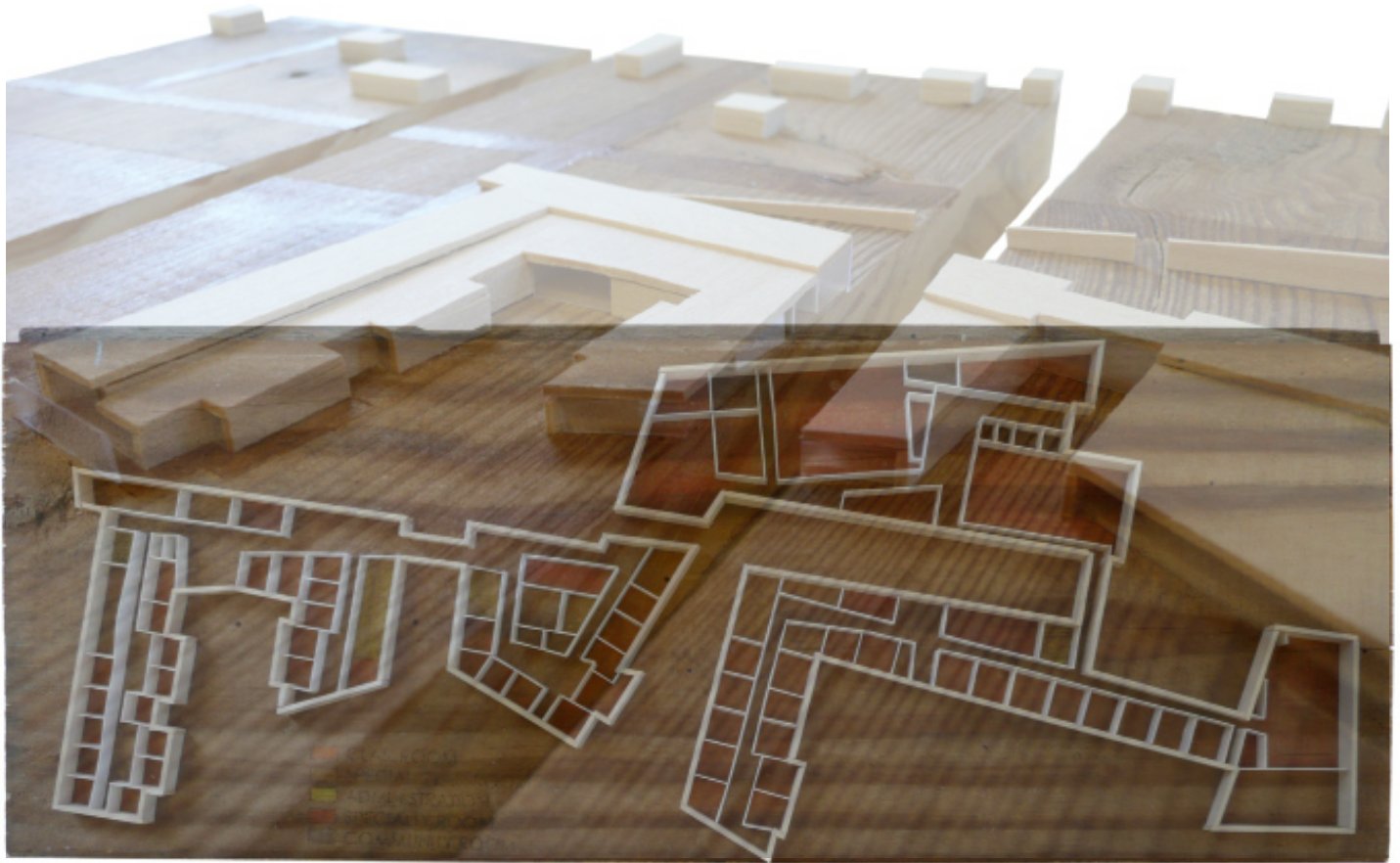
Schematic Design + Building Sections

The schematic design final building had ideas that not only shown up in the plans, but also had ideas that shown up in sections.

The sections models came as a fourth series, but unlike the rest they were more of a final product and stood up instead of lying flat.

The sections try to describe the relation ships between the inside and outside areas of the school. The look into how the courtyard are used and give an idea of what the sunken basketball court will look like. They also try to explain how the natural light will filter into the space.

The first section located at the top of the images shows how the core building's basketball court will connect to the outside plaza. The second and third models show the scale of the building compared to people that are using its courtyards.

Schematic Design + Building Section

After the original building sections it was pertinent to do a section that was larger and showed more ideas of connections and proportions of rooms.

The model was sliced thru the basketball court and a section of classrooms. This location was chosen to show the variation in scale and ground change.

The classrooms, which are not fully developed, show a simple bar joist construction and so that they are located on gardens and also have a side the is open to the sun through most of the day. These model also shows how the corridor and the special classroom relate to the regular classrooms.

On the other side of the model is the core building. This building is cut through the gym, library, and a cafeteria. It shows the relation between these major spaces as well as the scale compared to the classroom area.

Schematic 71
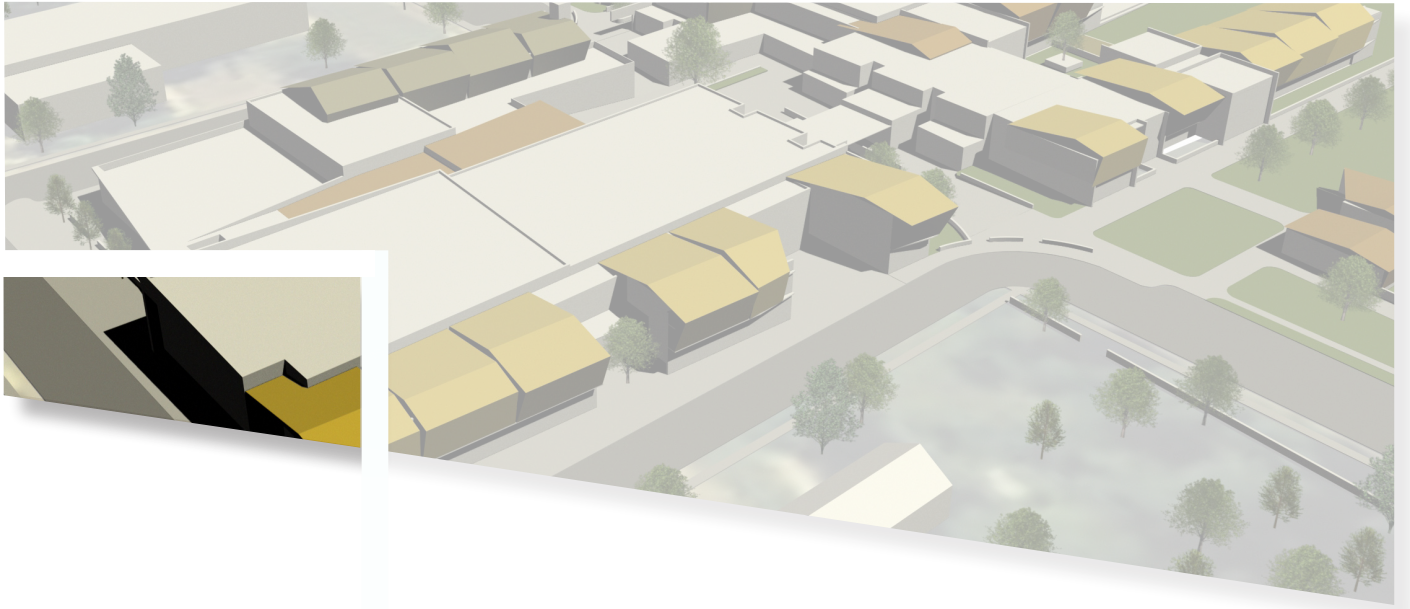
Design Development:
K-12 Rural Public School

Design Development + Design Revisited

The final Critique from the first semester brought some new ideas reguarding design. The current design did not connect with the city / community, it lacked good organization, and had scale issues. Design Development brought a 100% redesign to the school, and its surroundings. The new design attempted to connect the school with the community while at the same time reworking the layout of the school itself. A portion of the new designs looked into scaling the building to fit better within the community and to allow for a more appropriate scale for the students. These ideas as well as others helped shape the new school.

The project not only took a new look at design, as explained above, but also took a new look at the medium used for the presentation. Computer models, instead of physical models, were used to better represent the project. The models on this page represent a progression of the ideas presented on this page.
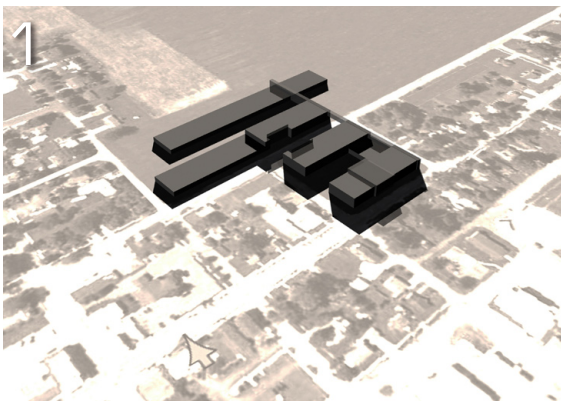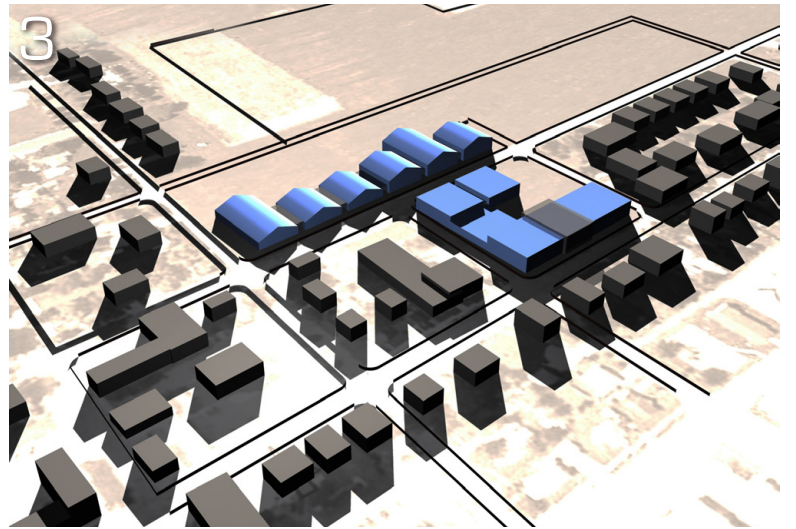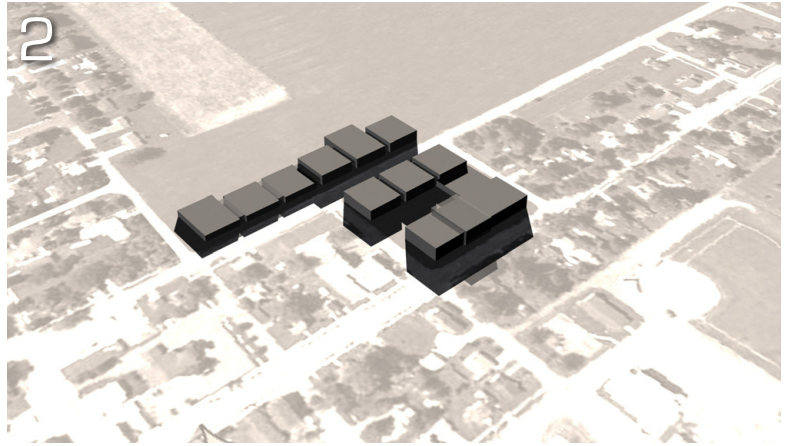
Development 73

Design Development + Initial Floor Plans

At the final critique, of the first semester, a model was brought into conversation. The model was an abstraction of a main building with three pods adjacent to it. It was said that this model should influence the redesign of the project. From this model came the ideas of a main building with pods that represented each school. With the building, now placed on the main street of Merrill, a connection is made between the city and the school. This placement on the site allows the school to receive more pedestrian traffic as well as serve as an element of pride in the city. To strengthen this connection the gymnasium was put onto the main street with a large opening to the street. The building located on the street will hold the community center while the buildings behind will be educational areas and classrooms.

Floor plans numbered 1 and 2 deal with the ideas of "pod" and also look into the connection of the street and the school. Floor plan number 3 looks more in depth at classroom layout, and the idea of "pods." Number 3 will ultimately become the design that is selected to continue with.
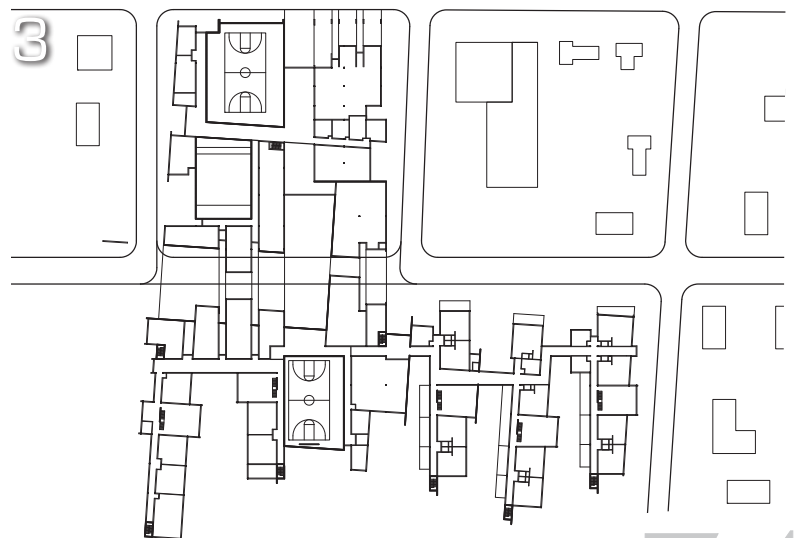
Design Development + Initial Models

During the early stages of the floor plan design, elevations where being developed. From the floor plans a 3d model was constructed. The plans were designed to support two floors and the roof. After the initial phase of extrusion, roofs were added.

The roofs on the project, which are yellow in the models, are used for more than just weather protection. The roofs are primarily used as shading devices on the western exposure of the pods. They are located along the classroom to keep direct sunlight from entering the educational areas. The secondary use is not functional, but rather one of form. The roofs are also used to mimic the roofs of the surround community, helping the school blend into the horizon.

The images numbered 1 and 2 are studies of how the roofs will work and where they will be located. The 3rd image shows development of the sports fields and parking lot in relation to the school.
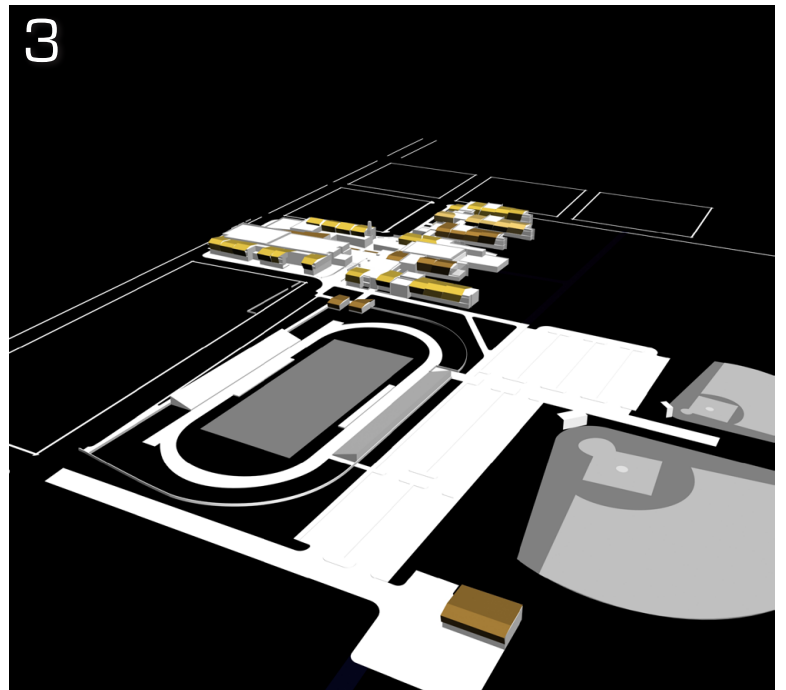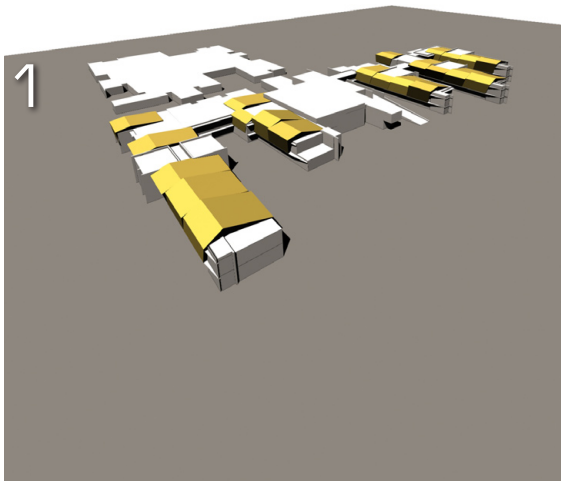
Design Development + Detailed Spaces

After the major spaces were sufficiently completed the detailed spaces were developed. Four spaces were developed in greater depth so that the building was more easily understood.

The first major space to be developed was the roof / wrap detail. (right) The wrap is constructed of wood 2"x8" while the rest is a standing seam metal roof. Behind the facade lays two floors of classrooms and the single loaded corridor that the students use. On the outside of the wall is an area for gardening and a grass courtyard.

The other image (below) is of the threshold that you pass through to arrive at the educational entrances. Originally the area was a street that was closed for the safety of the students. Now it is lined with art rooms and computer labs. The path, that the rooms line, dips down and rises again to an elevated courtyard where the students can spend time outside.
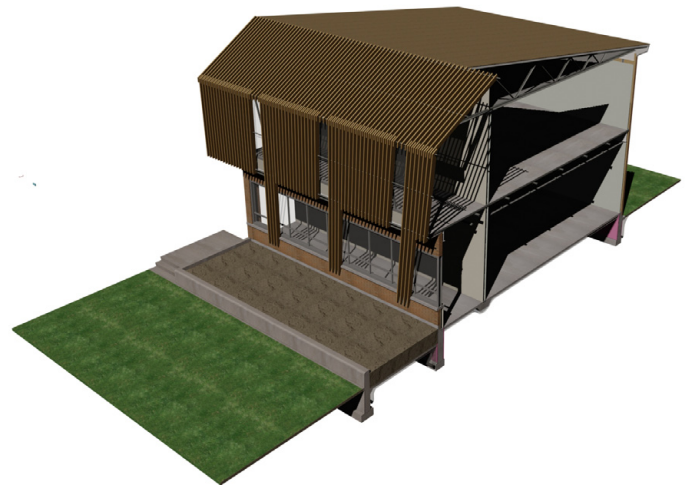
At the end of design development a project emerged that was much different in form from the project of the first semester, but the ideas behind both remained similar. The following pages hold the images of the new design.

Behind this design are many ideas that hold the intent of the original concept of connections. The school as said before now borders the main street and holds a community center within itself. The complex is broken up into two parts. The north building holds the community center on the first floor, and part of the high school on the second floor. The back building holds the elementary school on the east side and the middle / high school on the west side. (The Key Plan drawing on the next page displays this information.)

The rendering below best describes the building and how the scale is broken down with the use of the form. The roofs as explained before are a major contribute to this idea. The other form used to make the building fit into a smaller human scale is the use of roof terraces. The second floor has many exits to spaces that can be used as outdoor gardens and classrooms. Many of these spaces are centralized around the main courtyard to allow for two level interaction.

Places that lie outside of the school are also a major part of the connection with the community. The sports fields as mentioned before as located right off the street to allow easy access for spectators. This area also holds the parking which is hidden by the football field. Like the community that surrounds it the school and parking will be heavily planted to allow for parking that will have sufficient natural shading.

Another place outside the school is the courtyards to the south of the building. These areas hold safe places were the children can play while the teacher can watch them from the classroom. On the end of each classroom wing is a concrete wall that supports a basketball hoop.

Although not every idea was explained within this page, many more idea will come out when the next pages are explained.

FIRST FLOOR

KEY PLANS

SECOND FLOOR

Legend:
- ELEMENTARY
- MIDDLE
- HIGH
- MIDDLE / HIGH
- COMMUNITY

N-S BUILDING SECTION

CLASSROOM SECTION

N-S BUILDING SECTION

CLASSROOM SECTION
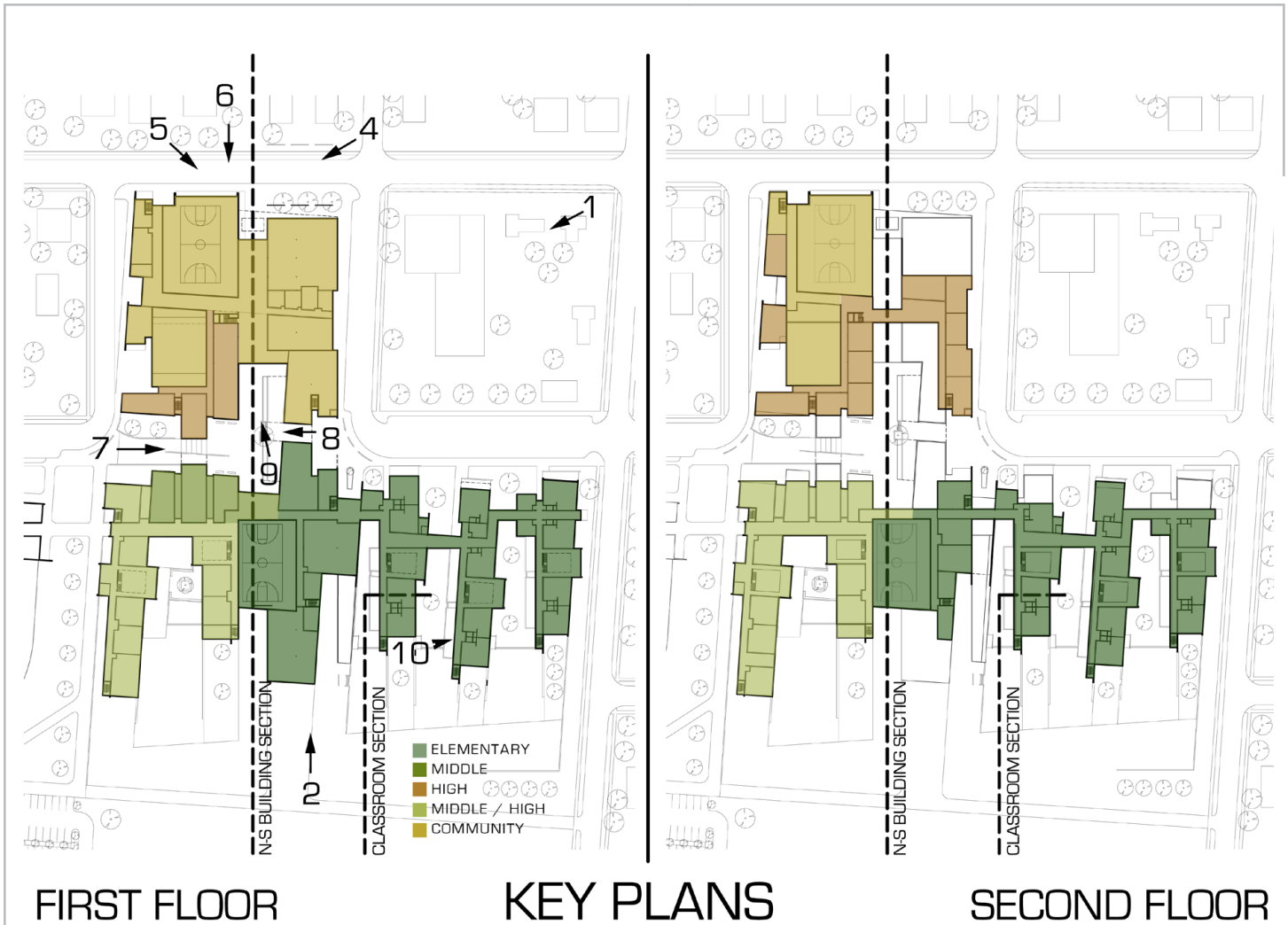
Each color on this image represents a specific use type of the building. The key for the colors is located right in the middle of this page.

The dashed lines represent section that are in the following pages.

The numbers on the above drawings represent where the origin of a render is constructed from. The corresponding images are located within the next few pages.

The second floor has white spots on parts that were colored on the first floor. These locations represent the terraces.
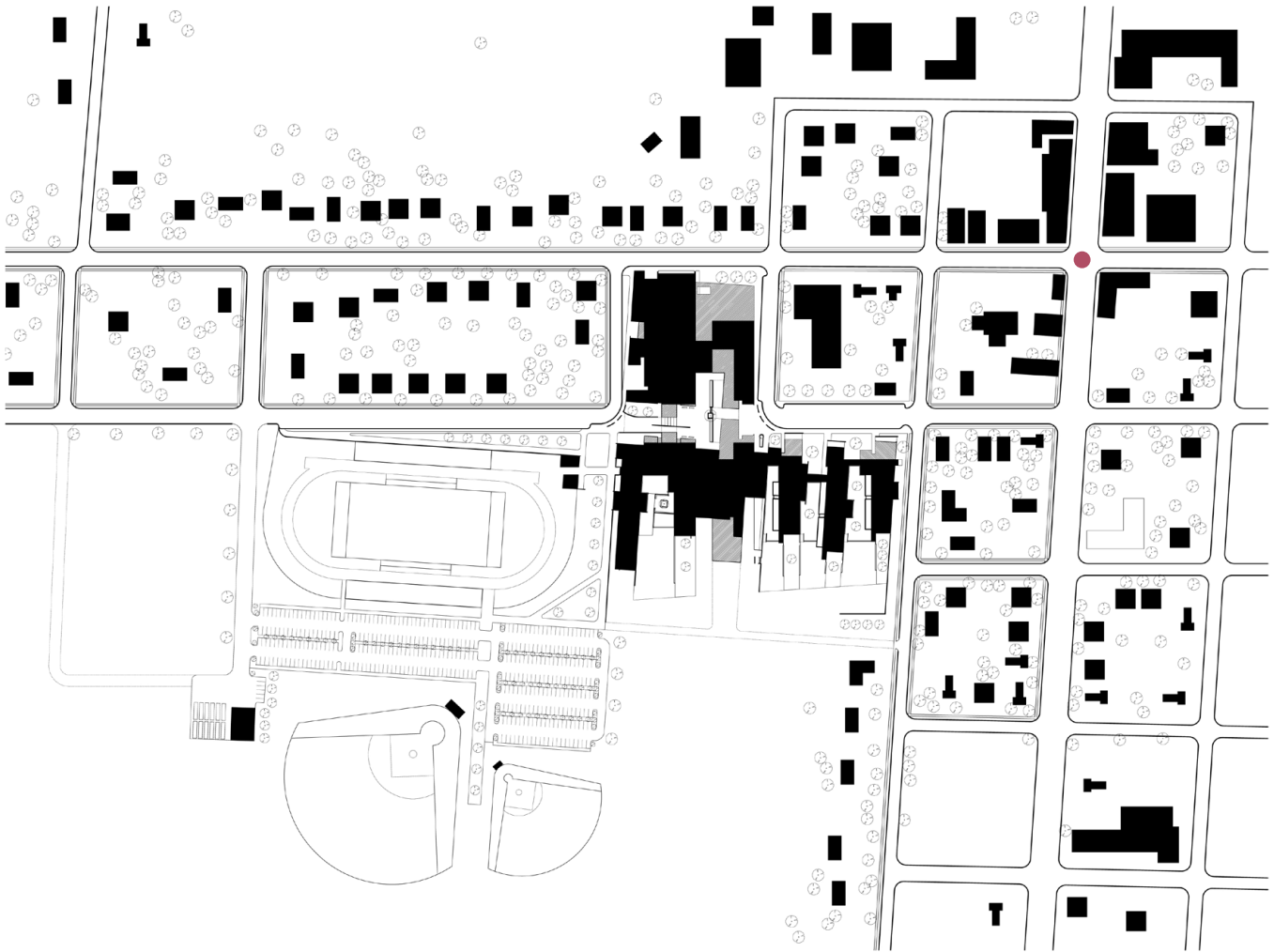
Merrill, MI extends just beyond this site drawing. The small commercial center is located at the red dot. This center consist of mom and pop shops that are only open between 9 and 5.

The areas of hatch that are throughout the school represent the terracing of space.

The following two pages hold the floor plans for the project. Each consist of an AutoCAD file with shadows to show what is located inside and what is outside. Each floor plan also denotes rooms. The plans were laid out in two buildings, each housing different features of the program as explained before. The north building houses the community center which consists of a library, gym, pool, auditorium, and conference rooms. It also houses a large portion of the high school which consist of classrooms and administration.

The south building is broken up into wings that consist predominantly of classrooms. Each wing in the elementary school contains two grades (one on each floor), that converge around a gathering point. This system is known as the house plan. This allows the students to socially interact with a smaller group of people which makes stronger relationships.

The rest of the south building consist of middle and high school classrooms which are located in special wings, such as science. The shop is also located in this area to allow easy access to the exterior parking lot.

Development 79

GYMNASIUM

WEIGHT

LOCKER ROOM

OFFICIAL ROOM

LIBRARY

CON. ROOM

LOCKER ROOM

AUDITORIUM

KITCHEN

CAFETERIA

DRAMA

ART

ADMIN.

LIBRARY

ART

COMPUTER LAB

ADMIN.

BAND

CLASS - K

CLASS - P

CLASS - 4

SUPPORT

SUPPORT

SUPPORT

CLASS - K

CLASS - 4

CLASS

GATHERING

GYMNASIUM

ADMINISTRATION

GATHERING

CLASS - 2

GATHERING

CLASS

LOCKER ROOM

CLASS - K

CLASS - 4

GATHERING

CLASS

CLASS

CLASS - K

GATHERING

CLASS - 4

DRAFTING

STORAGE

MECHANICAL

LOCKER ROOM

CLASS - 2

CLASS - 4

SHOP

CLASS - 2

GYMNASIUM

CLASS

CLASS

AUDITORIUM

CLASS

COMPUTER LAB

CLASS

CLASS

CLASS

CLASS

CLASS

CLASS

CLASS

CLASS

CLASS

CLASS

CLASS

CLASS

ART

SUPPORT

COMPUTER LAB

SUPPORT

SUPPORT

CLASS - 5

CLASS

MULTI

CLASS - 1

CLASS - 3

GATHERING

GATHERING

GATHERING

MUSIC

GATHERING

CLASS

CLASS - 1

CLASS - 5

GATHERING

CLASS

CLASS - 1

CLASS - 3

GATHERING

CLASS - 5

CLASS

GREEN HOUSE

CLASS - 3

CLASS - 5

CLASS

CLASS - 3

CLASS

The top drawing is a section that is cut through a classroom wing. It shows the single loaded corridor and the classrooms. It also shows the structure of the wooden wrap located on the left side. Also on the left is the garden space, which at points has places where a student can exit the building on the left side to get to the courtyard.

The lower drawing is a building section cut through the north / south axis. It is cut through the main entrance hall as well as the elementary basketball court.

Development82

Design Development + Final + Aerials

These images are exterior renderings of the school. The different roof colors differentiate the wings of the school. Each wing is detailed with its own color therefore allow the students to easily be able to find their wing as well as allowing them to have a sense of pride for their designated area.

The first rendering is taken from the northwest and shows the street view of the elementary school. It also show the interaction between the athletic fields and the main buildings.

The second rendering is located on the south side of the building. It shows the courtyards that are sandwiched in between the wings of the grades. The courtyards all have gardens as well as green space for the children to play. The courtyards are also elevated to give a sense of threshold when the occupants cross the stairs. All of the courtyards eventually blend into the landscape. The light colored green on the drawing is a grass paver road that is used to transport mechanical equipment to the mechanical room located on the south side.

The third rendering is the site from above. It is similar to the site plan, but it denotes roofs instead of figure ground. Behind the school the landscape was purposely left open to give the students a view into the distance.
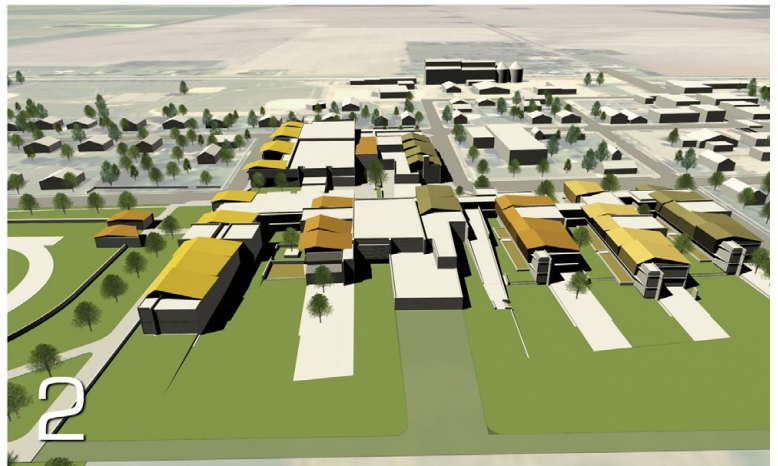
The school has four main entrances. They are the elementary, middle, and high school entrances, as well as the ones denoted in these renderings, the community entrance.

The Community entrance is located off of the main street for obvious reasons. The entrance is first a large awning that tries to pull people into a small plaza and than into the building. Next to this is the high school gymnasium, which is completely open to public viewing.

Just beyond the windows on the left side of the plaza it where the library is located. This entrance is not only for the library, but also for all other community and sports related activities. This entrance is also open to students if need be.

The educational courtyard was built where the roadway once was before it was deemed a safety hazard to the occupants. As noted before many of the spaces that line this courtyard are the art classes so that the school can show its art to visitors just by looking into the windows. Also on both sides of the courtyard a dip is used to show that the elevated courtyard is important. It is also a good place for social interaction.

The courtyard is not only a space for socialization, but also a space for the entrances to the middle and elementary school. The high school entrance is in rendering number 9. To get to the entrance from the parking lot the user must go thru rendering number 7 therefore finding themselves in the courtyard. Number 8 is a view coming from the center of town.

The material used in this space try to mimic the material and colors that are found in the surrounding area. The first floor exterior is an orange brick. The second floor is a lightly green tinted metal panel. These material are used throughout the project, but are the most prevalent here.
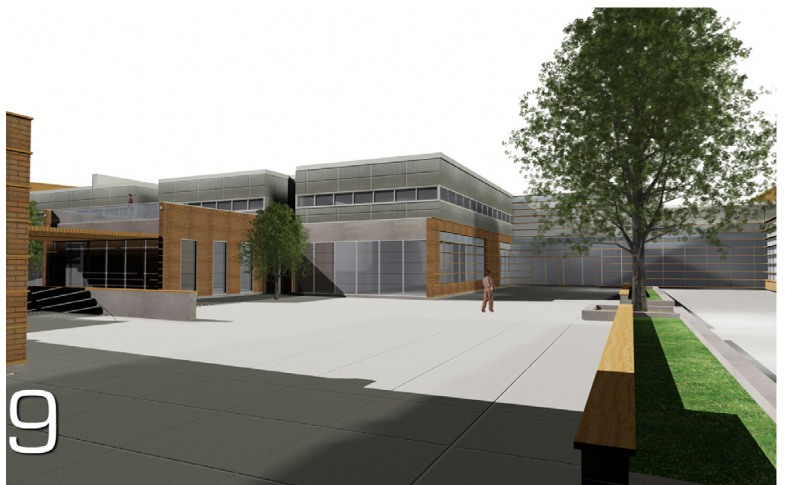
Design Development + Final + Space Renderings

The wrap that focuses itself around the classroom spaces is seen in rendering number 10. This space has been previously explained, and will be the same as last time. (pg. 73)

The rendering below are of the structure of the classrooms. They show the major structure to the metal studs to the final piece.
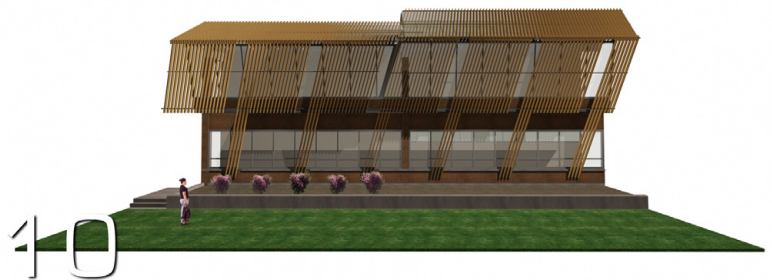
Final Design:
K-12 Rural Public School

Final Design + Redesign Ideas

During the Design Development critique a few things were brought up about the design. The first was that the main community entrance needed to be more inviting and possibly have a large plaza where the community users could converse. The second issue was that parking immediately around the building was very scarce. More parking was needed for such things as voting at the school or other quick visits. Another problem brought up was that the courtyard between the classrooms wings did not seem very inviting.

The largest issue with the design was that the sports field and parking were very unoriginal and lacked the same sense of rigor that the building held.

The final design would bring fixes to these issues as well as more detail to the final products of the design.

For the final design the interior was looked into for the first time. The renderings of the interior are taken inside the main entrance and in a classroom / gathering space.

The final boards which are on the following pages consist of floor plans, sections, and rendering. The drawings were model in 3D Studio Max or AutoCAD, and than printed out and rendered over. The renderings that were chosen to exhibit try to best illustrate the project with a minimal about of information. In these follow pages all images will be describes sufficiently.

The only major design change that was made was the changing of the sports field and parking. The fields were moved to the south of the school so that they could better connected with the school and the paths that were set up. The parking was placed closer to the school, but still near the playing fields. The football field now borders the landscaping that craws out of the building. The view of the horizon that the students originally had is still there because the football field has been dropped down five feet to allow for the uninterrupted space. The grass pavers were kept to allow people to still exercise through the school property. In design development the parking was blocked by the football field. Now the parking is blocked by metal wraps that also protect the trees.

Final Design + Redesigned Areas

Other than the sports field layout, the classroom courtyards also needed some major revamping. To accomplish this the area was looked at in detail. On the right the wrap and gardens stayed, but the space was made more friendly with the use of new paths. Now instead of the garden going up to the building a sidewalk is there. Along with the sidewalk are concrete pillars that can be used as playground equipment or places to display work and or have class out side.

The left side holds a connection that goes straight to the classroom. This side is more shaded and holds benches and balconies that the students can use when on recess. This side also holds the ramp that take you from the top space to the lower space of the courtyard.

Like this area, the main entrance was also redesigned to better serve the communities needs. The main entrance (not pictured here) was reworked to allow for more room between the doors and the street. The front now uses a light weight awning to invite people to enter.
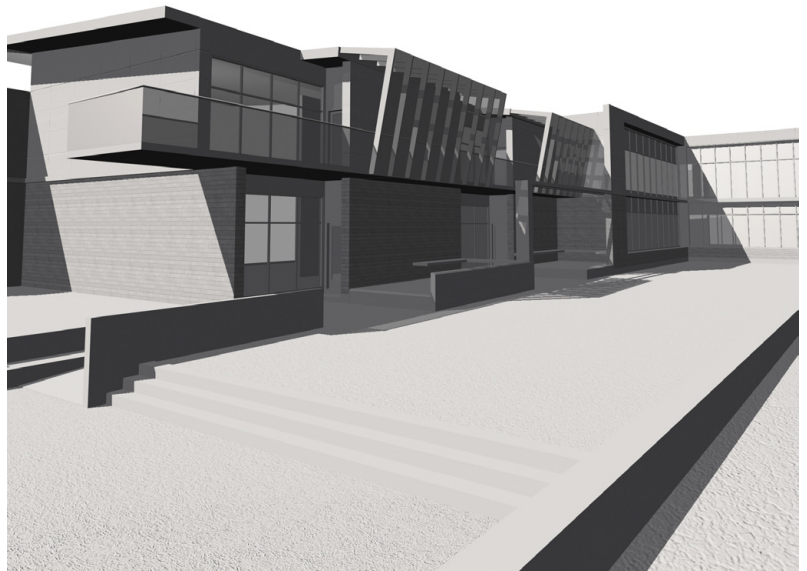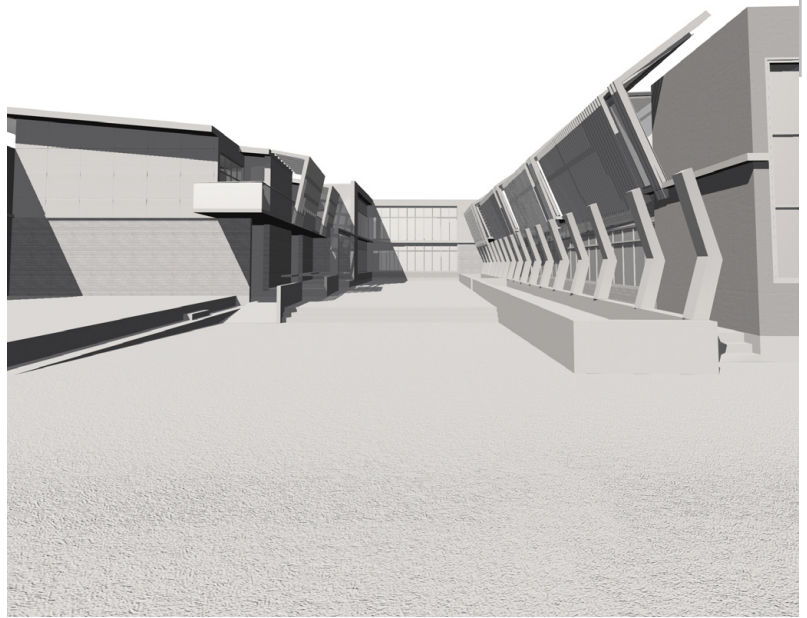
Final Drawings

MERRILL PUBLIC SCHOOLS AND COMMUNITY CENTER

Currently, the rural public schools systems in America have weaknesses in several areas. These issues must be remedied to allow new buildings to be constructed and students to improve in academics. Contemporary issues include: lack of community involvement, decentralized districts, buildings removed from the town, age of buildings, and design ideas left over from the eightieth century. These issues in addition to the amount of money put into education impede many schools districts from new schools. Also, taxpayers see no need for new facilities if their children have already graduated. The question arises as to how we can reconnect the community with the public school so that the students are not left with insufficient places of learning.

This project looks at these ideas and tries to find a solution that will succeed. Merrill, Michigan is a town of 800 residents with a K-12 population of 900 students bussed in from the surrounding areas. The town is 95% residential with a few commercial buildings. The School has been positioned on the main street within one consolidated site in order to save community space as well as improving connections for administrators and students. Integrated within the K-12 school is a community center that allows the taxpayers to have a portion of the institution. With the school and community center in one location many interior spaces are removed due to the ability to share rooms. In example, instead of a three libraries for three schools there are two because the high and middle school share one. Most current schools are based on egg crate design that does not allow for a good quality learning environment. Merrill Public Schools has a single loaded corridor that allows most classrooms to accept natural light and open area for gardening. These aspects as well as others help Merrill Public School become a school that is more inviting for Merrill's residents and more suitable for student learning.

ONE MILE
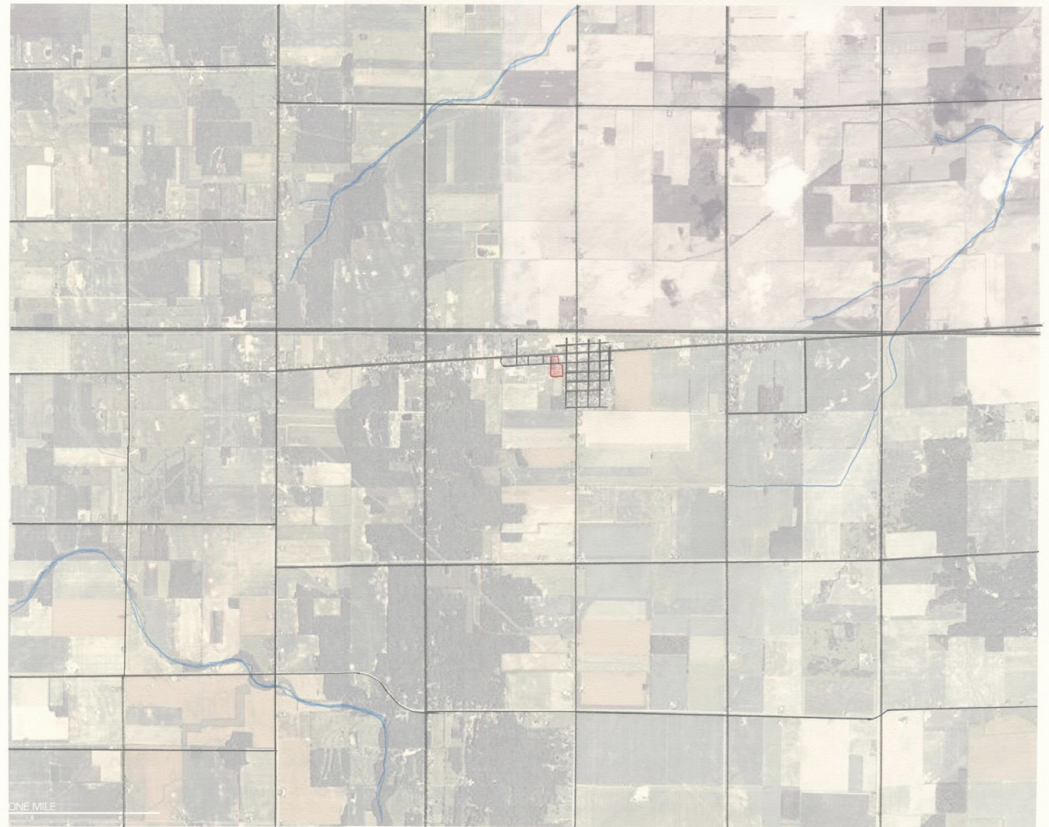
PROJECT BACKGROUND   SITE

The image to the right is used to show how desolate and un-urban the site is. Without this image it may be impossible to judge the site conditions that the project holds. The grid in the middle is Merrill, with the red being the site.

Final Drawings

SITE / MERRILL, MI   SCALE 1/128" = 1'

The building layout is very similar to the final at the design development stage. The things that have been changed the most are the athletic fields, parking, and the connected pavilions. The major lot was not the only parking that was added. Parking was added to the east of the building as well as to the north. These spaces will be used for short term parking. The pavilions, which are the shapes that come off of the back of the building, are used to connect the fields with the school. These pavilions are also used to shade the bleachers.

Final Drawings + Floor Plans

The next three pages contain the Key Plan, Structure, and the First and Second Floor Plans. These drawings include the information on how the school is laid out and how its pieces connect with each other.

The Key Plan is a representation of the uses of each part of the building. Each color represent a section. The Key Plan also holds the room names that have been omitted from the floor plans for graphical reasons.

The Structure shows the post and beam system that is being used. The structure consist of 36' bays that are sized to mimic a house. Each bay is made of wide flange columns, I-beam supports, and bar joist that hold up metal decking. Most columns are set into the walls, but a few are exposed.

The First and Second Floor Plan are again shadowed to show what is outside and what is in. Like the last bench mark the Plans are made of two buildings. The north building holds the community center and high school, while the south holds the elementary , middle, and high school.

The community center consist of rooms that are shared with the students. Therefore some of the community center is off limits during school hours. The community center holds a library, that is shared between the community as well as high and middle schools. Also shared are a gymnasium, auditorium, pool, and conference rooms that can be used for meetings, or gatherings.

The high school portion of the north building holds administration on the first level and classrooms on the second. The administration is there to be a guide to the students and the people from the community. The receptionist is able to watch the entrance and stairs to the second floor to make sure the wrong people do not go into places that are not designated for them. Much of the administrative offices have windows

so that the students always have natural surveillance on them. The first floor also houses the high school art room and well as the drama room. The drama department is placed on the first floor so that they have easy access to the auditorium. Also, just outside the exit doors near drama is an outdoor practice theater. Both of these rooms are places on the courtyard so that people that pass by are able to see what the students are working on. The second floor consist of classrooms and areas that are used in connection with the auditorium. Most classrooms have outside terraces near them that allows for outside interaction. These spaces would also have small plants for the student to take care of. The classrooms are set out into three wings with two open spaces between that are used for interaction between classes and before school.

Besides the interior of the north building the exterior is also important. The main entrance is located in a plaza which will allow interaction of the towns people. The plaza also holds plantings and spaces for seating. Each side of the north building has concrete paths that allow people to travel around the building, but no entrance is on these sides due to security issues.

The south building holds the bulk of the educational program. To the east is the elementary school and to the west is the middle and high school.

The Elementary school is broken down into three wings that each hold two grades. The one on the left is kindergarten and first, the middle is second and third, and the right wing is fourth and fifth. Each wing has a center open space that is used as for collective gathering. The wings allow the buildings to separate which allows for courtyards in between the wings. These courtyards hold the gardens and green play areas. Each classroom will have its own space to garden which will allow the students to learn about the environment. The gardens will be on the west side of the wings so that they receive the most sun. The east side will hold seating areas and the second floor will have a balcony for two level socializing. On the west side of the elementary school is the entrance and the administration to secure it. The west also holds the gymnasium and its support rooms.

The west side of the south building holds the middle school and portions of the high school which use shared spaces.

Final Drawings + Floor Plans

The entrance to the middle schools is on the south side of the educational courtyard. The administration again protects the entrance from unwanted visitors. This side consist of two wings each with two levels. Each wing on each level has a specialty area such as math or science. Like the elementary school they also use gathering spaces for the students. Besides regular classrooms, the south building also holds spaces for the middle schools art room and computer lab. These are placed along the education courtyard. Above these room are more classrooms that have places to go outside onto terraces.

Besides the building the floor plans also represent the play area behind the south building. The courtyards that were described earlier leak out into a more expansive green area. These areas are separated at each wing by a slight threshold in topography. The play areas hold basketball courts, space for equipment, and open expanses to play in. Around the elementary school is a small wall to keep the students inside the property. Also the building uses natural surveillance so that the teachers can watch the students from most interior spaces. Behind the high and middle school is the football field which can be used during recess if needed. Each wing is also ended with a concrete slab which allows the students to play games like four square.

Final Drawings
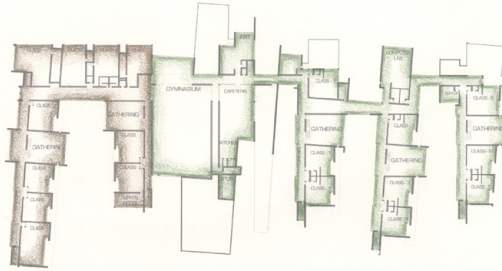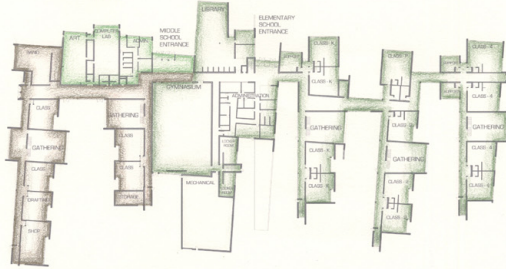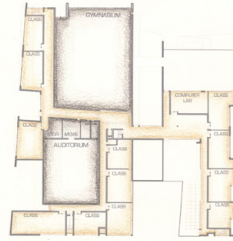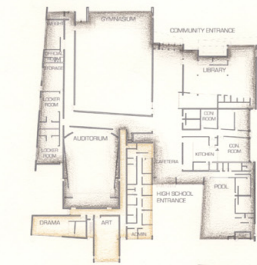
KEY PLAN   SCALE 1/64" = 1'

	ELEMENTARY
	MIDDLE
	HIGH
	MIDDLE / HIGH
	COMMUNITY
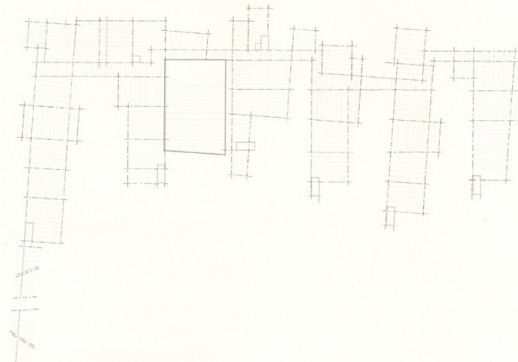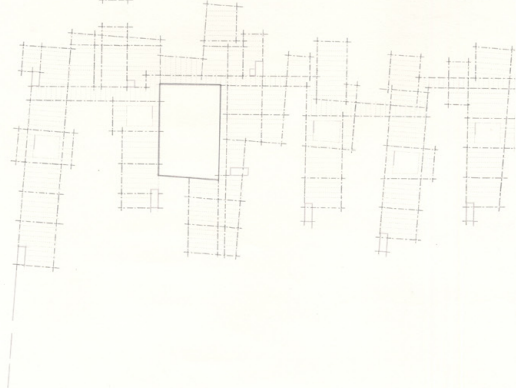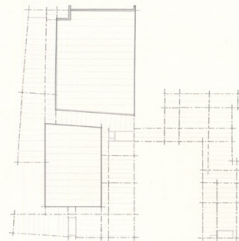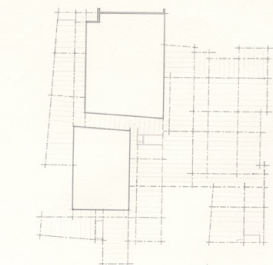
FIRST FLOOR STRUCTURE   SCALE 1/64" = 1'

SECOND FLOOR STRUCTURE   SCALE 1/64" = 1'

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FIRST FLOOR PLAN   SCALE 1/32" = 1'

Final Drawings

SECOND FLOOR PLAN   SCALE 1/32" = 1'

N

Final Drawings

AERIAL

Final Drawings

MAIN ENTRANCE
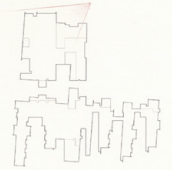
The main entrance has changed since design development. The entrance now has a plaza that can be used for social interaction between the towns residents. The plaza and school itself will be protected by ballards and planters so that a car does not damage the facade. Seating is also available for the students waiting for pick-up or people that want to take a break. The awning is put in front of the school to demarcate the entrance and to keep rain off of the visitors. The entrance consist of three doors, two for the main hall and one for the library.

Final Drawings
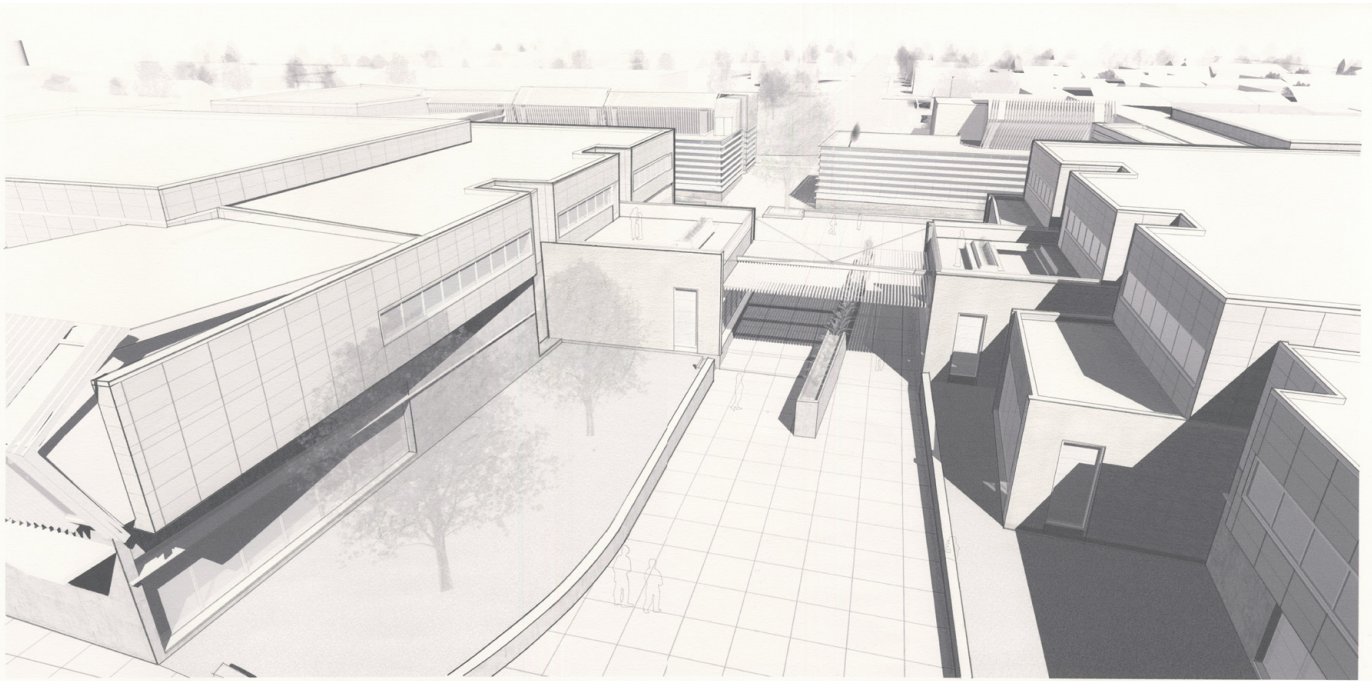
EDUCATIONAL ENTRY COURTYARD

The education courtyard is the area that is used to enter the middle and high school. To the left is the high school and to the right is the middle. Both schools have art rooms that border the path to the courtyard so that visitors and students can see the work of the students in the art classes.

Final Drawings
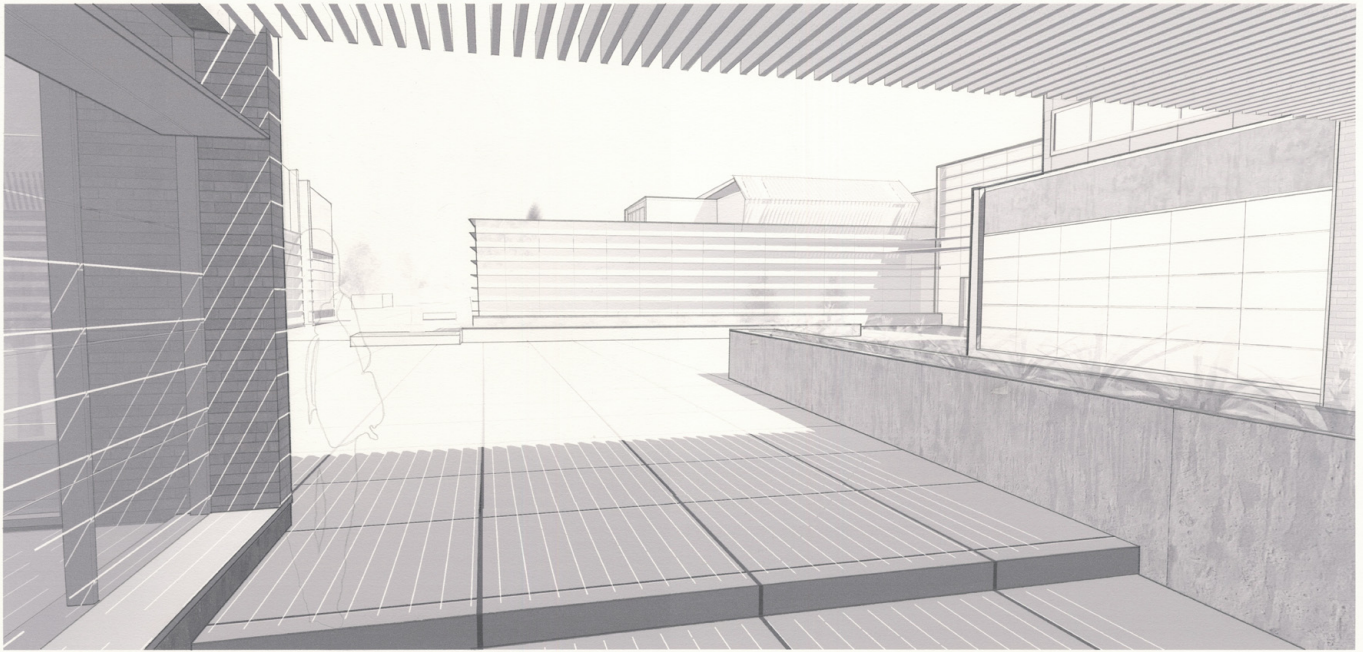
EDUCATIONAL COURTYARD THRESHOLD
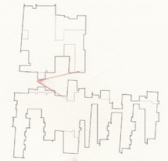
The threshold into the courtyard is put in place to separate the courtyard from the parking lot without the use of a wall. This space is meant to feel like it is encapsulated and secure from the town outside of the school. The awning above wood be created from the same wood that is used on the wraps. On the left in the distance of this rendering is the entrance for the middle school. The right side is the glass that walls in the art room.

Final Drawings

ELEMENTARY EXTERIOR
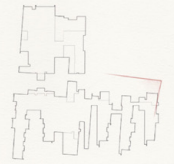
The elementary school is directly adjacent to a row of homes. Therefore the school is broken down into a scale that represents these homes. This rendering of the school is showing the north side of the building which holds all classrooms. These classrooms have glass walls with screens in certain areas for privacy. Areas for planting are placed behind concrete walls that are placed to protect the walls of the school. An exit is located in each wing so that students can be picked up just outside of their classrooms.

Final Drawings
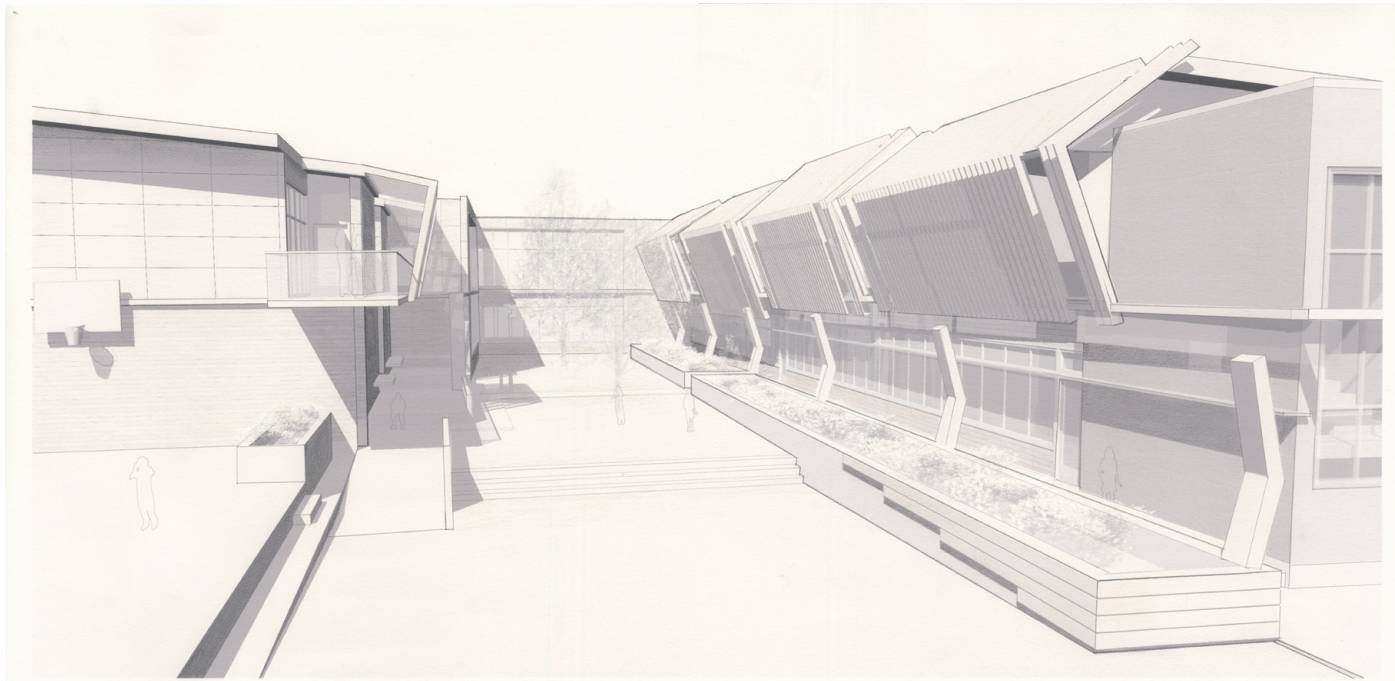
CLASSROOM COURTYARD
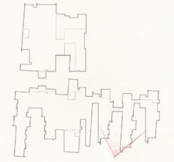
The classroom courtyard is flanked by classroom wings on two sides and the corridor on the north side. The wing to the right side holds the garden and the sidewalk along the edge of the building. The left holds the benches and the ramp to get to the level below. The courtyard is on two different levels so that a space is delineated if the teachers only want the students to play in a specific area. On the far left is a detail of how the basketball court and hoop would connect to the school.

Final Drawings
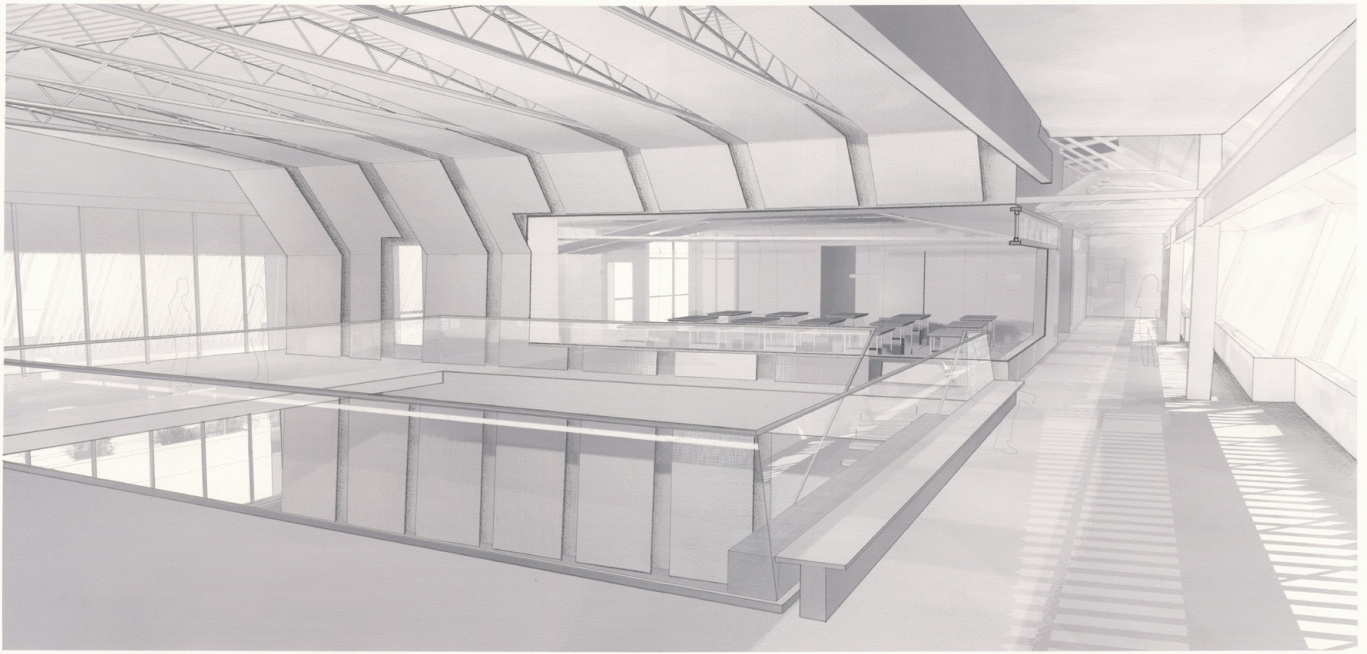
GATHERING SPACE / CLASSROOM

The gathering space is used for the meeting of the whole grade or just for a place to socialize between classes. The rendering above has a section cut through the far wall to show what a typical classroom would look like. The wraps would be used to post information.
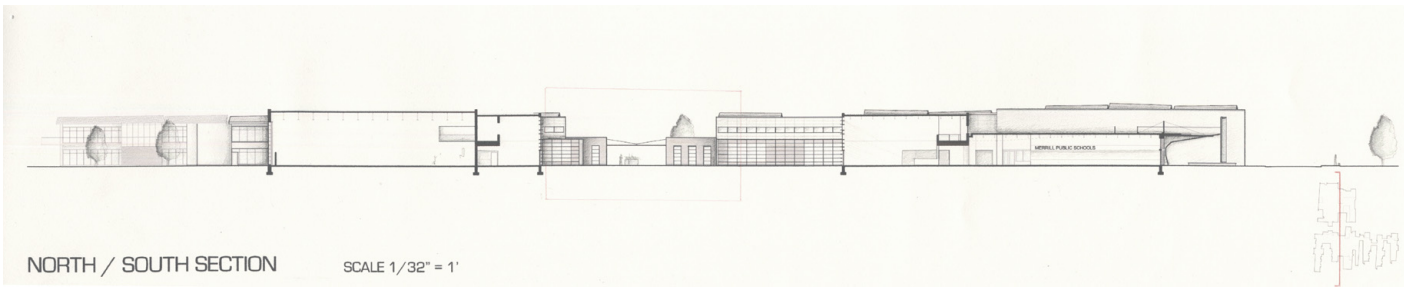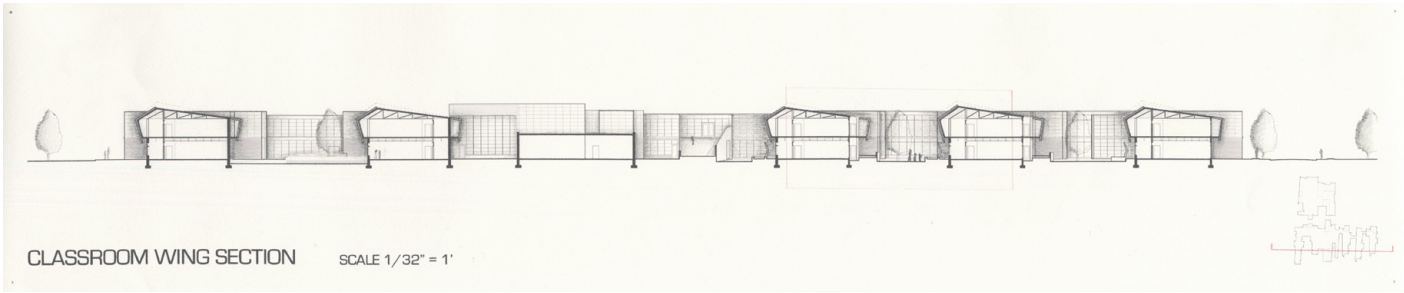
Final Drawings
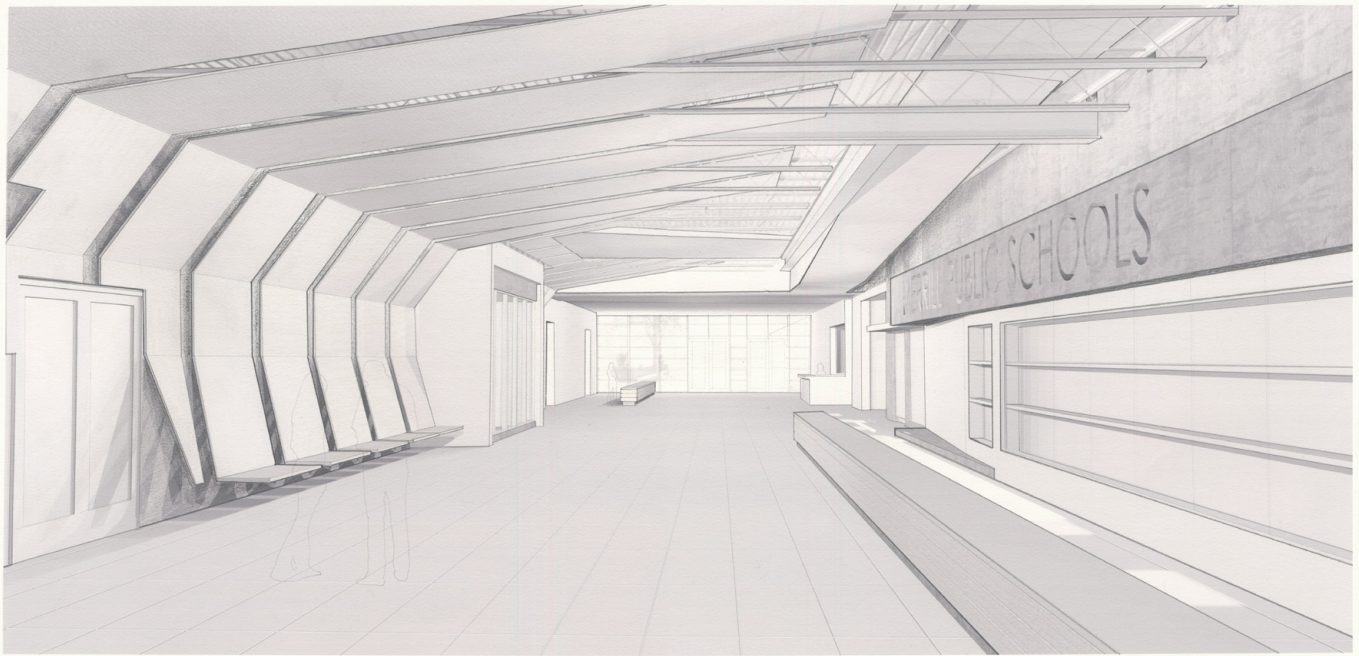
MAIN ENTRANCE INTERIOR
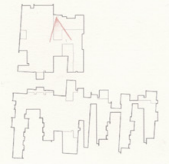
The main entrance will be used as a gathering spot during sporting events or other events in the city. The left side has benches and the entrance to the library. The room that comes out form the left wall is the library computer lab. The right side holds the display for the school achievements as well as a bench to sit on. At the end of the hall is the entrance into the education courtyard. This connection is present so that the visitors can interact with the students without physical contact.

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Final Drawings

CLASSROOM WING SECTION   SCALE 1/32" = 1'

NORTH / SOUTH SECTION   SCALE 1/32" = 1'

Final Drawings

CLASSROOM / COURTYARD SECTION   SCALE 1/4" = 1'

This section shows the connection between
the indoor and outdoor of the classrooms
and courtyards. The halls are single loaded
with classrooms on each level. The left side
shows the balcony that is used for plantings.

Final Drawings

EDUCATIONAL ENTRY THRESHOLD SECTION   SCALE 1/4" = 1'

This section is cut through the threshold to the education courtyard. On the right is a computer lab and on the left is an art room. On the second floor are classrooms that have a connection to an outdoor terrace. The terrace like the other outdoor areas holds places for seating and for planting. In the middle of the section is the awning used to demarcate the parking from the educational courtyard.
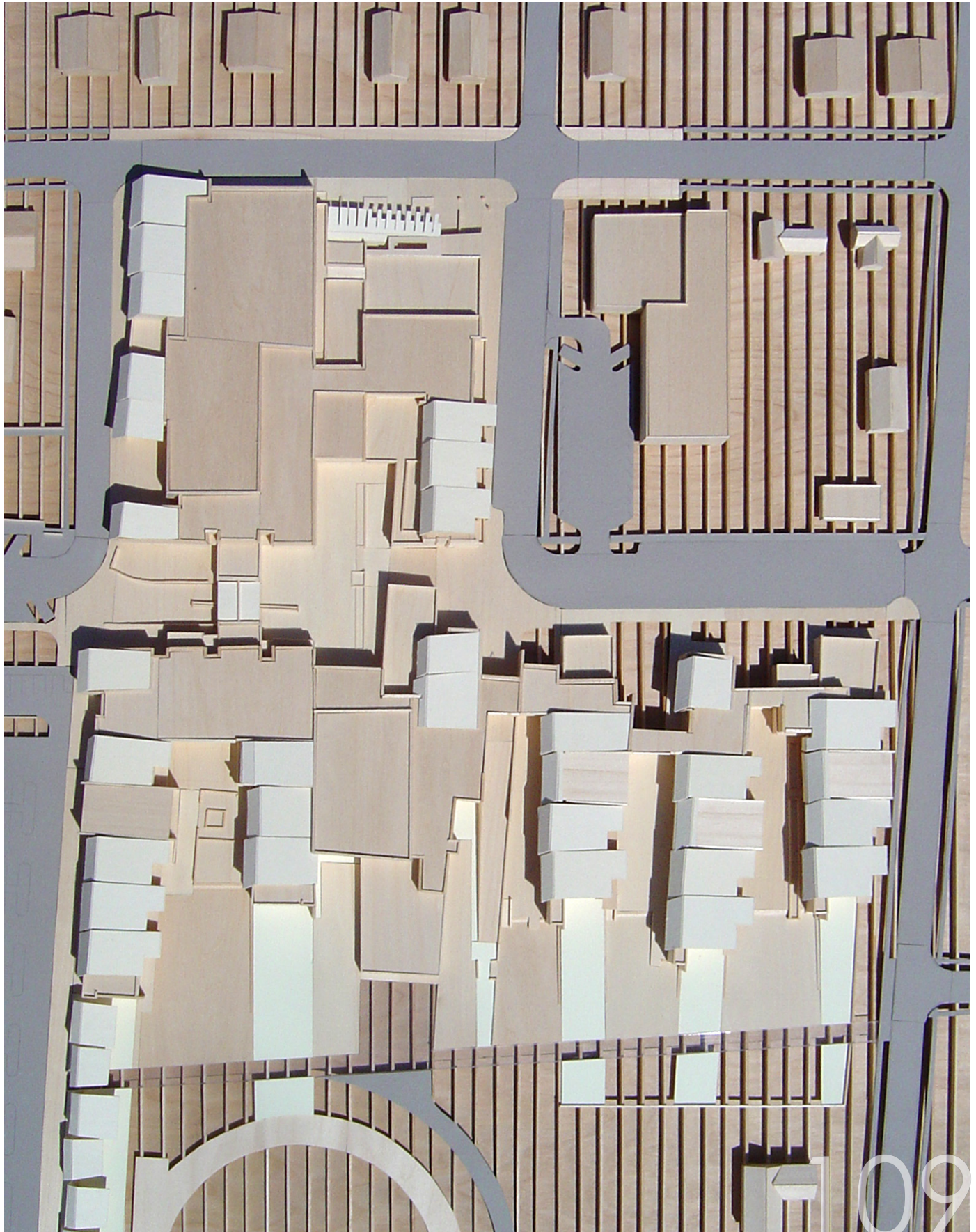
Final Model

The final model was constructed on a 24" x36" base to make it the same size as the floor plans. It is constructed of basswood, museum board and plexi glass.

The model was built to show spaces that were not present in the renderings. Vertical terrain was used to elevate the building so the changes in elevation in the courtyards could be shown. It was also used to show that the football field would be lower so that it is possible to look at the horizon.

The next pages are of the model and its details. The photographs were shot in sunlight to show how shadows would effect the building.
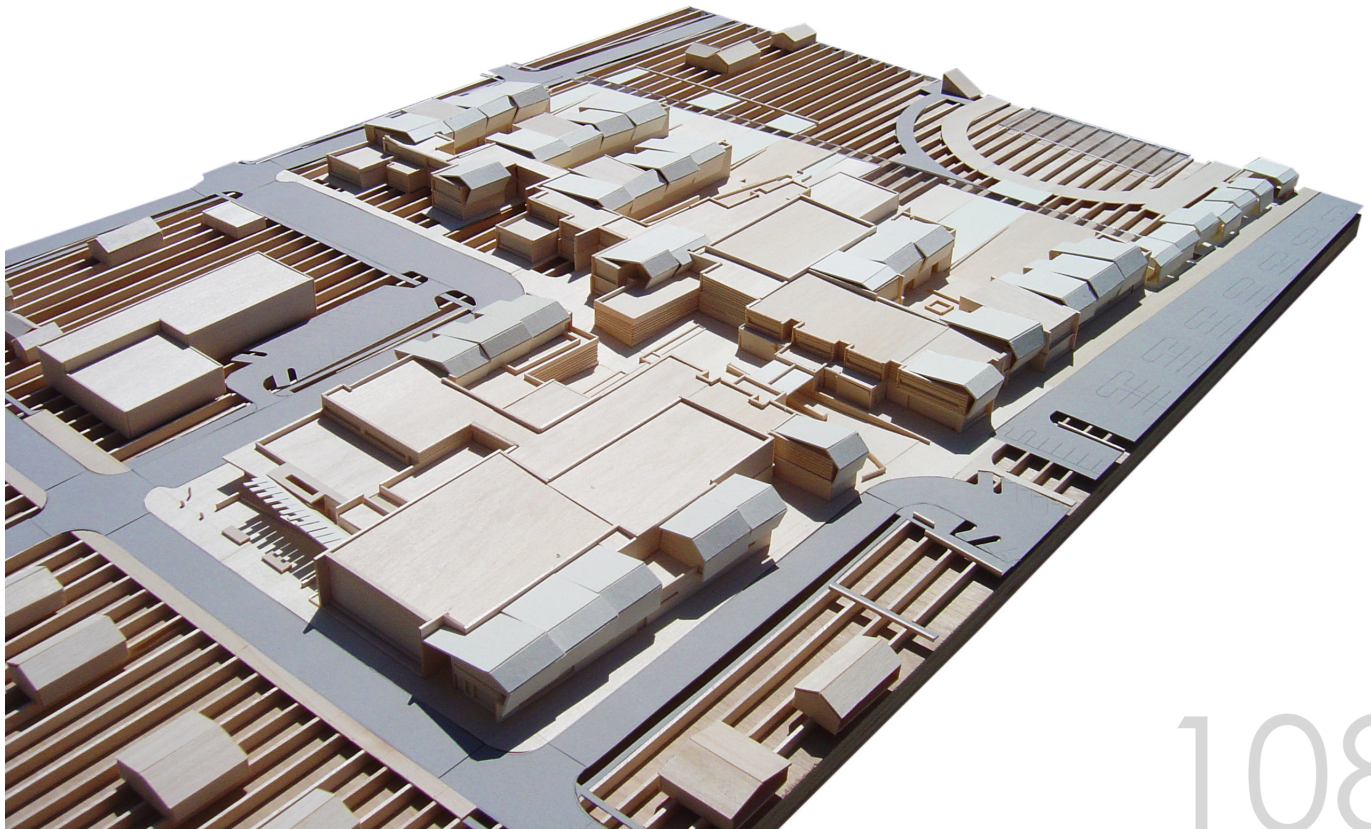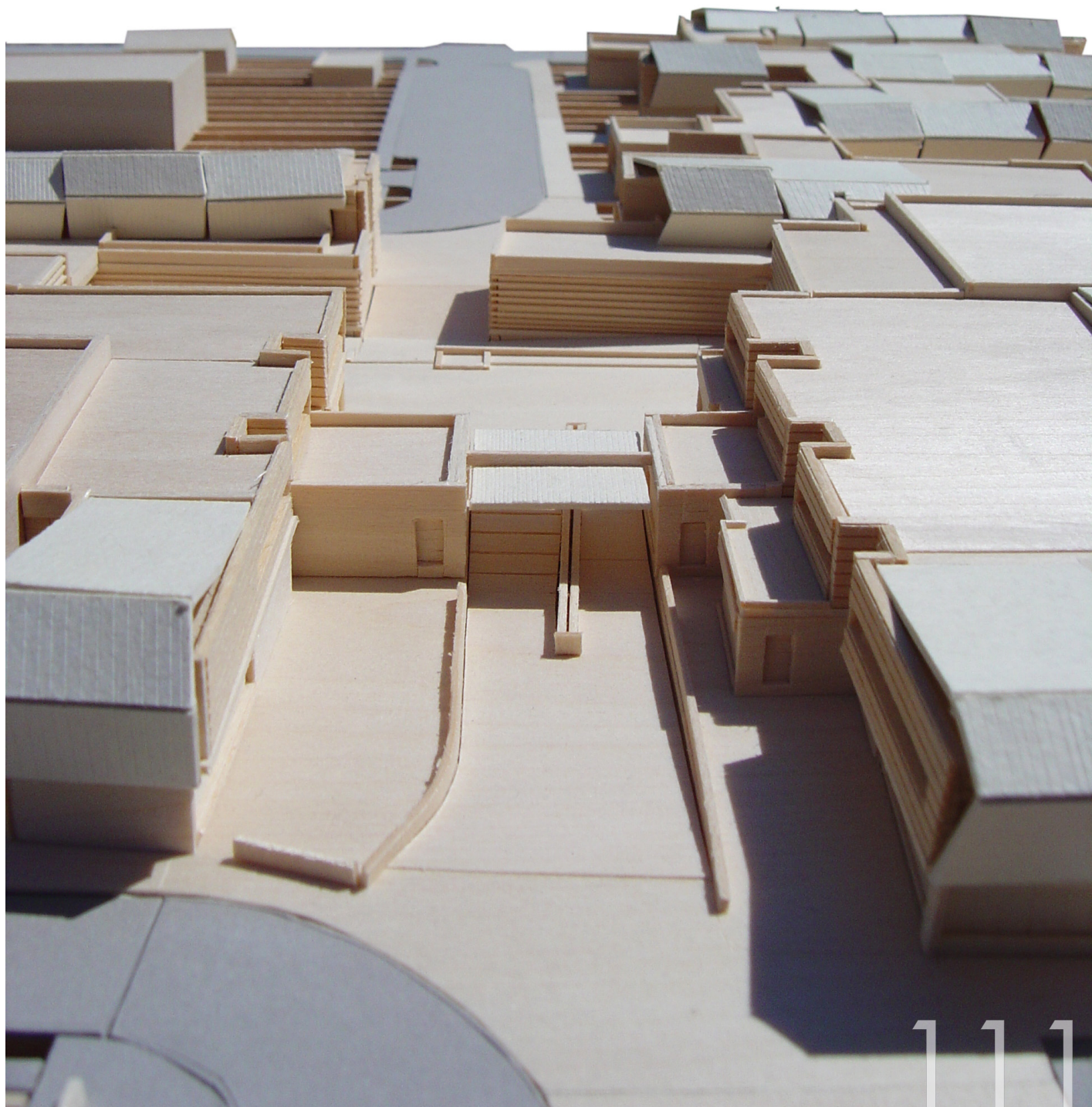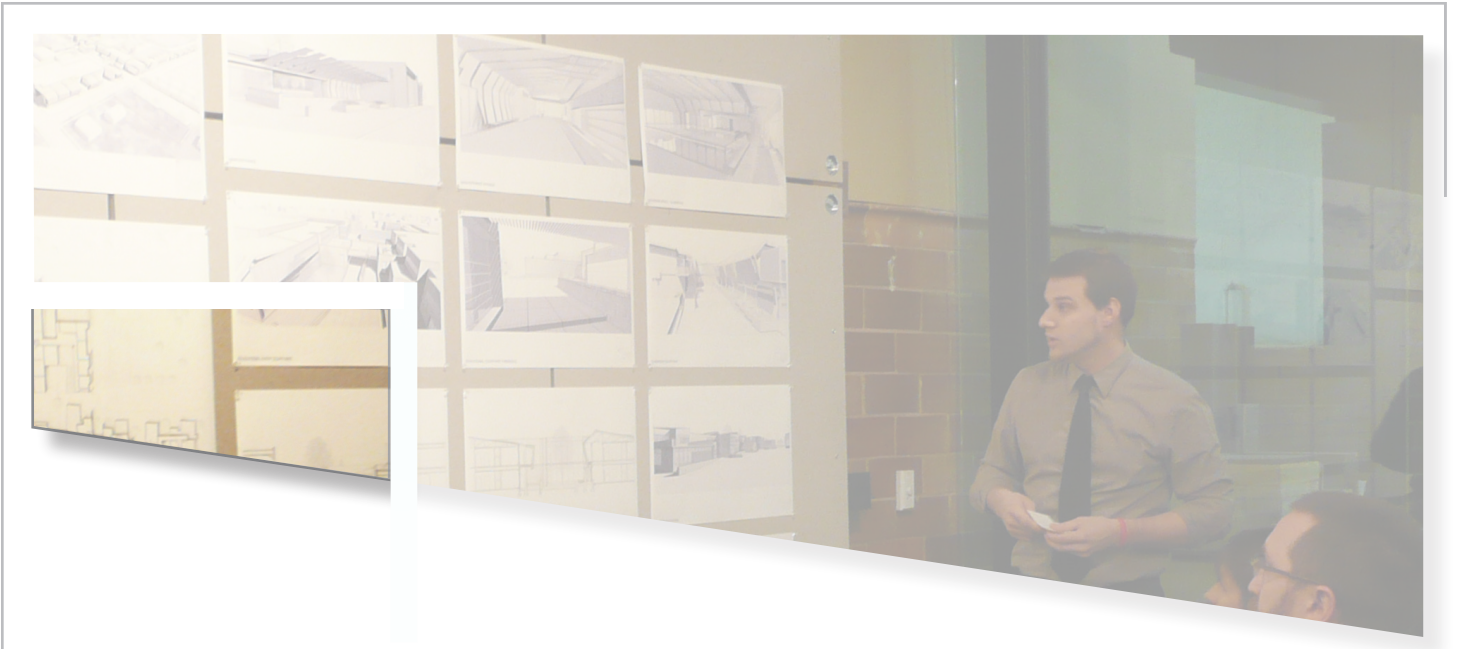
Final Model

Final Model

Final Model

Conclusion:
K-12 Rural Public School

Conclusion

The project ultimately looked into how a rural city can have a contemporary school that is available for the students and tax base to use. The project also set out to remedy the problems that schools hold with planning, design, and connecting with the community. Overall, I believe the project did meet most of the goals it set out to accomplish, but where these goals to easy to meet? The thesis project tried to be a thesis by changing the rural school so that it was more useful to the community. To do this the thesis involved mostly planning things that had rarely or never been tried, in current and past school. Most thesis about schools are more involved with the pedagogy instead of the aspects of planning.

In the end the project, like most thesis projects, could have been pushed further in the direction of a deeper thesis, which would have helped me learn more as a student going into the field of architecture. At the same time the direction that I took has taught me a significant amount and I am very happy with the project that I decided to explored.

Endnotes

1   The Boston Globe, "Schools vie for honor of being the oldest," www.boston.com.
2   U.S. Department of Education, "The Federal Role in Education," www.ed.gov.
3   U.S. Department of Education, "The Federal Role in Education," www.ed.gov.
4   Taylor, Aldrich, and Vlastos, p.5.
5   Tanner, "Educational Facilities Planning," p.252.
6   Tanner, "Educational Facilities Planning," p.252.
7   Tanner, "Educational Facilities Planning," p.246.
8   Rutgers, "Natural Surveillance," www. crimeprevention.rutgers.edu.
9   Brubaker, "Planning and Designing Schools," p.67.
10 Tanner, "Educational Facilities Planning," p.274.
11 Crowe, "Crime Prevention Through Environmental Design," p.149.
12 Crowe, "Crime Prevention Through Environmental Design," p.149.
13 Tanner, "Educational Facilities Planning," p.28.
14 Tanner, "Educational Facilities Planning," p.28.
15 Brubaker, "Planning and Designing Schools," p.66.
16 Tanner, "Educational Facilities Planning," p.37.
17 Tanner, "Educational Facilities Planning," p.37.
18 Crowe, "Crime Prevention Through Environmental Design," p.186.

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