A MODERN BARN RAISING

by
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Submitted in partial fulfillment of the requirements
for the degree of Master of Architecture (First Professional)

at
Dalhousie University
Halifax, Nova Scotia

April 2004

DEDICATION

Evert and Linda,

Thank you for your endless support and encouragement.

CONTENTS

ABSTRACT

How can untrained and trained labour forces work together on the construction of a project?

The pursuit of this question involves:

- Investigating construction methods which allow for a high tolerance of error.
- Grouping trained and untrained labour forces into their own construction phases.
- Designing a building for a real client
- Investigation of drawings that illustrate the studied construction methods.

What I have studied is essentially a way of practicing architecture. It is an example of an approach that I value.

My client is a group of eight people; board members from the Ward 1, New Glasgow Community Center. This thesis focuses on the design/renovation proposal for their community center in New Glasgow, Nova Scotia, Canada. The building program evolved out of meetings with the client. The building's program and design proposal will continue to evolve after this thesis. Thus far the program has a variety of spaces, administrative offices, small meeting rooms, a daycare centre, a multipurpose hall and an exterior recreational ground.

Building science is my main field of study. Construction methods are designed to involve members of the community, both trained and untrained in the field of construction. It is the intention of this thesis to find ways that members of the community can be brought together during the event of construction.

BACKGROUND

My motivation lies in a pursuit of meaningful architecture in the average built environment of Canada. The greatest challenge for an architect in Canada is to find work with developers, local builders, or home owners who understand the values of good architecture. It is in the opinion of many progressive architectural firms that the greatest buildings come from the most open-minded or creative clients. However, most building and development continues outside of the context of the dream client. I am interested in the average built environment, typically devoid of and ignored by architects.

I have been approached by a number of potential clients over the years to alter designs they found in newspaper clippings. Typically all they needed from me was a set of drawings, inspired by the clipping, to obtain a building permit. My first instinct was to avoid working on the generic designs that have littered our landscapes. I have started to change my opinion; this kind of work offers potential in changing what architects dislike so much.

Architects can start exemplifying their expertise by accepting all clients, and then learning how to convince these clients to use a few interesting ideas. These projects may not be so architecturally profound that they would be published, but they can start a momentum in the general public that could then expand the scope of our profession. This prompts another question: How can I contribute to architecture when I start on such infertile ground?

Architects can begin to influence the built environment for the better by working with the "everyday client", i.e., the lay-client who is not in the top two percent of the income scale. I would prefer to expand my client base beyond the two percent of clients who are willing to explore architectural ideas.

Compared to most countries, there is a great deal of construction in Canada, and it is unfortunate that so little of it is commissioned through architects. For architecture to survive as a contributing profession in Canadian culture, architects must look for ways to include the segment of the population that is unaware of our abilities.

The most common ground architects and clients have is a vested interest in the well-being of their communities. Using this common ground, I adamantly want to work with the members of the New Glasgow Community Centre. They may not be motivated by the beauty of well-designed architecture, but they care deeply about their community. They are striving to improve the quality of their community's built environment. They are struggling to build connections among neighbours and neighbourhoods. If effective, they could raise the perspective of the citizens beyond their own neighbourhood to the whole town. Architecture should play a valuable and supportive role in this process.

I intend to use simple construction methods to offer anyone willing to help in building, the opportunity to do so, regardless of relevant skills or previous training. During the fall 2003 semester, I started developing construction details that can be built accurately without measuring tapes or manicuring materials, beyond their original off-the-shelf state. Materials to be included will be relatively inexpensive, light, and easy for one person to manage.

I will continue to study other building components and methods of construction that will make the construction easier, user friendly and, in the end, community involved. The ultimate goal of my thesis is to design a set of construction techniques and a building design for the community centre which employs these techniques.

Community involvement in the construction is crucial on a variety of levels. It begins with an effort to design and collect resources in the community to build a new community centre. Constructing the center would, in itself, be an event. The community center will not provide formal instruction on construction methods but anyone who takes part in the event will learn by doing. The construction will be guided by professionals, and community members will learn simple techniques, which they then would be able to pass onto others. I would anticipate that the community could independently employ these techniques in other construction projects.

Members of the community center board have indicated that continued maintenance to the existing center is lacking because of the small number of people involved in the building's upkeep. With many members of the community taking part in the construction, the final structure will belong to everyone. The sense of ownership and pride of accomplishment will ensure greater efforts to maintain the building.

By being part of the construction, the members of the community will have an immediate intimate attachment to the building — they will be part of the building and the building will be part of them.

I want to create architecture that makes sense to the people who use it and is something the clients feel they created: something beautiful in the eyes of those who built it.

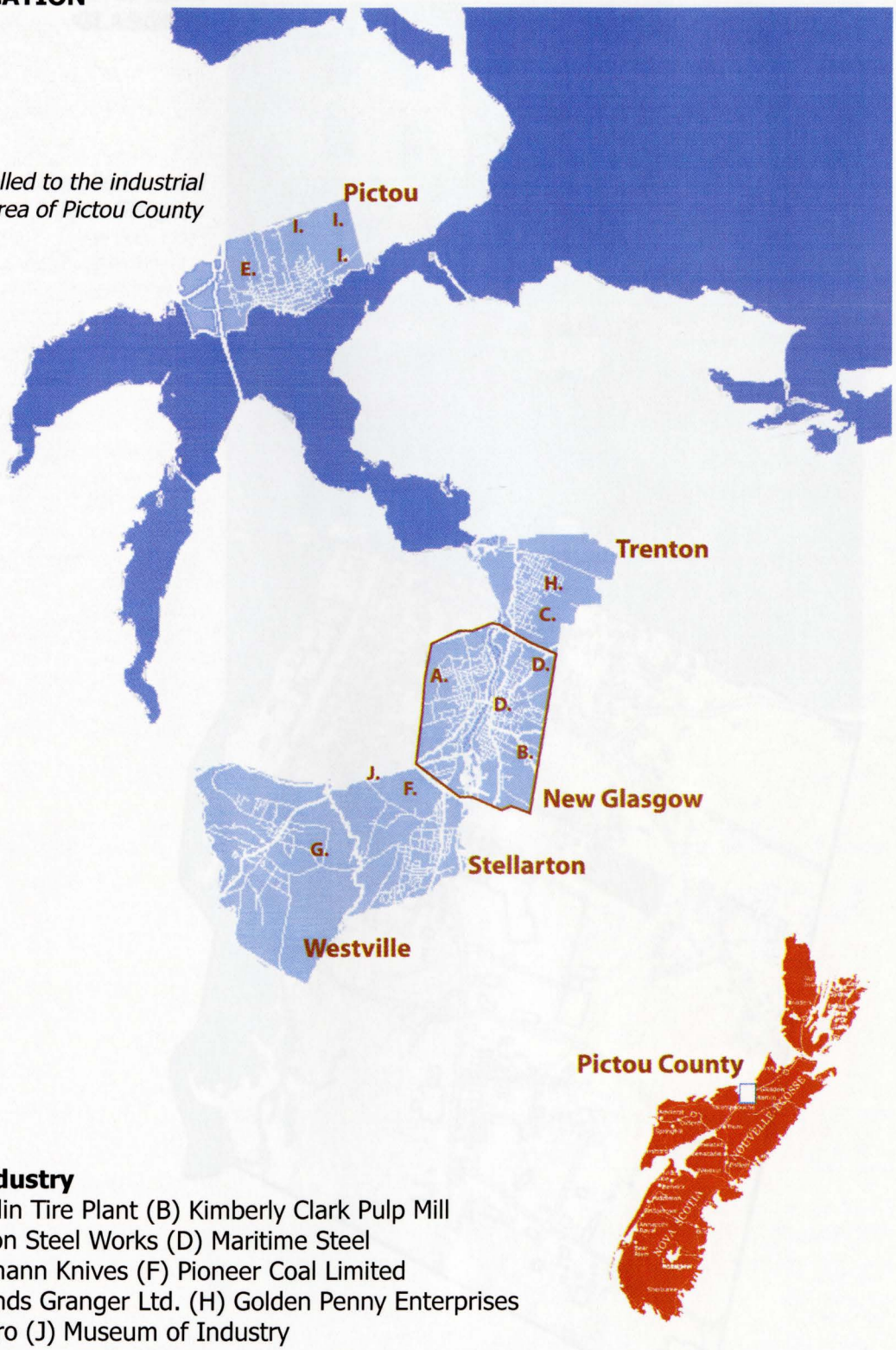
Then, ultimately, I am faced with a question: how can trained and untrained labour forces work together on the construction of a building?

THE CLIENT

I was contacted by Ivan Wyse from the Ward 1, Community Centre of New Glasgow, in Pictou County, Nova Scotia.

THE LOCATION

I travelled to the industrial area of Pictou County



Local Industry

(A) Michelin Tire Plant (B) Kimberly Clark Pulp Mill
(C) Trenton Steel Works (D) Maritime Steel
(E) Grohmann Knives (F) Pioneer Coal Limited
(G) Acklands Granger Ltd. (H) Golden Penny Enterprises
(I) SteelPro (J) Museum of Industry

Maps published by Pictou County District Planning Commission

WARD 1, NEW GLASGOW

I travelled around Ward 1, New Glasgow.

Map published by Pictou County District Planning Commission

DEVELOPING A BUILDING PROGRAM

I talked to people in the community.

Before I could start designing I had to get a general idea of what the community needs from a community center.

Meeting Date **Attendants**

September 29, 2003.....Board members from the Ward 1 Community Center (W1CC)

October 27.....W1CC

November 15.....Ivan Wyse

November 24.....W1CC

Phone Interviews

January 12, 2004.....Ivan Wyse

January 12.....Robin Maclean
Director of New Glasgow Recreation

January 13.....Robin Maclean

January 15.....Gary Rankin
Town Clerk

January 15.....Kelly Sloan
Town Executive Assistant

January 16.....Kim Dixon
Town Clerk

February 10.....Ken Langel
Ward 1 Town Councilor

February 12.....Judy Manning
C@p Site Coordinator

BUILDING PROGRAM

With all the information, from meetings and interviews, I constructed a building program.

Multi-Purpose Hall

Size: 240 sq m. (This is enough room for 200 people to sit at tables in groups of 5)

Location: Proximity to entrance and close proximity to exterior spaces.

Spatial Requirements: This space will generate a great deal of noise when in use and should be acoustically separate from the offices and meeting rooms. The multi-purpose hall will be used for functions such as darts, bingo, wedding receptions, parties and other group activities. The multi-purpose hall will have an exterior space to operate with outdoor events.

Storage: Tables and chairs for 200 people. There will also be storage space for general equipment that is not in use, such as dart boards, craft supplies, and electronic equipment.

General Storage Space

Size: To be determined.

Location: Storage closets will be in a variety of locations throughout the facility.

Maintenance Room

Size: Dependent on the heating unit used.

Location: Centrally located to make for short travel routes to all rooms and areas in the building.

Kitchen

Size: 24 sq m. This is enough room for 6 people to work comfortably in the kitchen at one time and service a maximum of 200 people at one time.

Location: Adjacent to the multi-purpose hall and in proximity to the lounge.

Note: Appliances (2 stoves, 2 ovens, 1 microwave, storage for utensils, and kitchenware.)

Canteen

Size: Provide room for over-the-counter service from the kitchen for the lounge area.

Location: The canteen will use the kitchen as a storage space but provide service to the exterior grounds and interior lounge space.

Note: Provide easy after-hours access.

Daycare Center

Size: 136 sq m (This is enough room for approximately 15 children and 1 supervisor)

Location: Visually connected to the parking lot and in close proximity and visually connected to the exterior play space.

Spatial Requirements: Parking: For the children's safety, it is important that parents are able to see their children enter the day care facility from the vehicle drop off area.

Interior Spaces: The supervisor should have a desk space and a filing cabinet. For the children there should be a sleeping/nap area, a cloak room with space for changing. There will be an active play space and a passive / group space. The active area is for physical activity, playing with blocks, paints and crafts. The passive group area is for working in groups around a table. The tables will be large enough to sit six children. The tables should be collapsible, and stored away when not in use. There must be two unisex water closets.

Note: It should be easy for parents who drop-off their children at the daycare, to easily travel to other facilities available in the community center.

2 Group Rooms (min.)

Size: 70 sq m is enough room for 15 students, 1 supervisor and a desk.

Location: Adjacent to administration spaces and in proximity to the main entrance.

Spatial Requirements: The room should be flexible for a variety of teaching activities; i.e., music, crafts, adult learning,

children's classes, etc.
Note: Furniture must be flexible. Storage space should be provided for teaching equipment.

Administration Spaces
Size: Undetermined.
Location: In close proximity to meeting rooms.
Spatial Requirements: Offices must be quiet and in low traffic area. Given the amount of change in programs offered through the Ward 1 Community Center, the administration personnel will change in numbers as well. The office space must be flexible enough to accommodate these changes.
Note: The group rooms will function as meeting spaces for the administration offices. It is important that they are in close proximity, yet acoustically separate.

Computer Stations
Size: 10 sq m. This is enough room for 6 computer station, considerations should be made for future expansion.
Location: Given the high frequency of the computer station, they should be located immediately adjacent to lounge and display boards.
Spatial Requirements: Each computer station should also provide room for a small work area. There will be one printer station to serve all computers.
Note: The computer stations must be securable during the hours they are not in use.

Information Area
Size: Undetermined
Location: In the lounge.
Spatial Requirements: The area should be well lit and very visible.
Note: The display cases will provide pin-up (securable) information and other pamphlets/brochures made available for pick-up. The area should be easily accessible and flexible for changing information.

Washrooms

Size: There will be 5 water closets for the males and 6 for females to service all areas except for the day care center.
Location: Adjacent to the multipurpose room and also directly accessible to the exterior space.
Spatial Requirements: The washrooms must operate independently from the rest of the facility. The washrooms should have a separate exterior entrance for access when the center is closed.
Note: Materials must be washable and durable.

Change Rooms

Size: A male and female changeroom of 15 persons each.
Location: Adjacent to washrooms. Accessible from exterior and interior spaces. Adjacent to multi-purpose hall.
Note: Materials must be highly durable in order to withstand exterior footwear during all seasons.

Seniors Room

Size: Room for 15 seniors
Location: Close proximity to lounge.
Spatial Requirements: There should be room for 15 people to sit at one time. A small kitchenette (equipped with 1 microwave, 1 stove and range, bar fridge and sink with counter space), a television area with couches. Large amount of storage space. Separate securable entrance and cloak room.

General Cloak Room

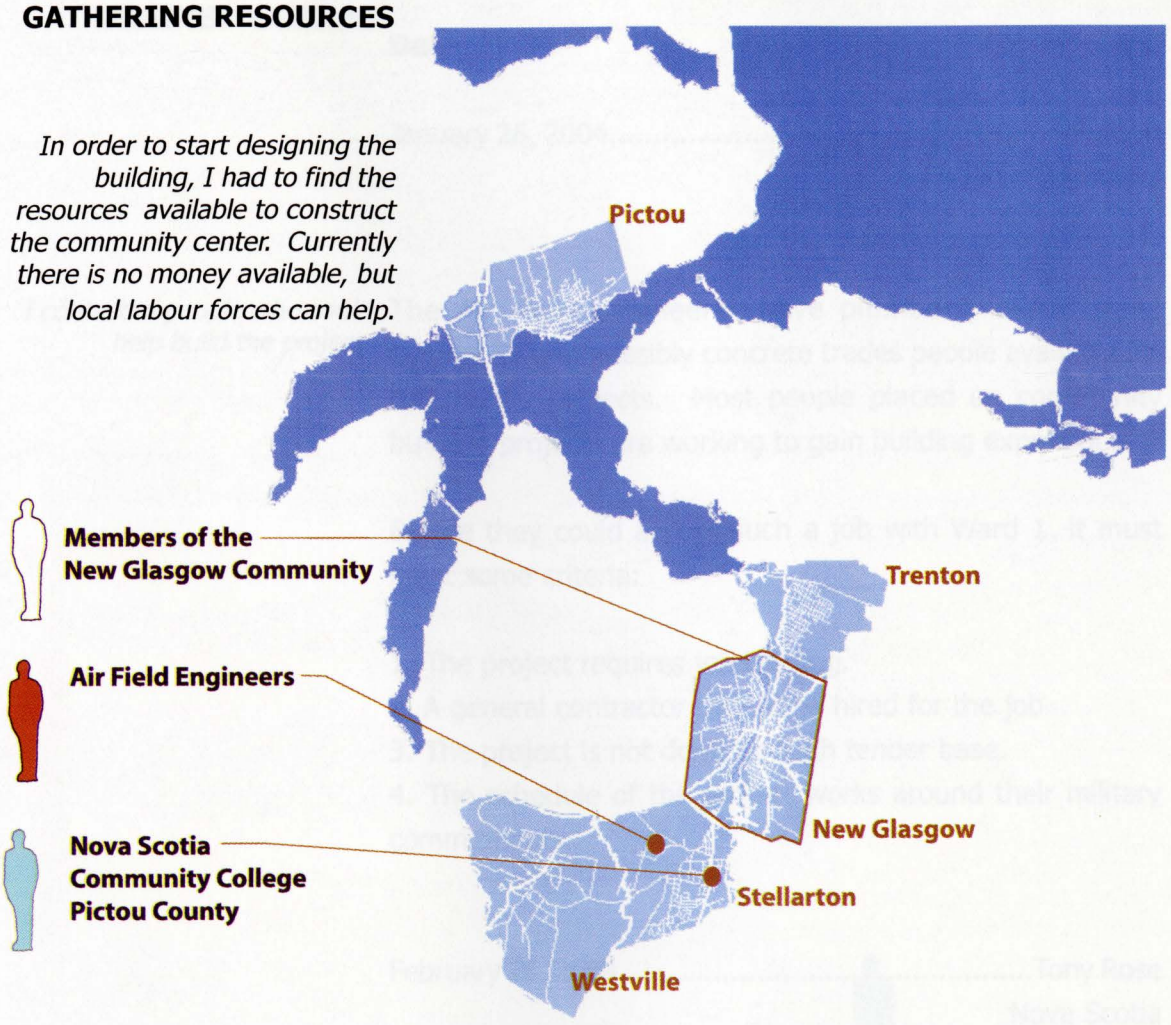
Size: 12 sq m
Location: Immediately adjacent to entrance room for a maximum of 200 jackets.
Note: Provide bench or seating space for the elderly.

Parking

Size: Provide room for a minimum of 100 parking spaces.

GATHERING RESOURCES

In order to start designing the building, I had to find the resources available to construct the community center. Currently there is no money available, but local labour forces can help.



Map published byPictou County District Planning Commission

TRAINED LABOUR

Date **Interviewee**

January 26, 2004.....  .....Ralph Heighton
Air Field Engineers

I contacted people who could help build the project.

The Air Field Engineers have plumbers, electricians, carpenters and possibly concrete trades people available for community projects. Most people placed on community building projects are working to gain building experience.

Before they could accept such a job with Ward 1, it must meet some criteria:

1. The project requires job training.
2. A general contractor cannot be hired for the job.
3. The project is not done through tender base.
4. The schedule of the project works around their military commitments.

February 26, 2004.....  .....Tony Rose
Nova Scotia
Community College
Pictou County

Welding and Cabinetmaking students from the Pictou Community College are available to do work.

Notes:

1. Cabinetmakers charge 10% of material cost.
2. Welders are available but they cannot do any structural work.
3. The students will meet all class commitments first.

UNTRAINED LABOUR

Aside from people who need to gain construction experience, I want to create the opportunity for anyone to participate in the construction of the community center.

Construction becomes a community event.

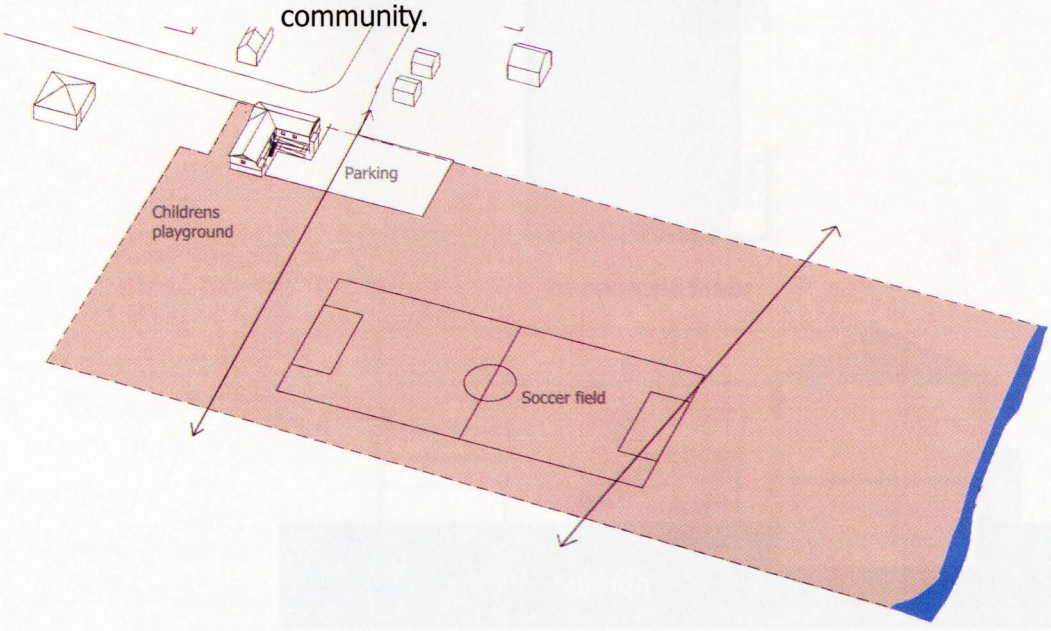
Members of the New Glasgow Community

All members of the New Glasgow Community will be encouraged to attend a "Barn Raising" type of event and assist in the construction of the community center.

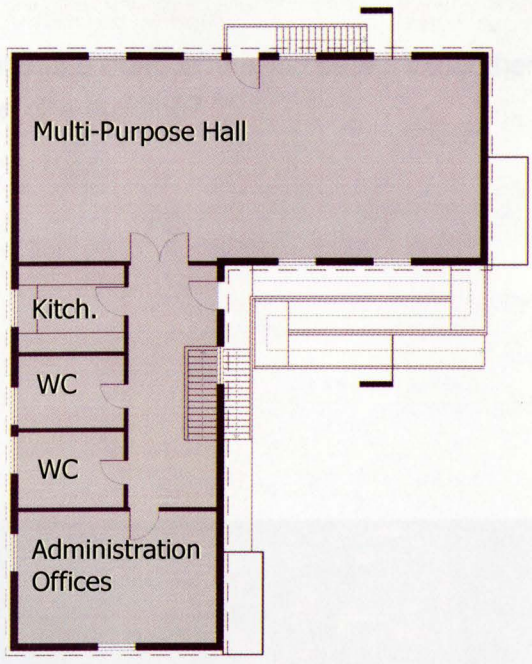
EXISTING COMMUNITY CENTER

The existing community center is a valuable resource worth keeping.

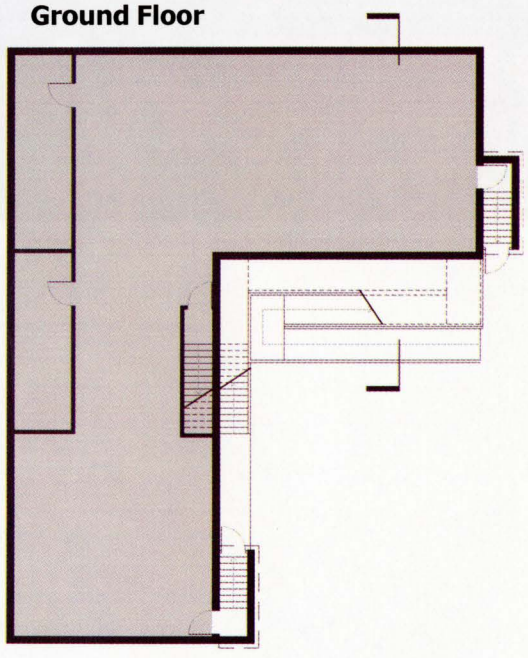
The existing community center is built out of two used modular buildings, purchased from the military. The property is located directly off a low density residential area and opposite a large plaza on the south. Given this, the site is well traveled by those moving between the plaza and residential area. The recreation fields and playground are used regularly by local schools and members of the community.



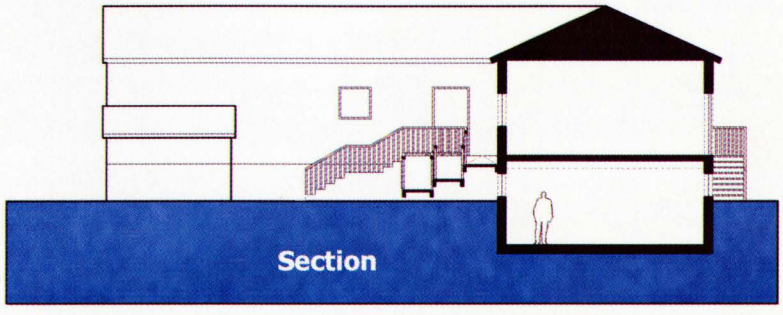
I drew the existing community center.



Ground Floor



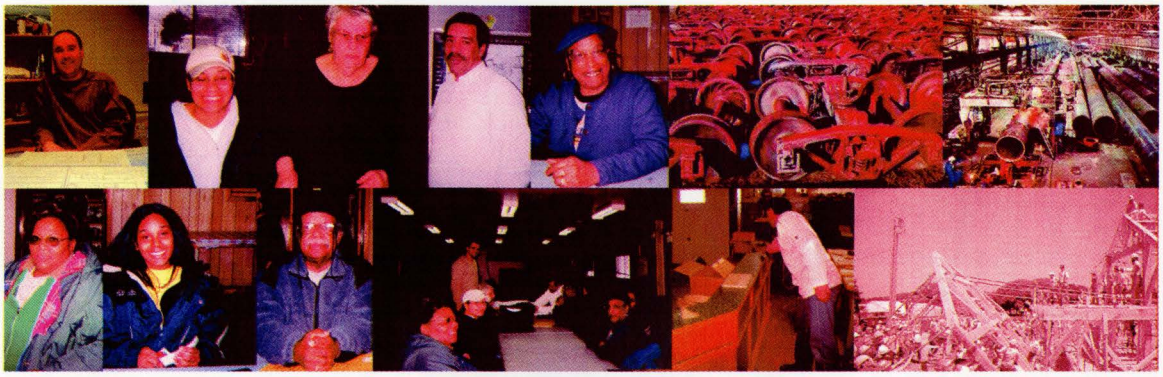
Basement Floor



THESIS QUESTION

How can trained and untrained labour forces work together on the construction of a building?

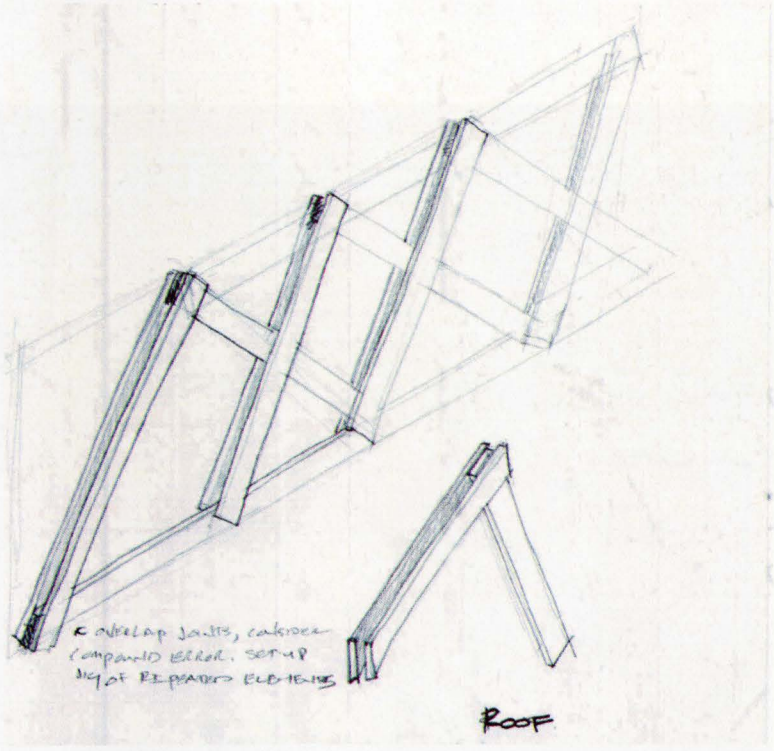
The manner in which so many people with a variety of skill sets are included in the construction of the project, became my main design challenge and the focus of my thesis.



PRELIMINARY STUDIES OF CONSTRUCTION METHODS

I set out to discover ways untrained people can build structural elements.

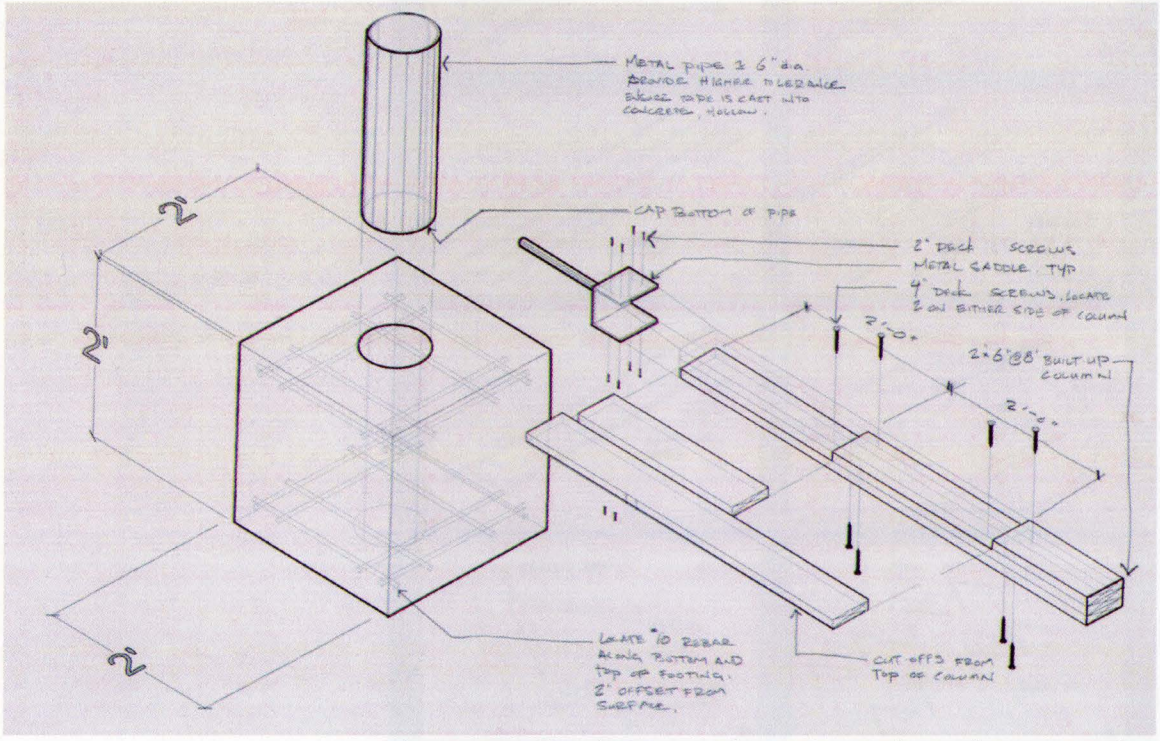
I designed a truss that would be constructed without measuring tools and 1 type of material uncut or changed before assembly.



The most challenging elements to construction in the building will probably be the roof structure. The largest span might be over the Multi-purpose Hall.

From the building program I concluded that a 35'-0" span could be enough to span the room.

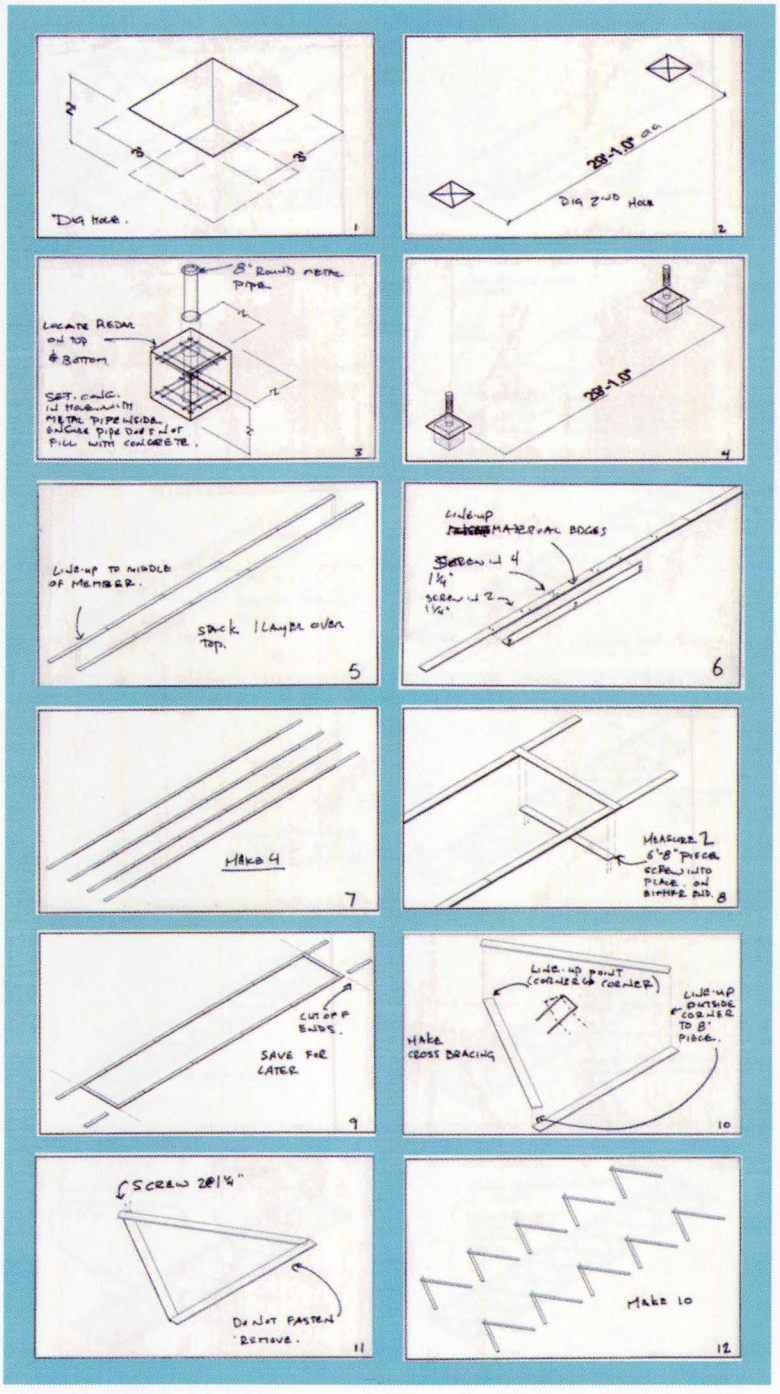
I designed some details that would have a high tolerance of error.



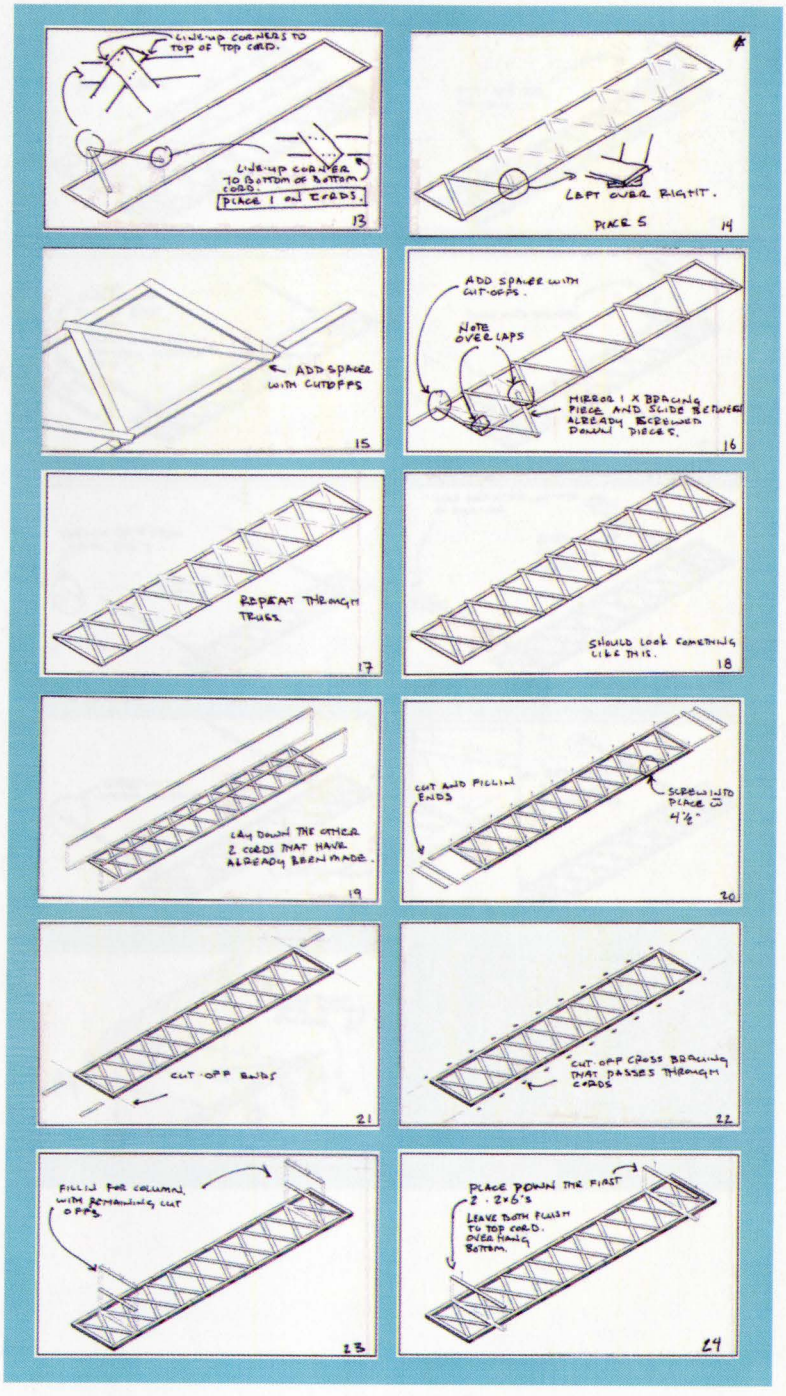
The connection between elements, such as the connection between the columns and the footing, must have room for error.

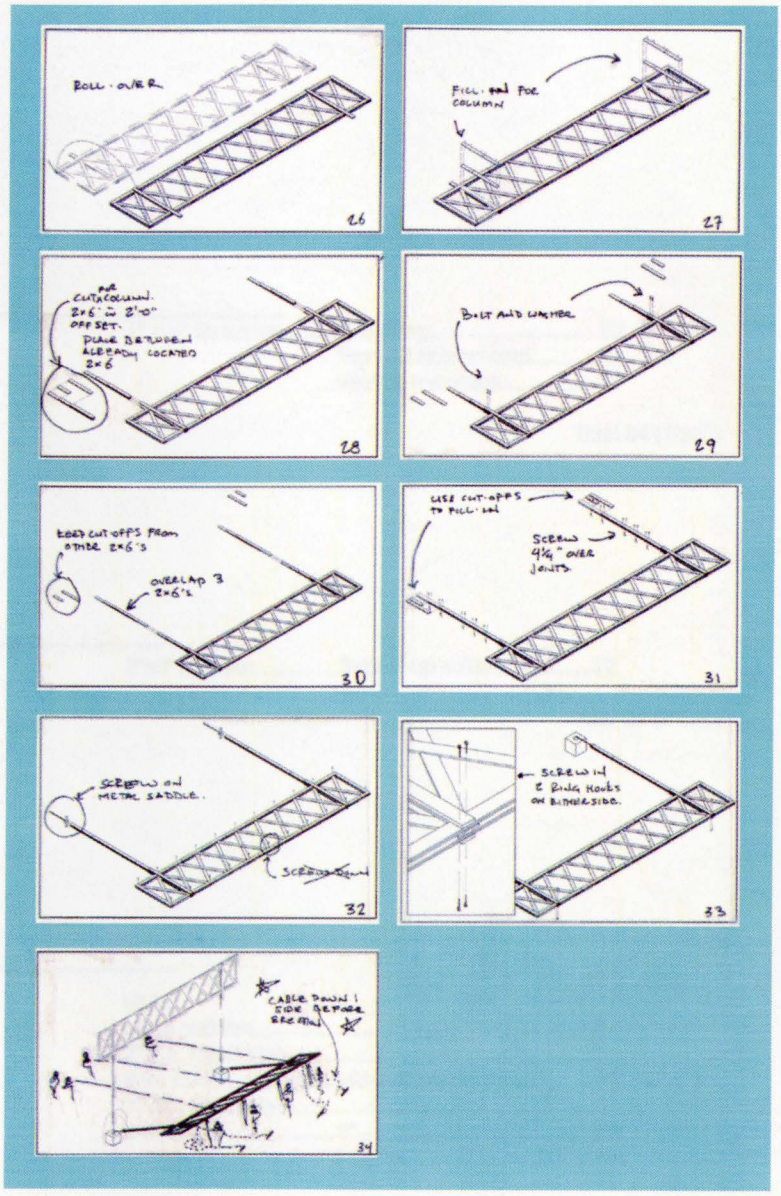
DO IT YOURSELF CONSTRUCTION DRAWINGS

I made the "Working Drawings" into "Do It Yourself" images.



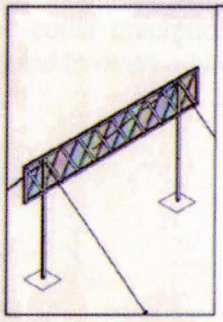
Community members building the truss could follow instructions drawn like "Do It Yourself" images.


LINE-UP CORNERS TO TOP OF TOP CORD.
LINE-UP CORNER TO BOTTOM OF BOTTOM CORD.
PLACE 1 on ENDS.
13
LAPT OVER RIGHT.
PLACE 5
14
ADD SPACER WITH CUTOFFS
15
ADD SPACER WITH CUT-OFFS.
NOTE OVER LAPS
MIRROR 1 X BRACING PIECE AND SLIDE BETWEEN ALREADY SCREWED DOWN PIECES.
16
REPEAT THROUGH TRUSS
17
SHOULD LOOK SOMETHING LIKE THIS.
18
LAY DOWN THE OTHER 2 CORDS THAT HAVE ALREADY BEEN MADE.
19
CUT AND FILLIN ENDS
SCREW INTO PLACE @ 4'6"
20
CUT-OFF ENDS
21
CUT-OFF CROSS BRACING THAT PASSES THROUGH CORDS
22
FILLIN FOR COLUMN WITH REMAINING CUT OFFS
23
PLACE DOWN THE FIRST 2 - 2x6's
LEAVE BOTH FLUSH TO TOP CORD. OVER HANG BOTTOM.
24


ROLL-OVER
26
FILL-IN FOR COLUMN
27
CUT A COLUMN: 2x6 @ 2'-0" OFF SET. PLACE BETWEEN ALREADY LOCATED 2x6
28
BOLT AND WASHER
29
KEEP CUT-OFFS FROM OTHER 2x6's
OVERLAP 3 2x6's
30
USE CUT-OFFS TO FILL-IN
SCREW 4½" OVER JOINTS
31
SCREW IN METAL SADDLE.
32
SCREW IN E RING HOOKS ON BOTH SIDE.
33
CABLE DOWN 1 SIDE BEFORE ERECTION
34

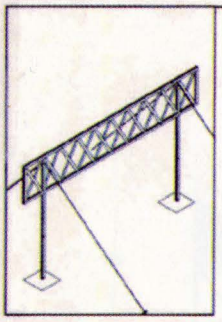
MATERIAL SPECIFICATIONS

I generated a list of materials.



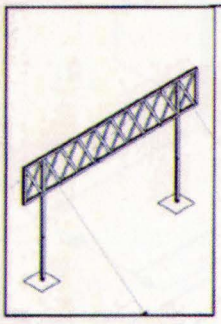
1" x 6" Strapping.....X bracing.....22
...Top and bottom cord.....36
...Vetrical members.....08

Total 64 (1"x6")

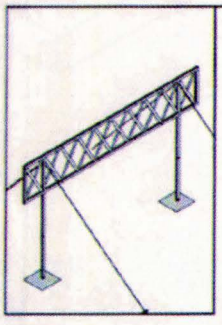


2"x6" Lumber.....3xBuilt-up column.....22

Total 22 (2"X6")



MISC.
Metal saddles.....2
2" dia. Metal pipe.....2
Wire cables.....with adjustable clasp.....4@ (31'-0")
3" dia. Metal pipe.....4
Screws.....1".....NA
3 1/2".....NA

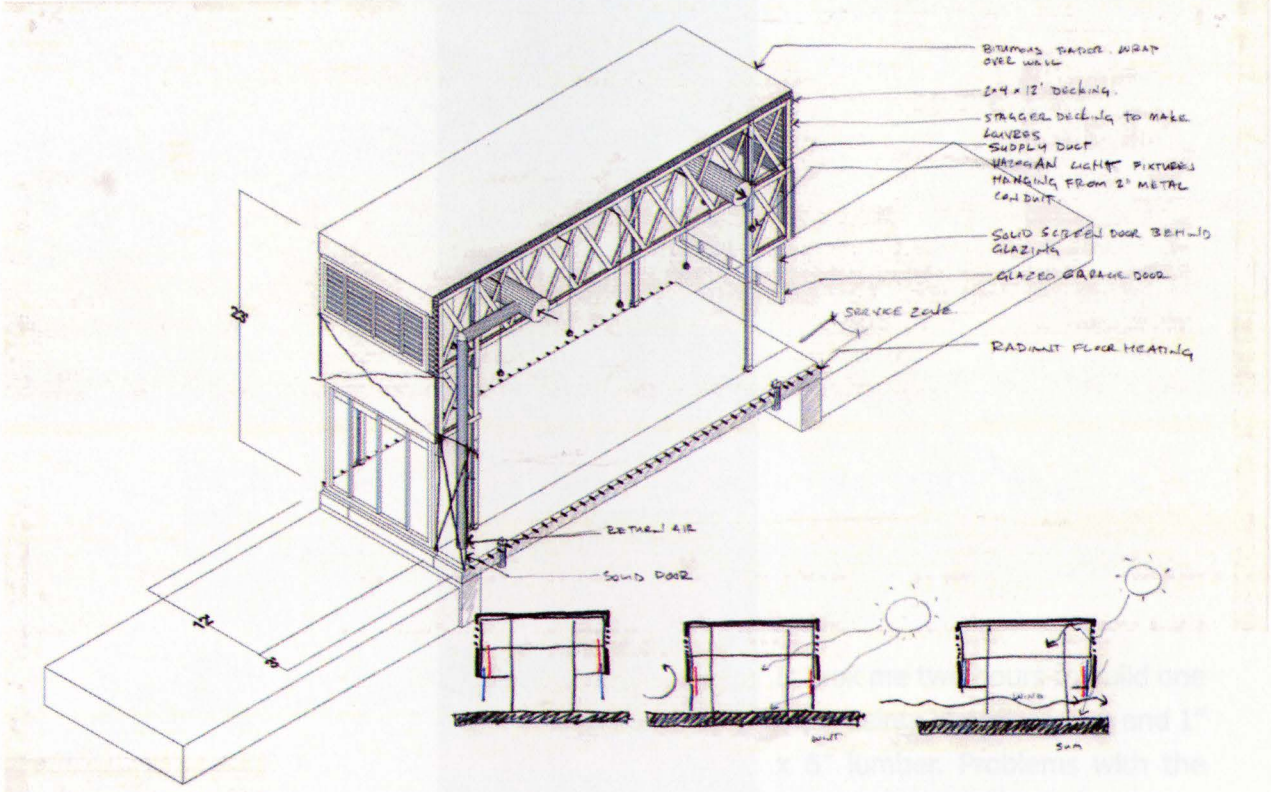


Concrete.....$2ft^3$ footings with
appropriate aggrogate.....$16ft^3$

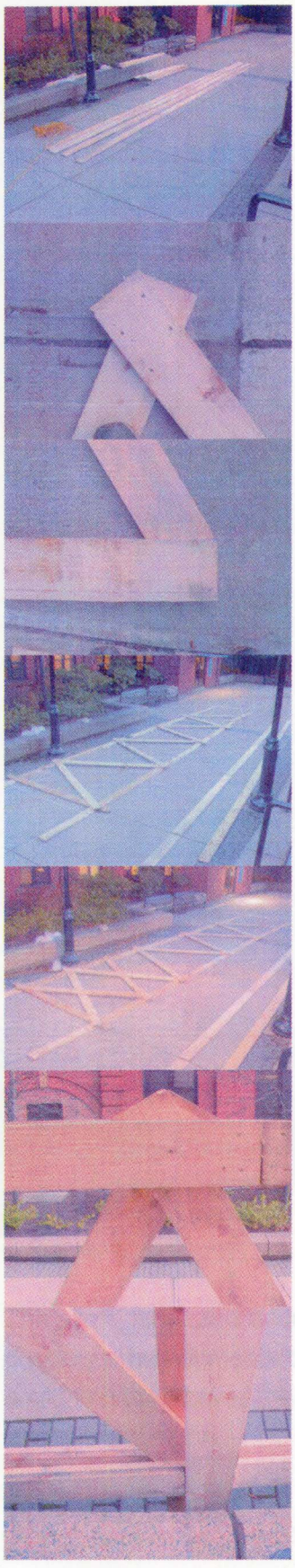
TEMPORARY EQUIPMENT
Wheel Barrow
2 Shovels
6 Drills (with extension cords)
500' of heavy duty rope

BUILDING EXTRUDED

I speculated on what a building with this kind of truss could look like. I designed one bay using the truss, which could theoretically be repeated to make a building.



I built the truss.

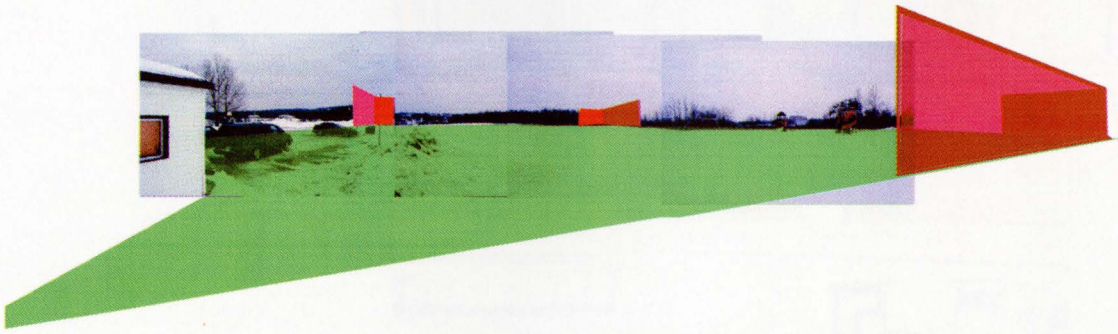


It took me two hours to build one truss using 3" deck screws and 1" x 6" lumber. Problems with the truss were that the top and bottom cords were not straight and the length of the truss was 6 inch off what I had drawn. It is important that the structure has more predictable dimensions.

SITE STUDIES AND CONTEXT

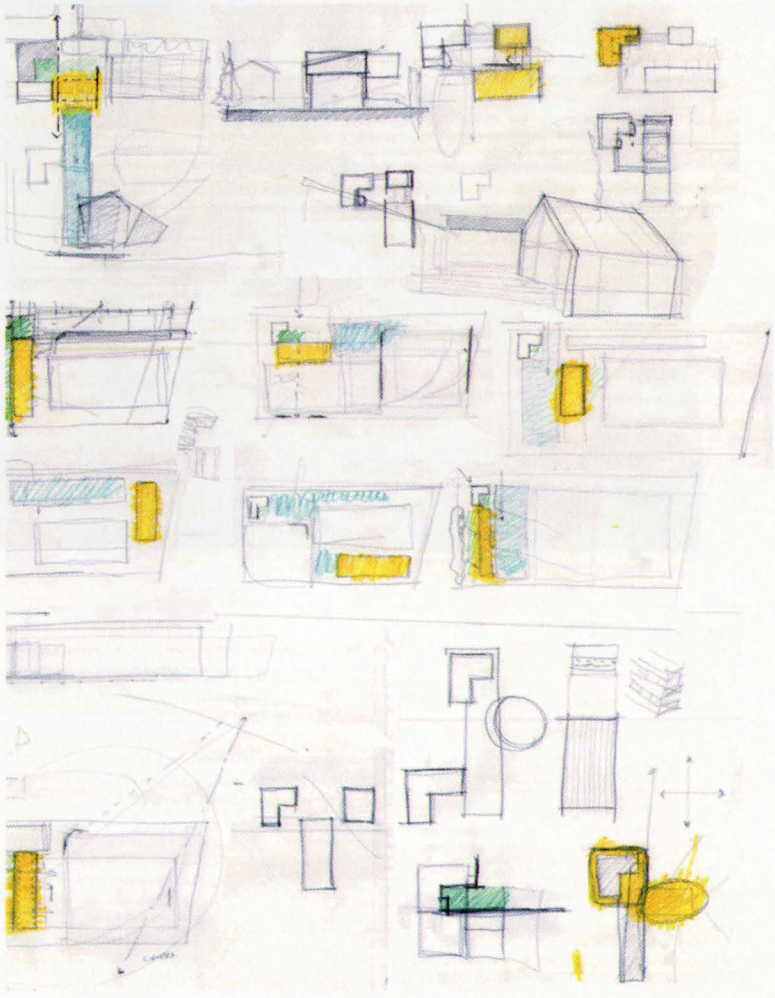
The construction studies are important, but a building cannot be designed out of context.

I tried to imagine what kind of construction would be appropriate for the site.

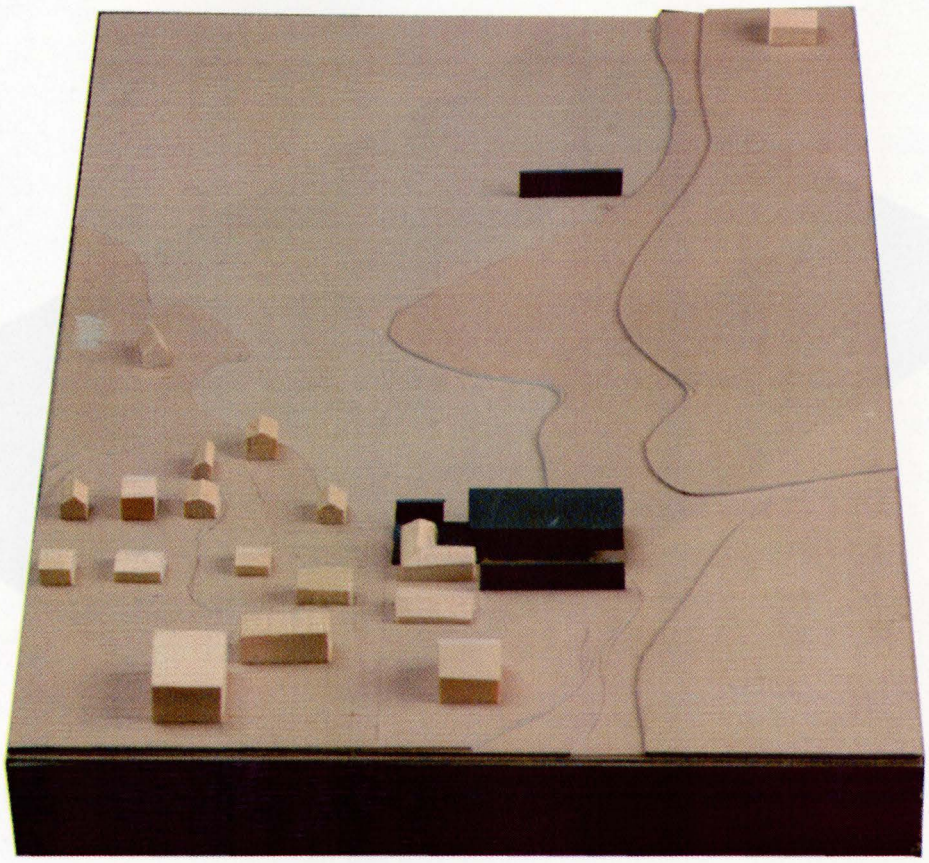


The site is large and undefined. The new building and possibly other elements that service recreational activities could be spread over the property, to give the site a stronger definition.

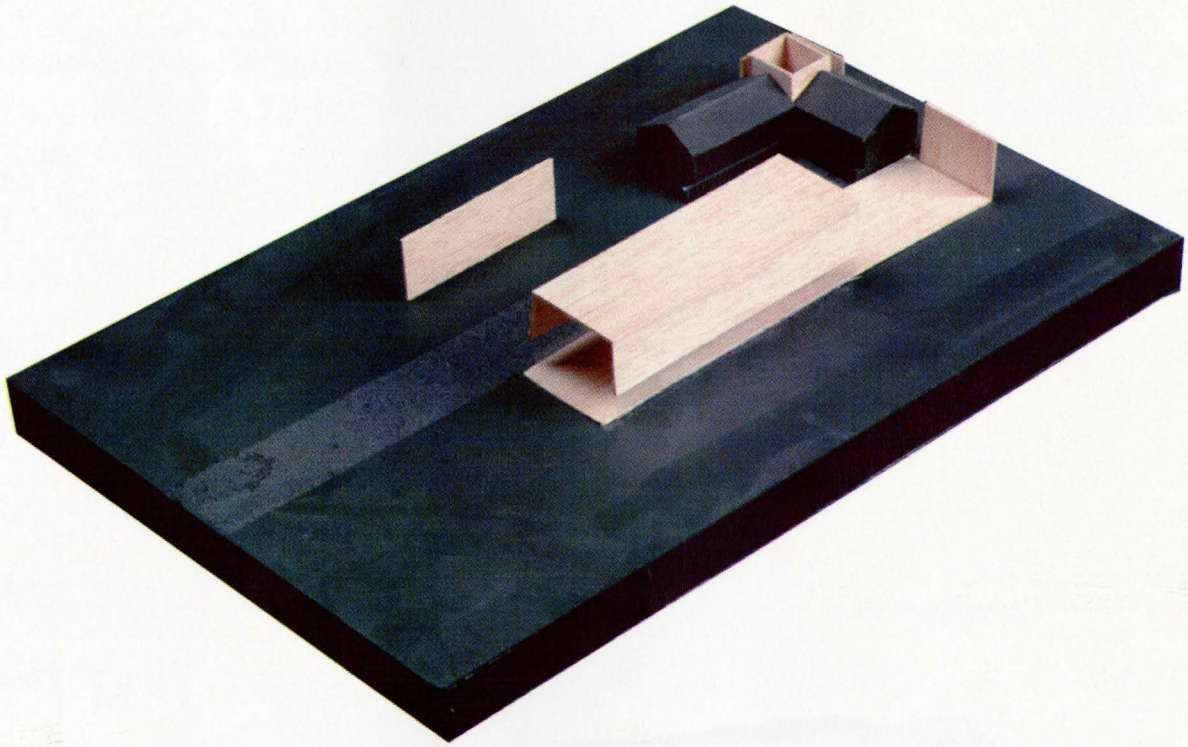
I studied ways a new building could be organized on the site and relate to the existing facility.



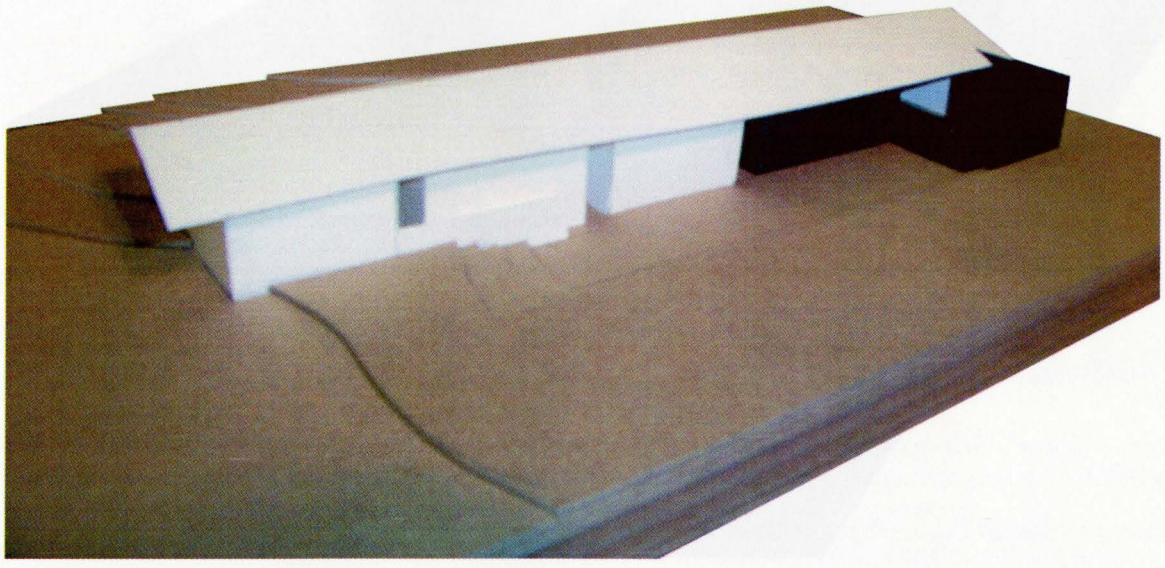
I made a site model.



I made models to study how it relates more to the existing building.

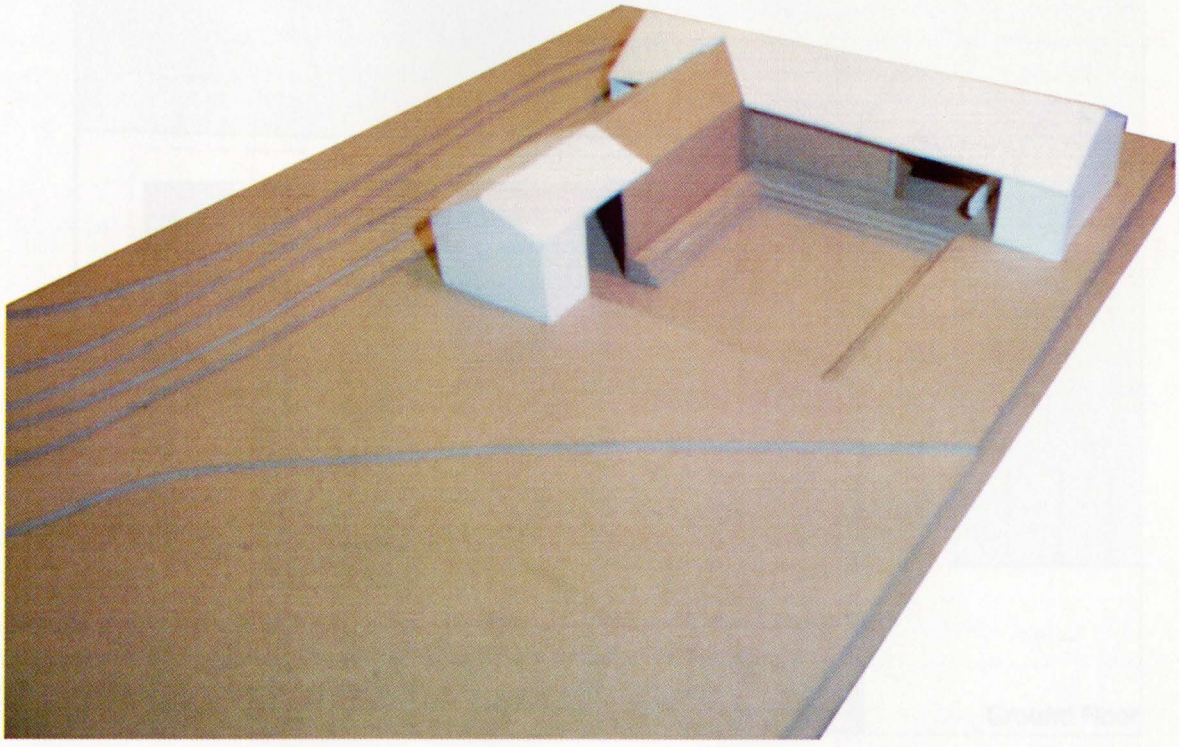


I examined ways a new facility could be connected to the existing facility.



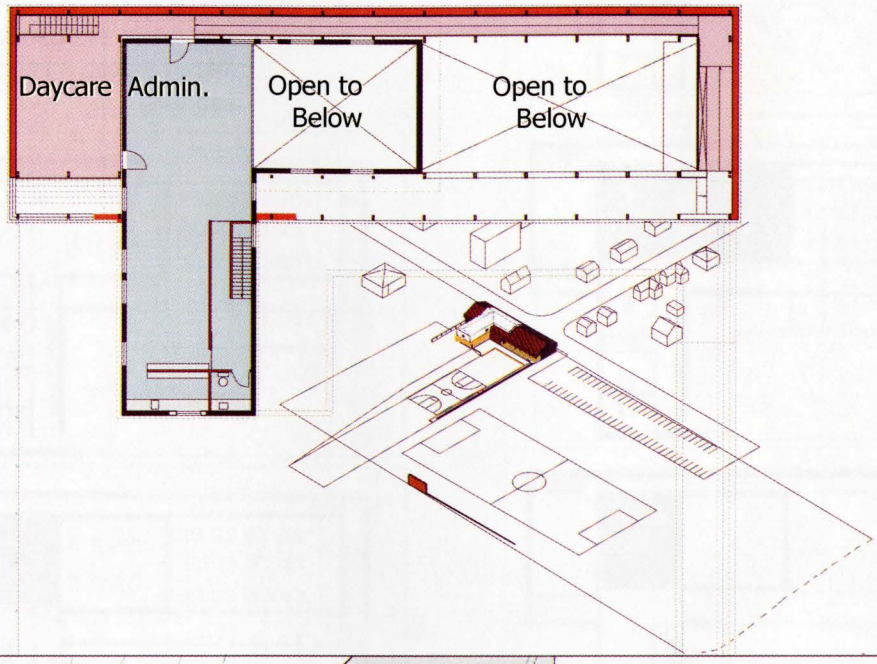
I examined ways a new facility could make the existing facility more useful.

I wrapped the new building around the existing building and dropped the grade to open the basement.

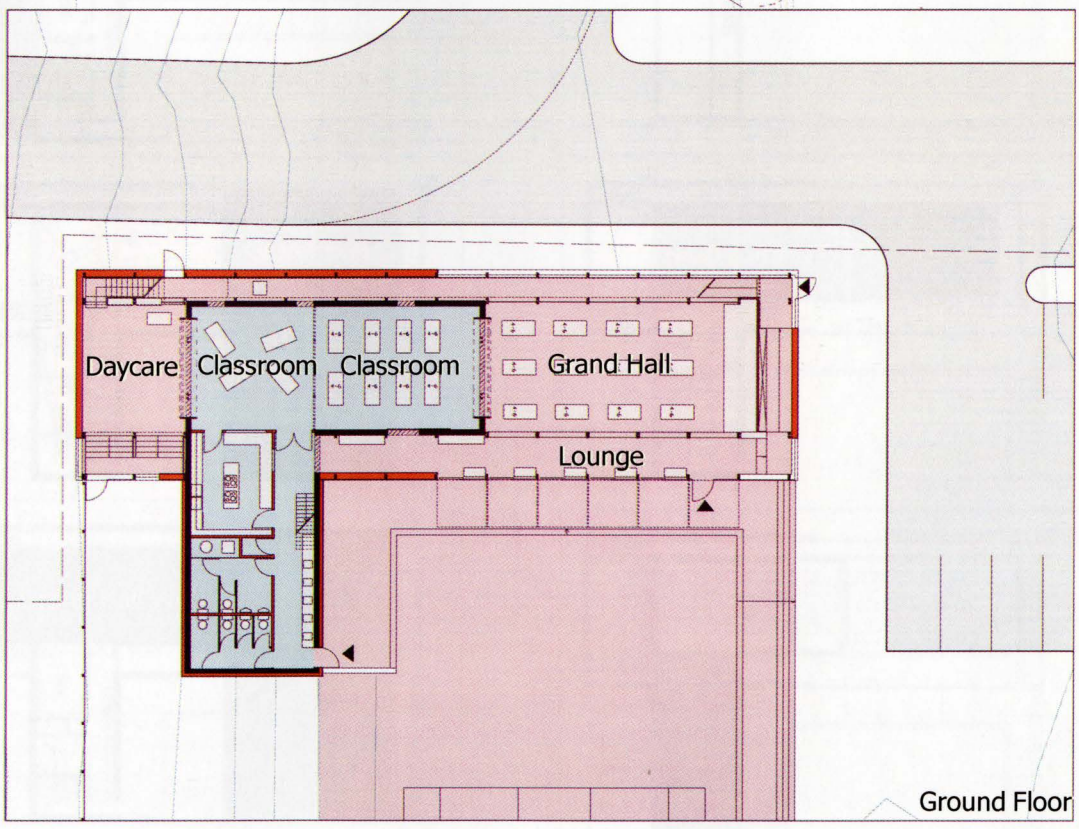


DESIGN PRESENTATION: PLANS

I developed the wrapping idea.



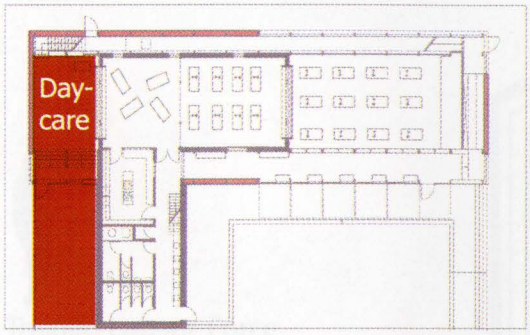
2nd Floor

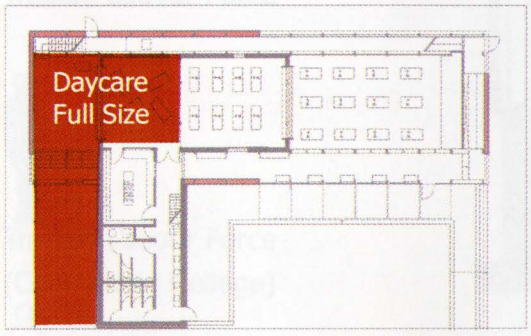


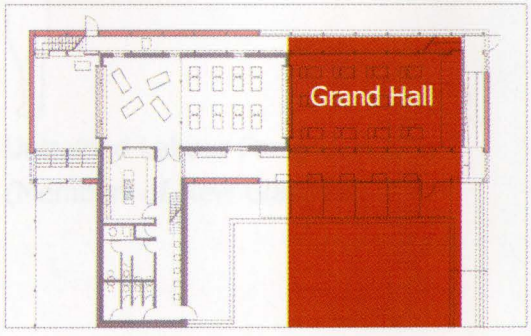
Ground Floor

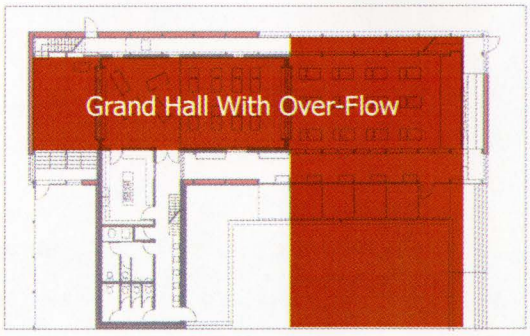
PROGRAM

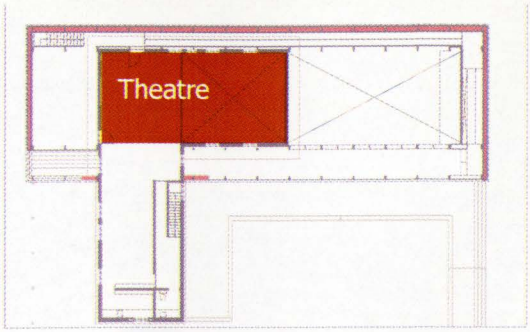
I designed the building to allow for daily programmatic changes.

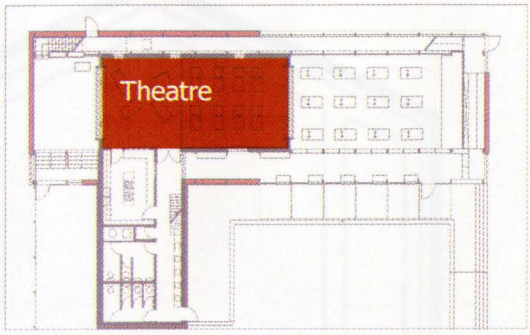


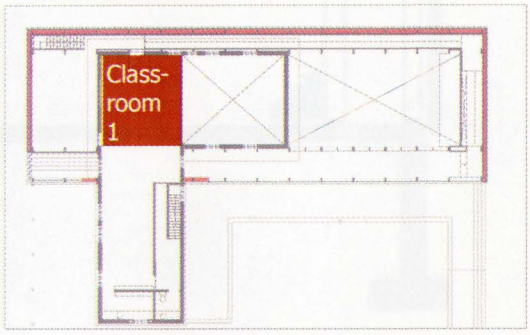


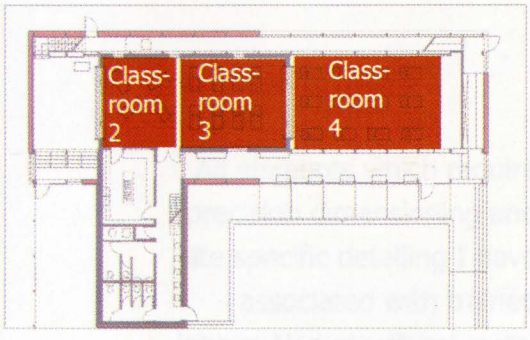


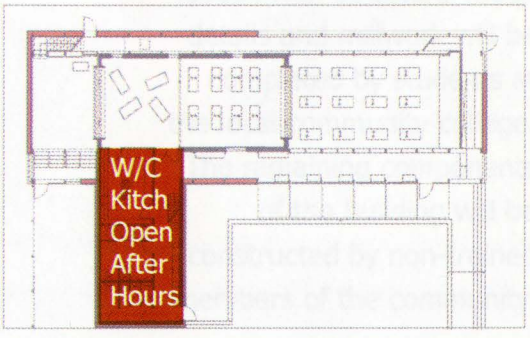






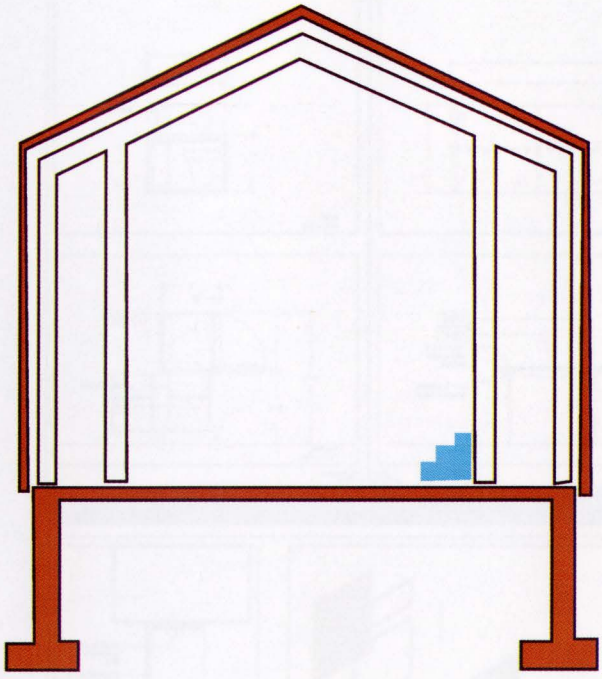






DIVISION OF LABOUR

I divided the building into elements associated with the groups who will build them.



Trained Labour Force

Trained Labour Force
(Community College)

Untrained Labour Force
(Members of New Glasgow)

All elements which require precision dimensioning and site specific detailing I have associated with trained labour. Non-structural metal details and millwork will be completed by students at the local community college. The remaining components of the building will be constructed by non-trained members of the community.

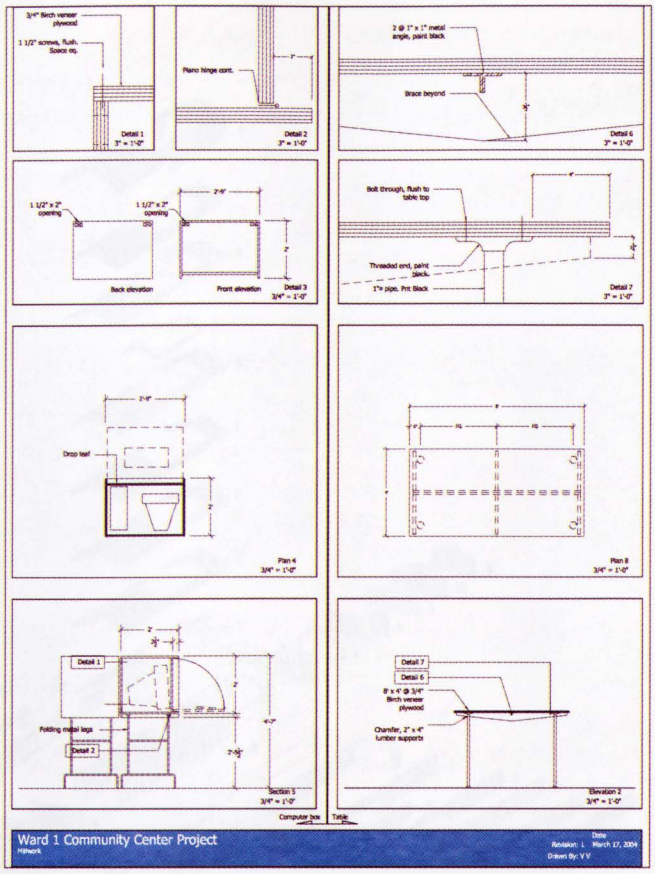
TRAINED LABOUR DRAWINGS

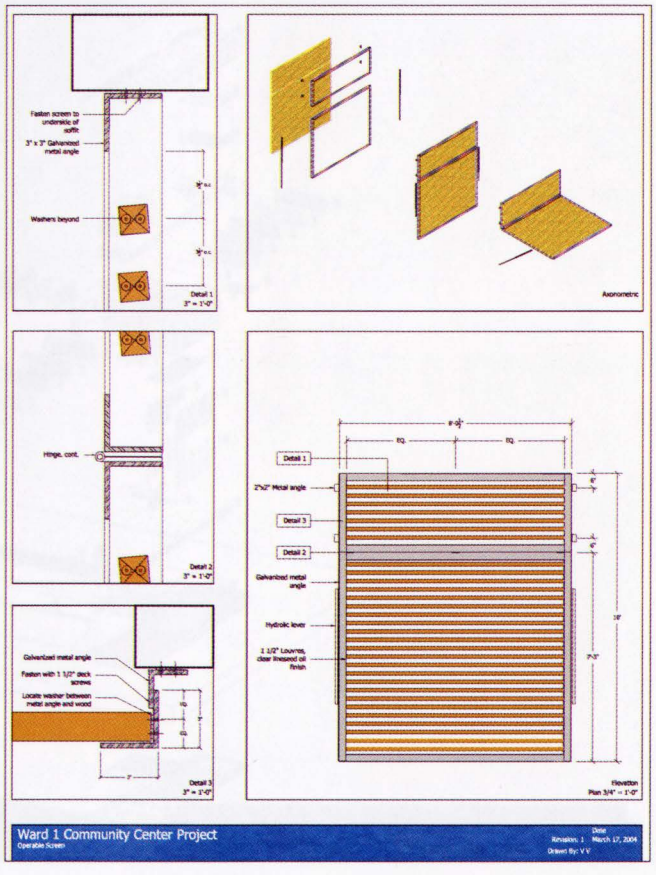
Because there will be different labour groups with different levels of training, I made construction drawings that would be appropriate to each group.

Trained Labour Force

Trained Labour Force (Community College)

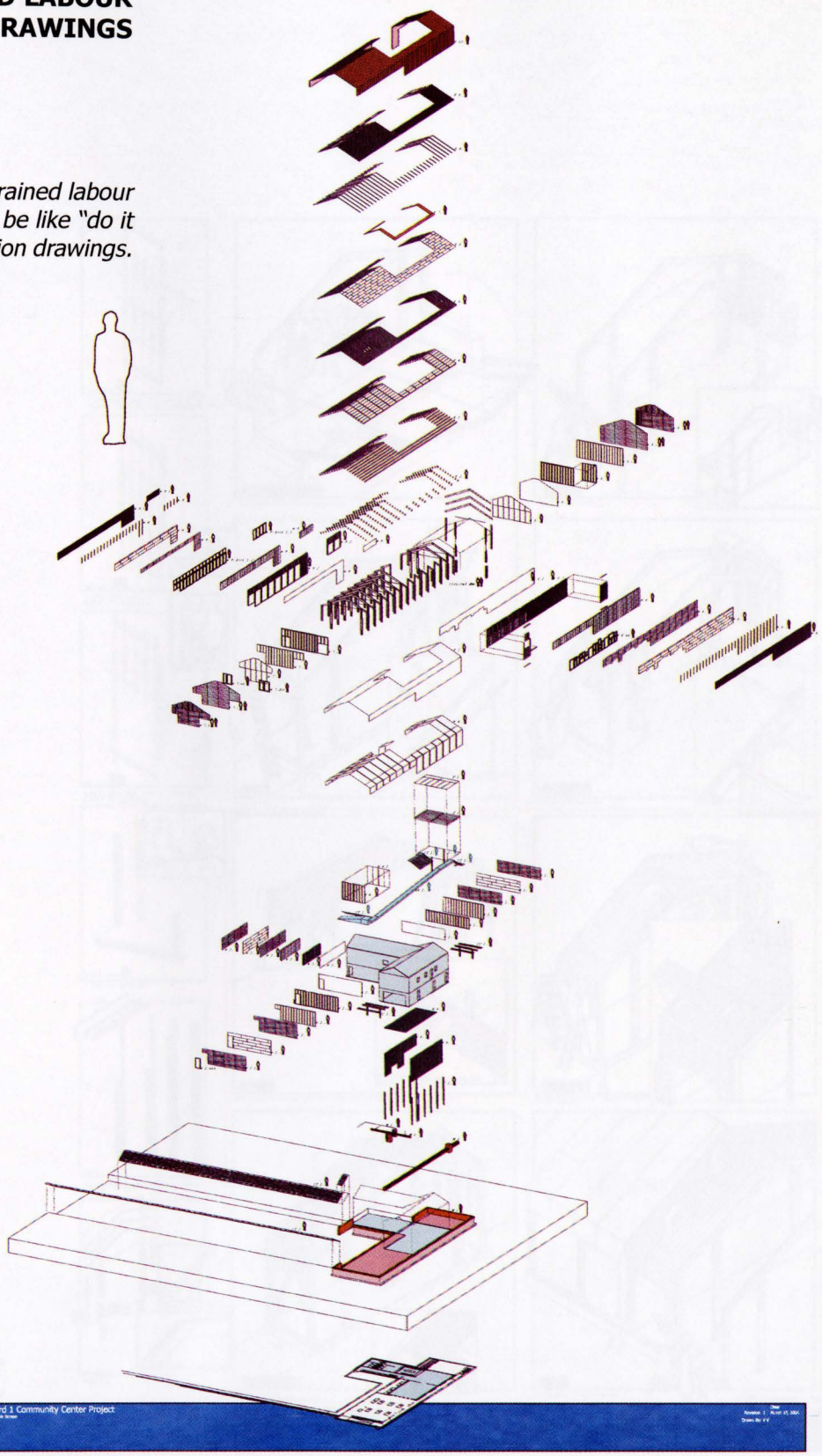
Trained labour forces will build from typical technical drawings. A millwork drawing (above) and the operable screens (below) will be constructed by students from the community center.



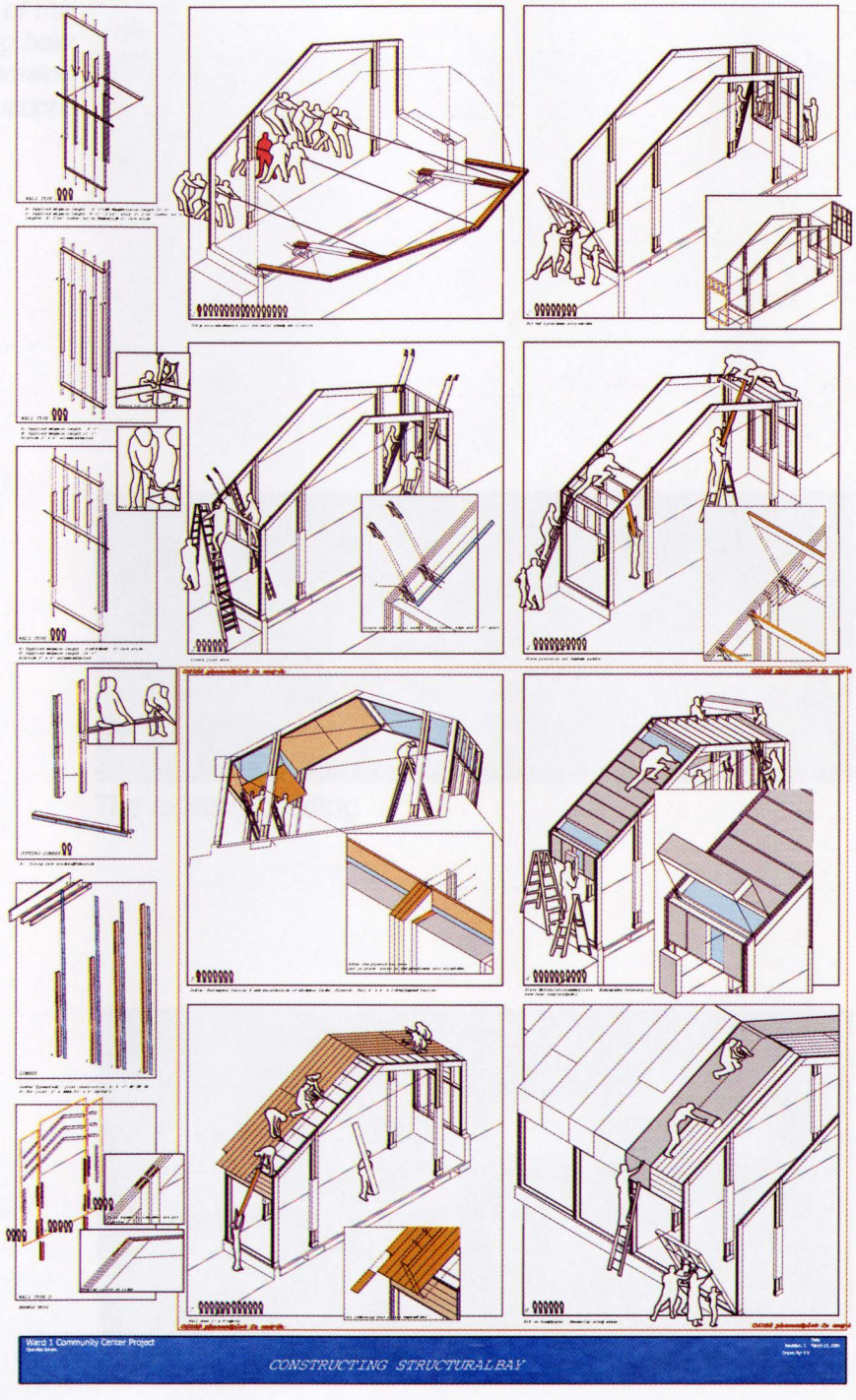


UNTRAINED LABOUR DRAWINGS

Drawings for untrained labour groups will be like "do it yourself" instruction drawings.



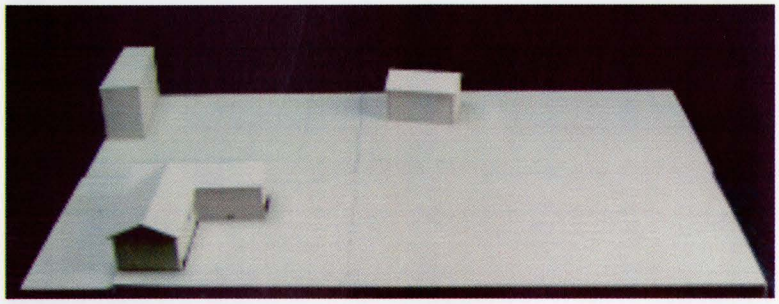
Specifications
(Page 36" x 50")



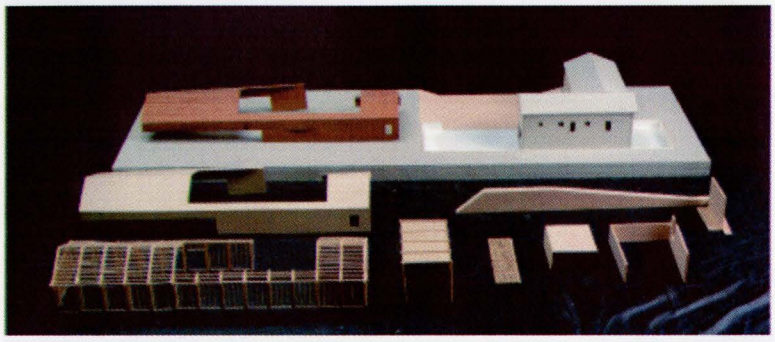
Construction of
1 Structural Bay
(Page 36" x 50")

CONSTRUCTION PHASES

I built a model describing the construction phasing of the building and illustrating how the existing building remains operable during construction.

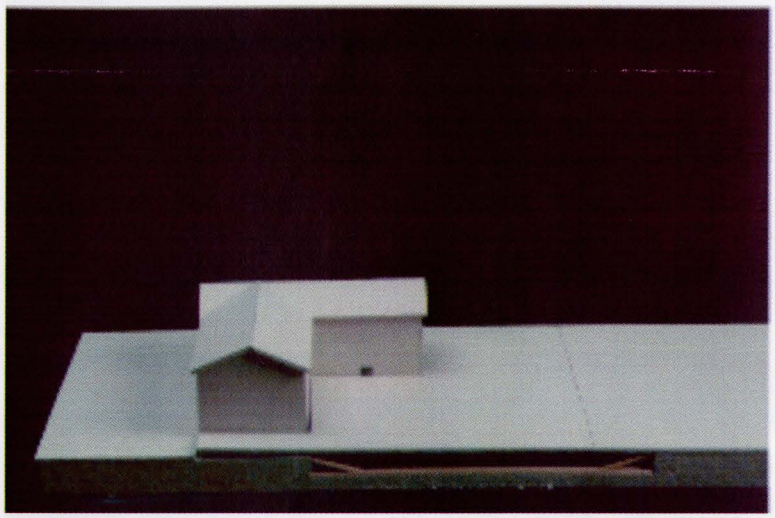


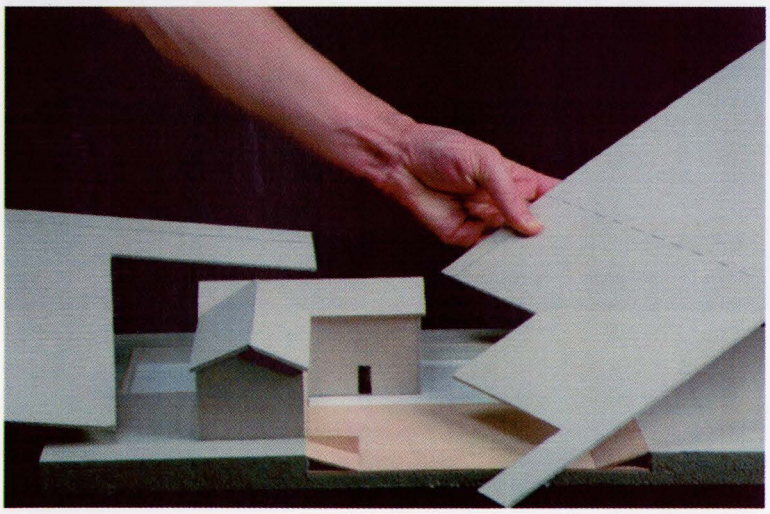
The existing building



The new building components

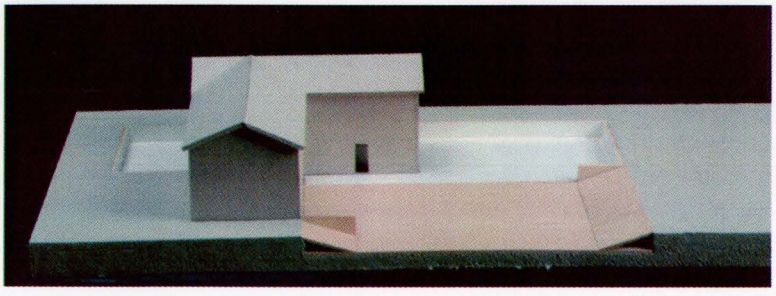
When using the model to describe I first remove the top grade to expose the foundations.



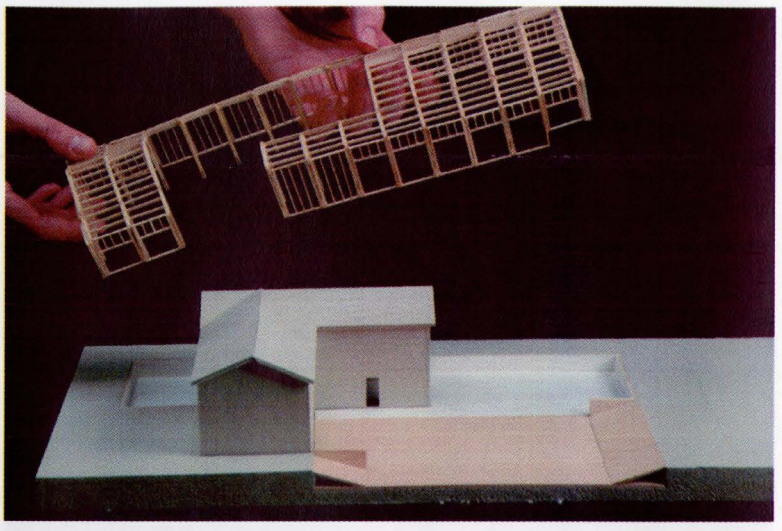


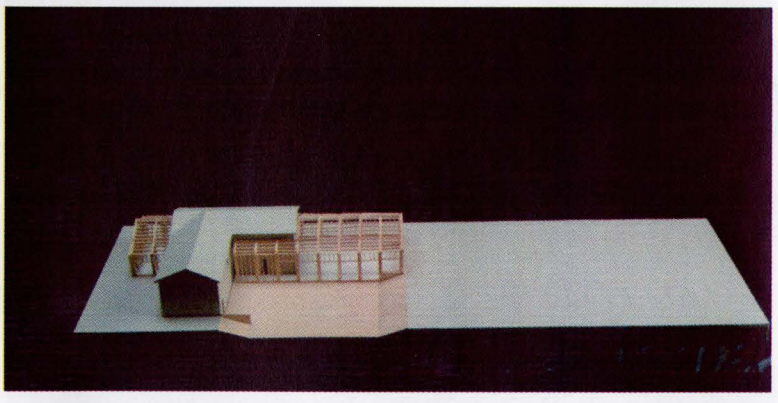
Phase 1

The trained labour force will construct the new foundation walls and locate the metal shoes (for the structure) in the concrete slab.



I put the structure in place.

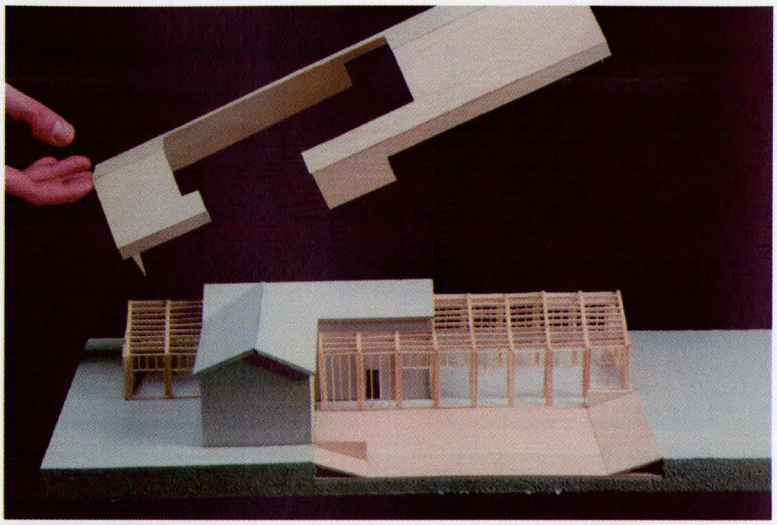


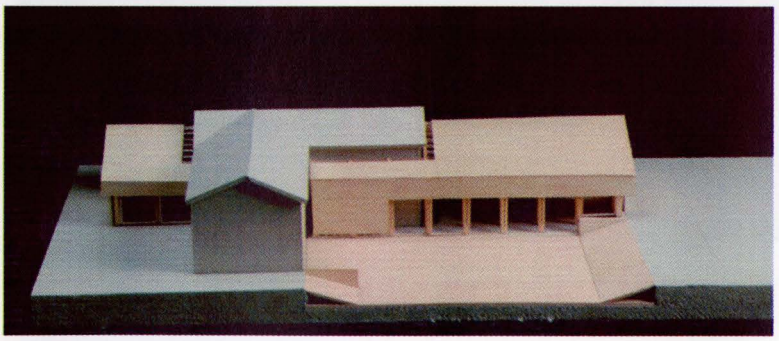


Phase 2

The untrained labour force with 1 trained labour person will construct the main structural frames around the existing building.

I put the sheathing in place.

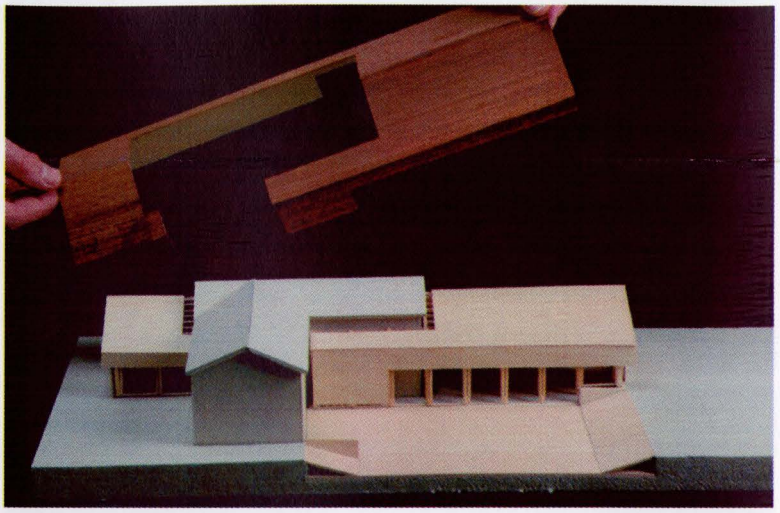


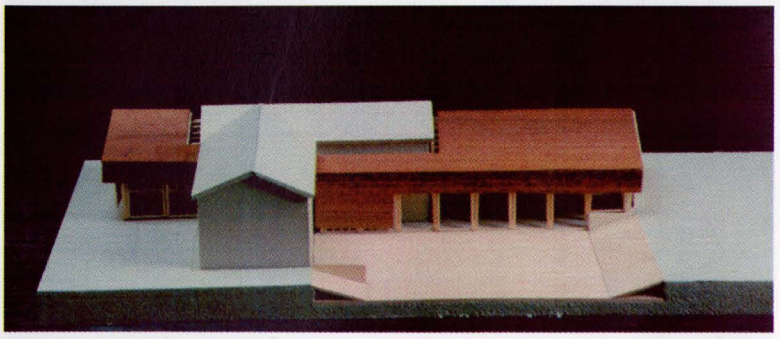


Phase 3

The untrained labour force will insulate the ceiling and apply sheathing.

I put the steel roof on.

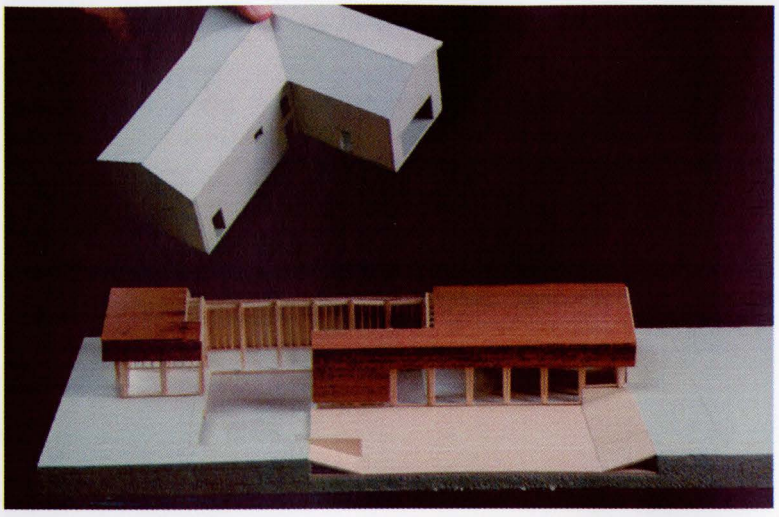


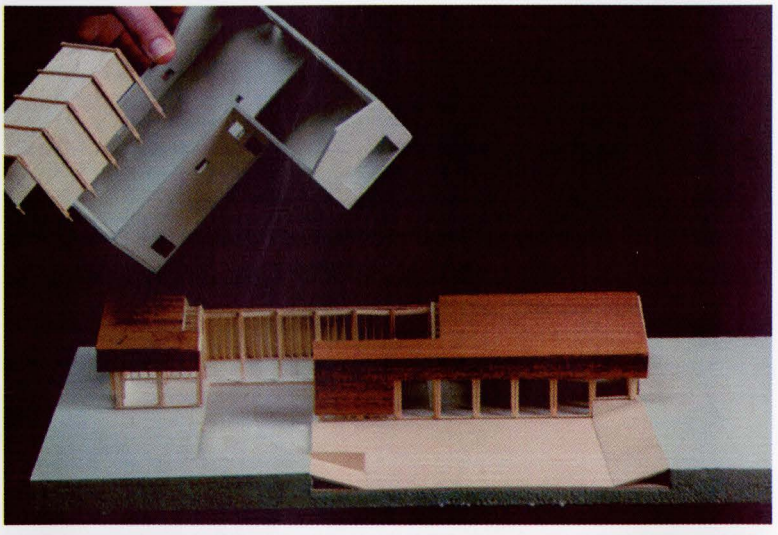


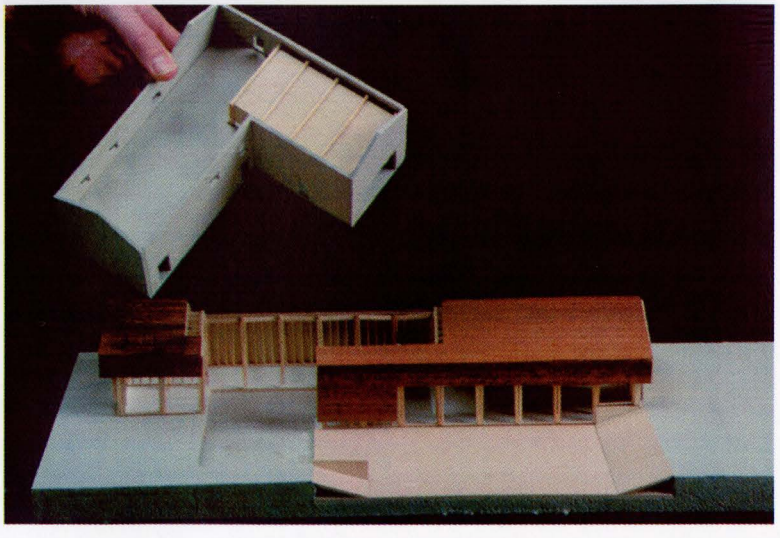
Phase 4

The trained labour force will locate the glazing and put down the steel roof/ walls.

I remove the existing building to indicate how it will be renovated.

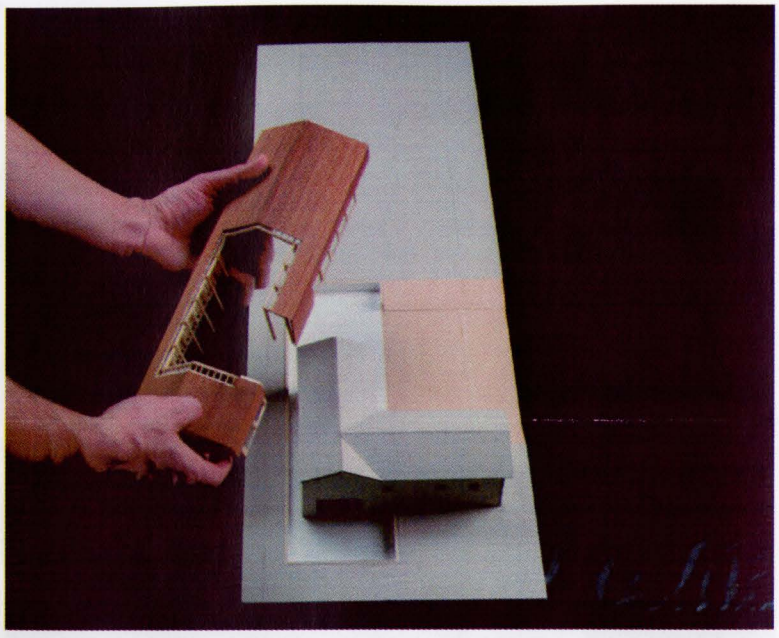




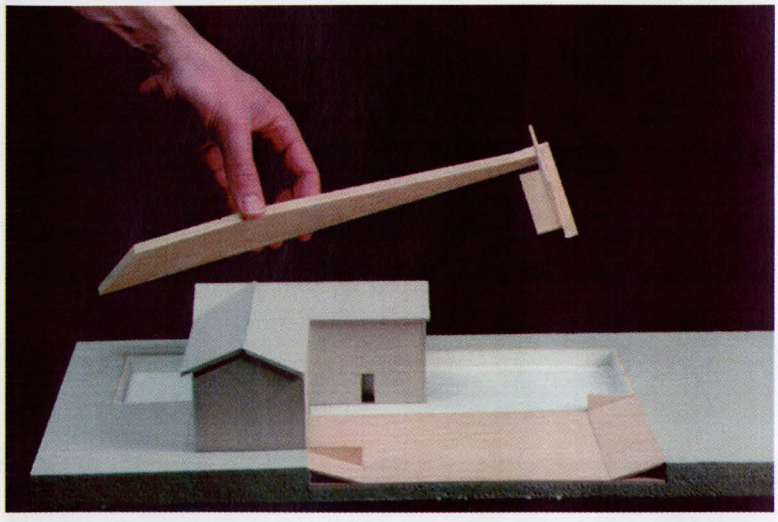


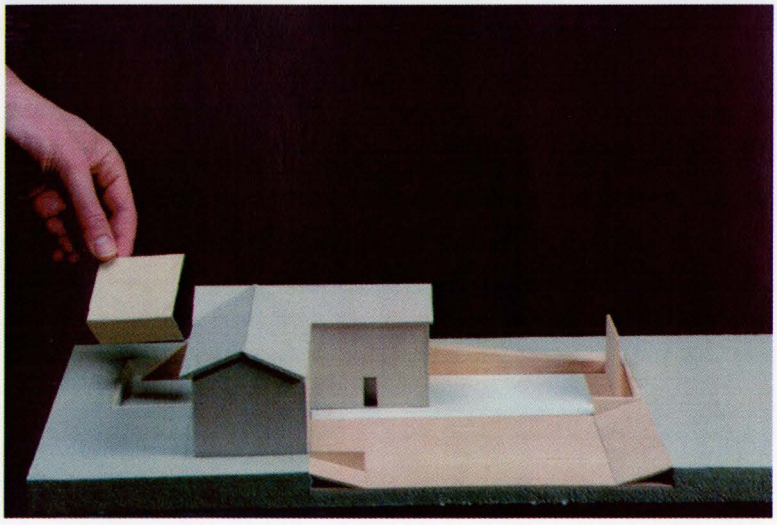
Phase 5

Renovate the existing building. The untrained labour force, under supervision of a trained labour person, will break openings through walls of the existing building and build a louvred wall in the new double height space.



I remove new structure of the model and locate interior elements of the project that will be constructed by students from the local community college.

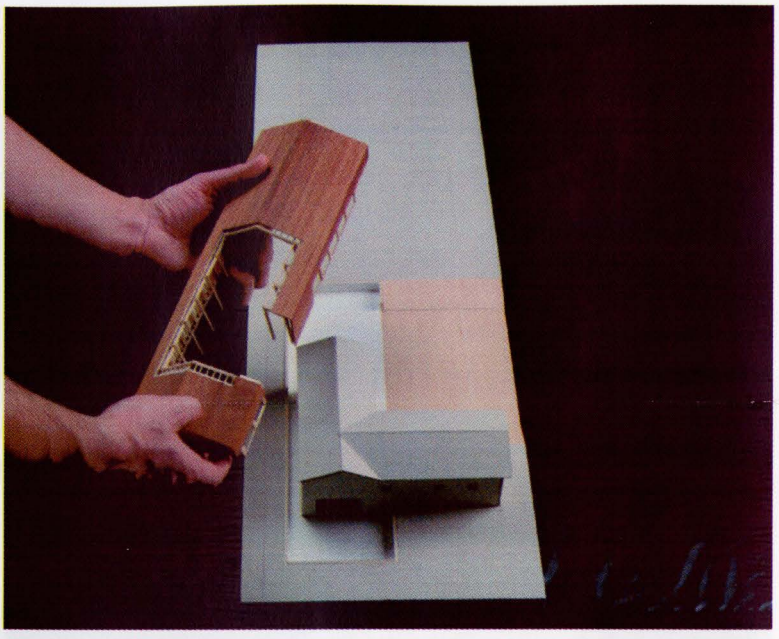


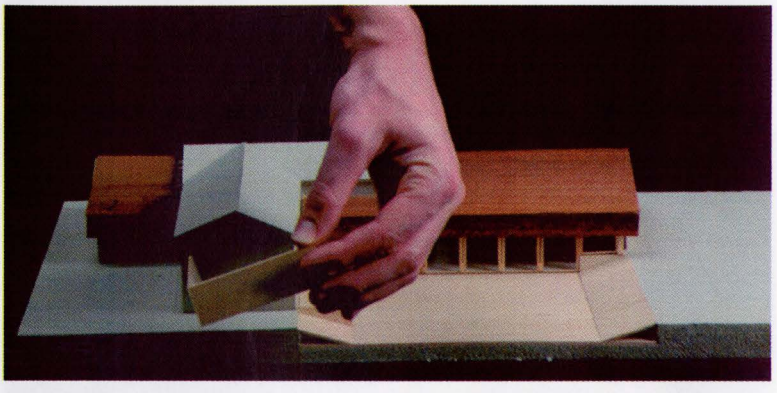


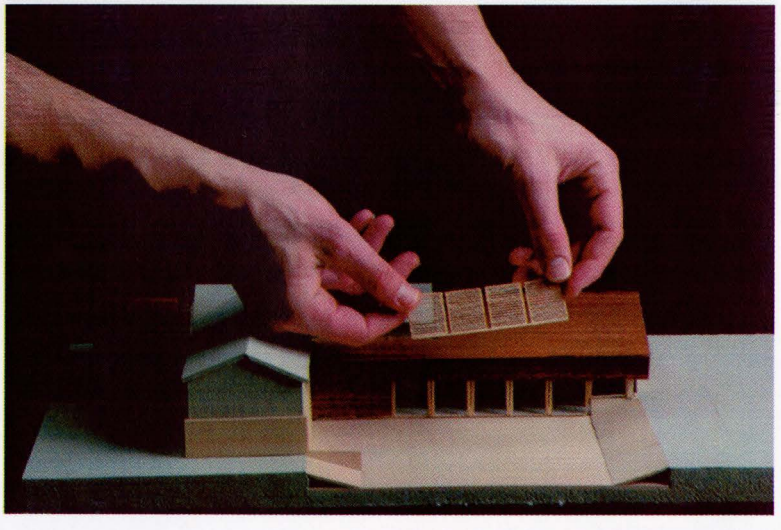
Phase 6

Students from the local community college will build the stairs, ramps, millwork and operable screens.

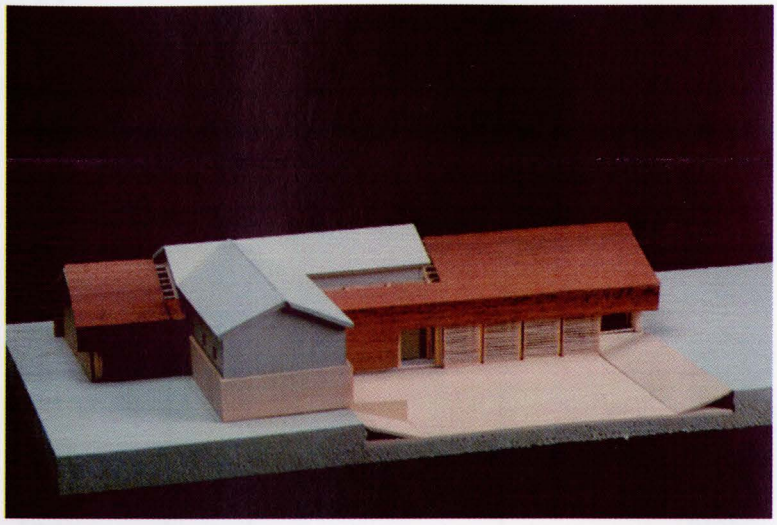
I put the new structure back onto the model and locate exterior elements of the project that will be constructed by students from the local community college.

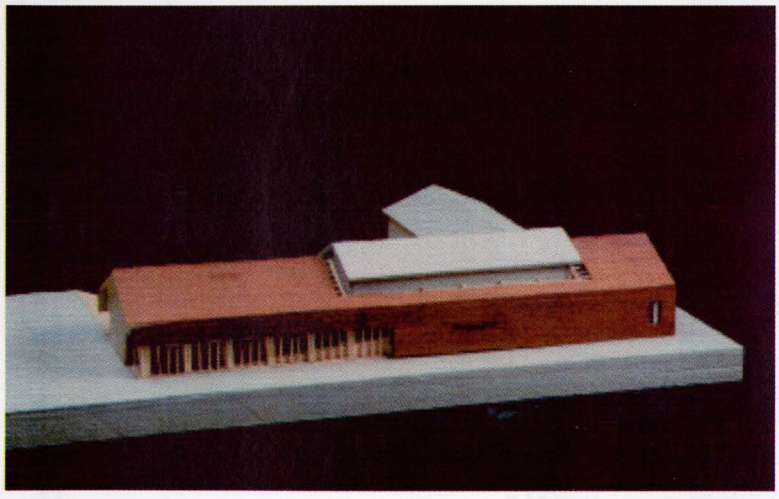






I rotate the model to show all sides of the project.





FURTHER BREAKDOWN OF CONSTRUCTION SCHEDULE

I made a construction schedule which illustrates the maximum allowable time for each phase.

Phase A
Excavation and foundation

PHASE B
Structural frame

PHASE C
Doors and windows

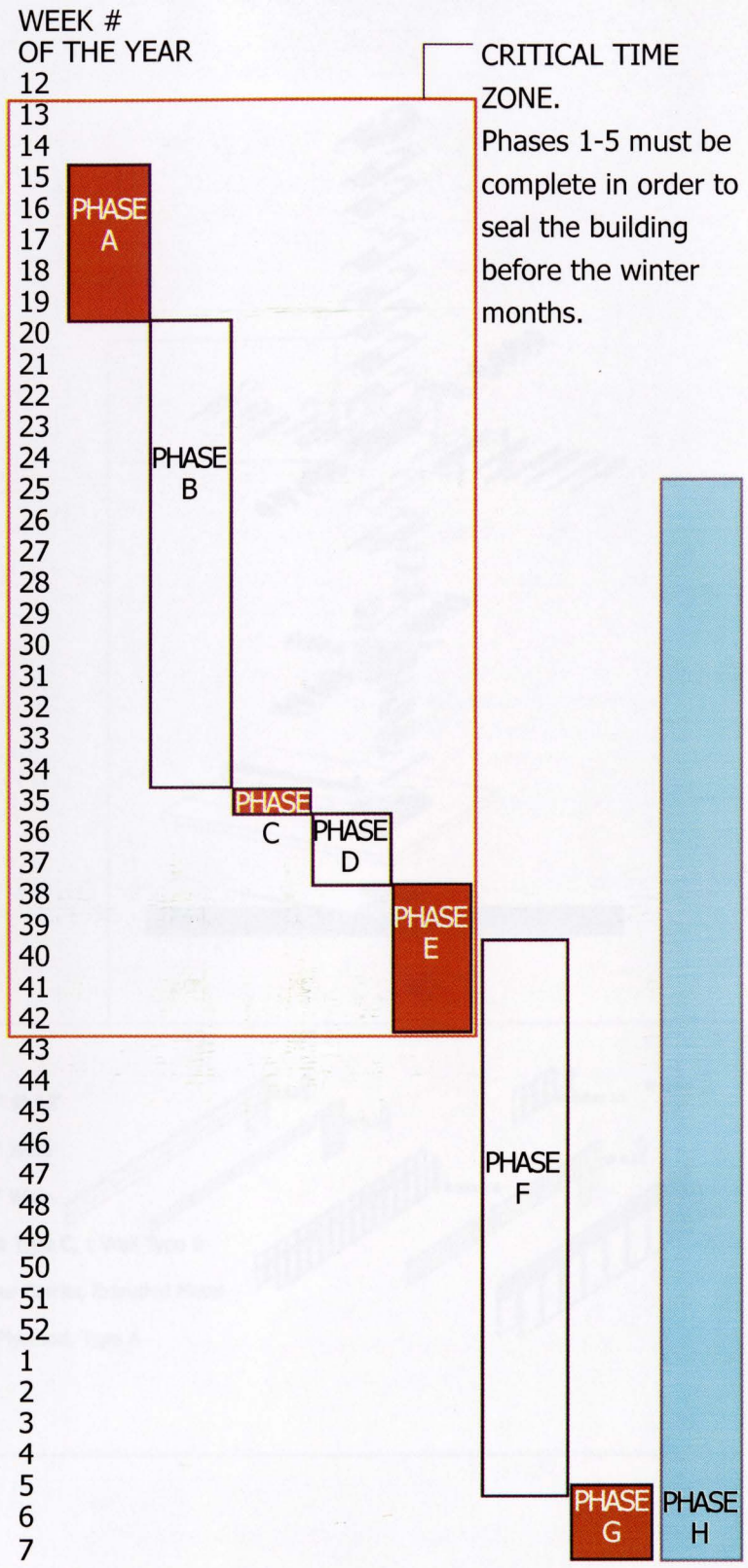
PHASE D
East and west wall

PHASE E
Apply metal roof

PHASE F
Renovation to existing structure

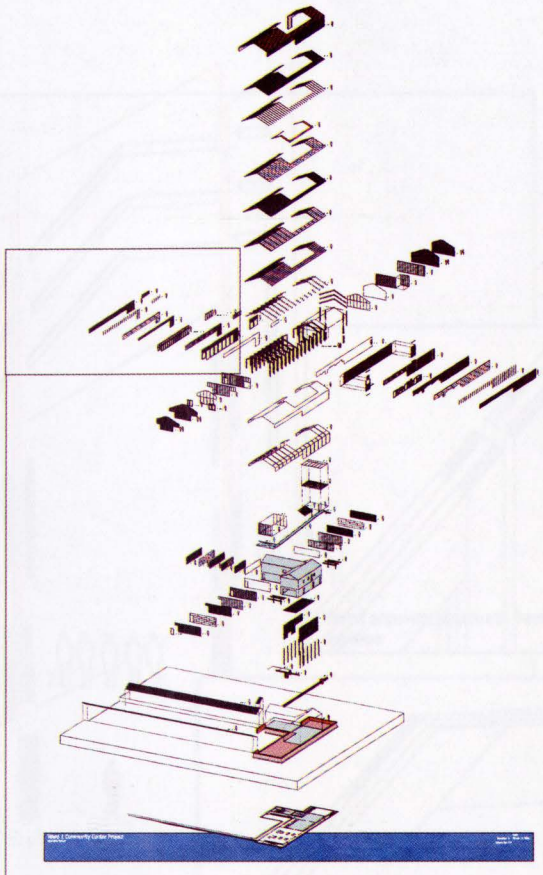
PHASE G
Mechanical electrical plumbing

PHASE H
Interior stair millwork metal work



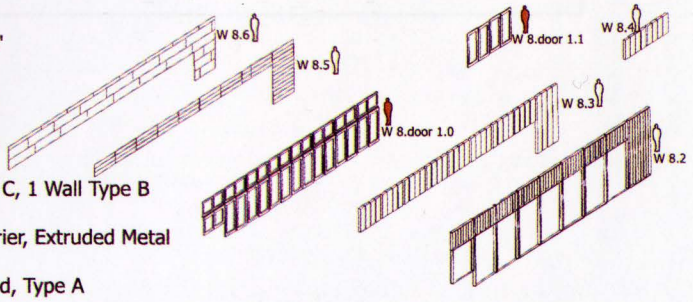
BUILDING SPECIFICATION FOR UNTRAINED LABOUR

I made an exploded axonometric drawing to function as a specification.



With this drawing it is easy to locate the particular type of wall construction required and what will be completed by untrained or trained people.

W 8.6	Membrane
W 8.5	Wood Sheathing, 2" x 8" @ 12'
W 8.4	6" Batt Insulation @ 16" Wide
W 8.3	6" Batt Insulation @ 16" Wide.
W 8.2	7 x Wall Type A, 3 x Wall Type C, 1 Wall Type B
W 8.1	2mm Polyethylene Vapour Barrier, Extruded Metal
W 8.0	1/2" Birch Veneer Core Plywood, Type A
W 8.door1.0	Contractor
W 8.door1.1	Contractor



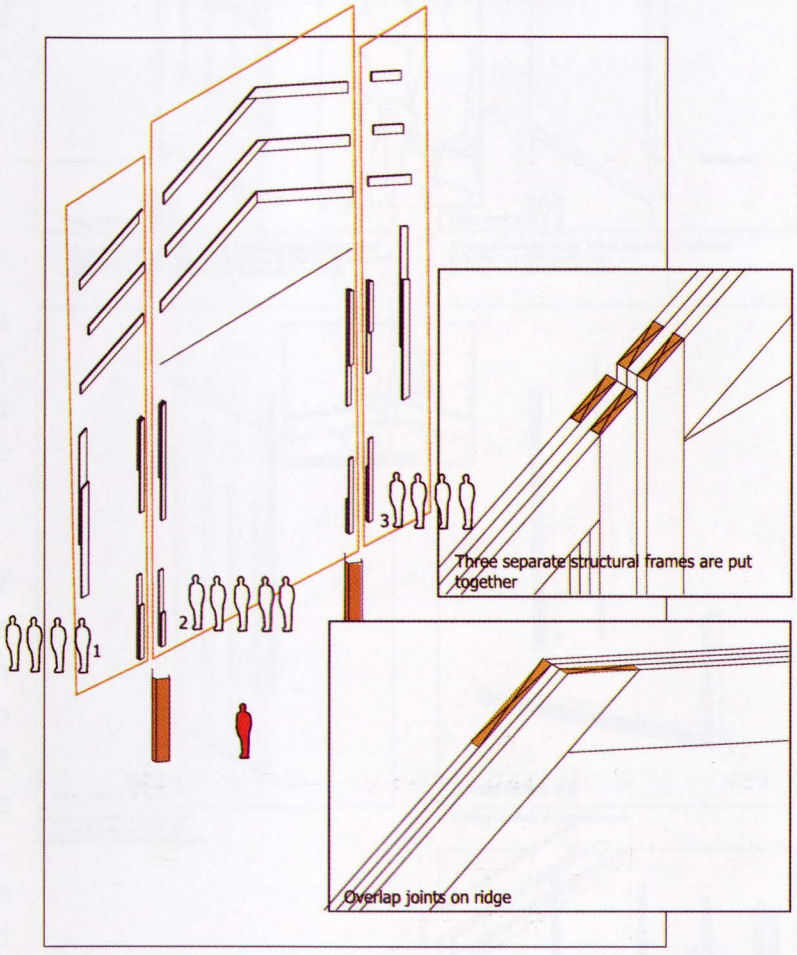
UNTRAINED LABOUR CONSTRUCTION

Located in the D.I.Y. untrained labour drawings are illustrations of how to the construct the main structural frame.

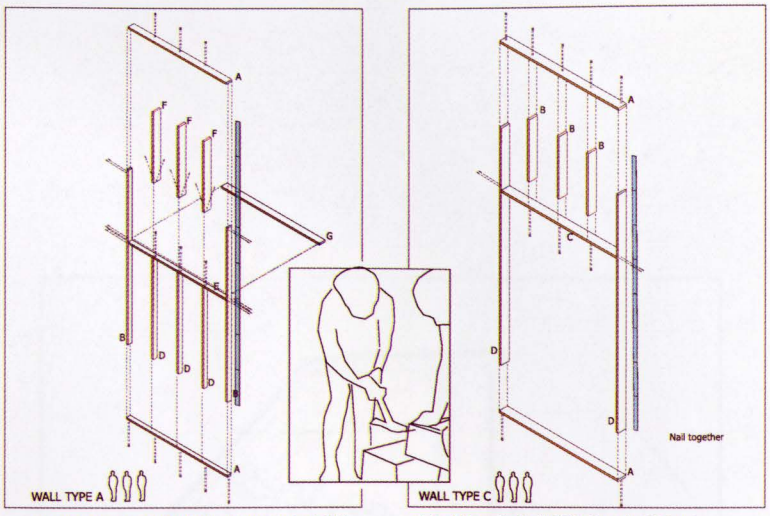
The building is essentially an extrusion of one structural frame. There are some differences in this structure, particularly where the new building meets the existing, but for the most part, the illustration of constructing one bay structure will be repeated for the whole building.

The size of the largest bay was determined such that lumber longer than the standard 16'-0" length is required. The whole frame is built-up of 3 separate jigs. The jigs will be built by a trained labour person and the frames are assembled by untrained community members.

The images of people on the following drawings designate how many people could work on the the particular phase at one time.

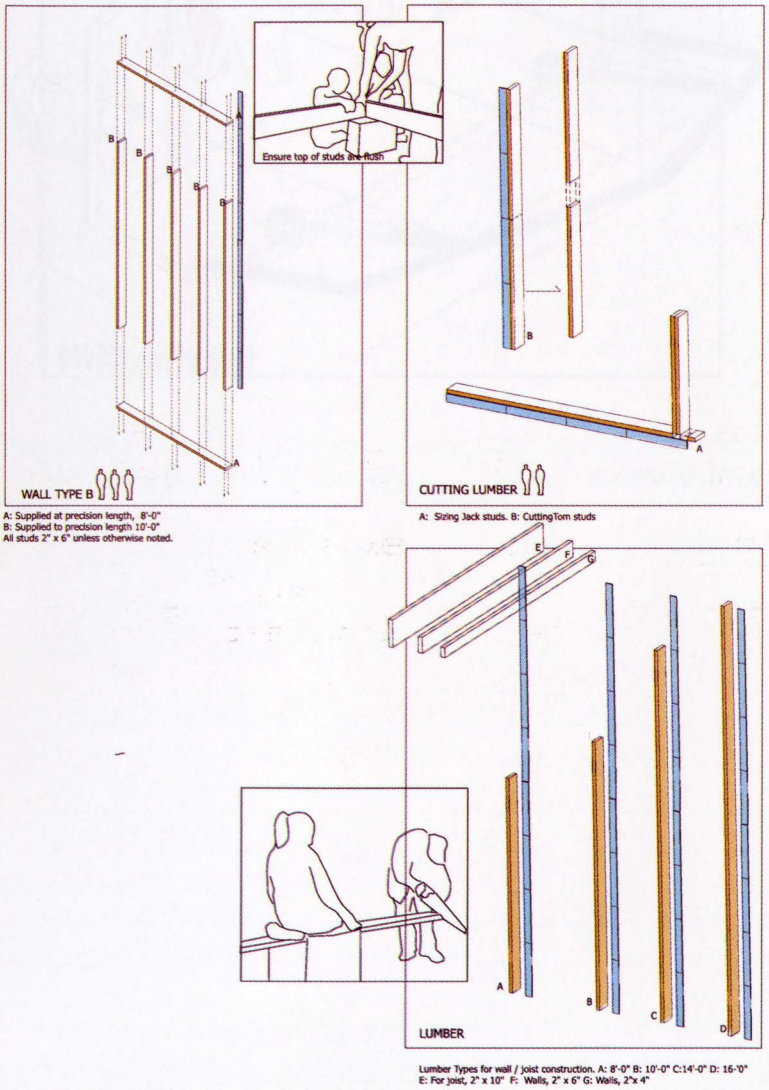


I made D.I.Y. illustrations of wall types.



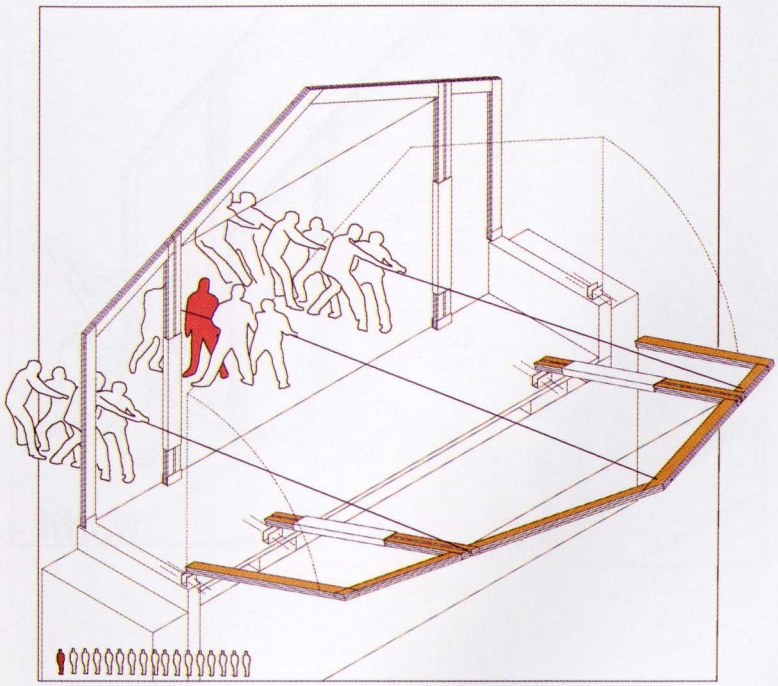
Since the building has a repetitive structural bay, walls that are located inside the structural frame will also be repetitive.

The top plate and width of all structural bays are made with precision stud length 8'0" lumber. This limits the amount of material that has to be manicured before it is assembled into a wall. The wall type needed for a particular bay is described in the specification drawing, illustrated on Pg. 47.

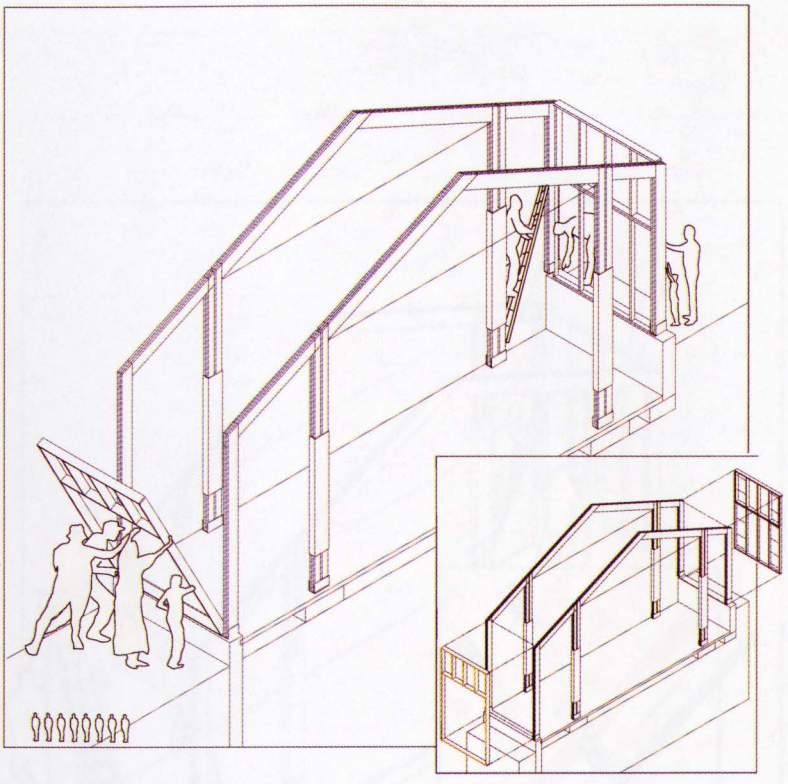


UNTRAINED LABOUR: CONSTRUCTING ONE STRUCTURAL BAY

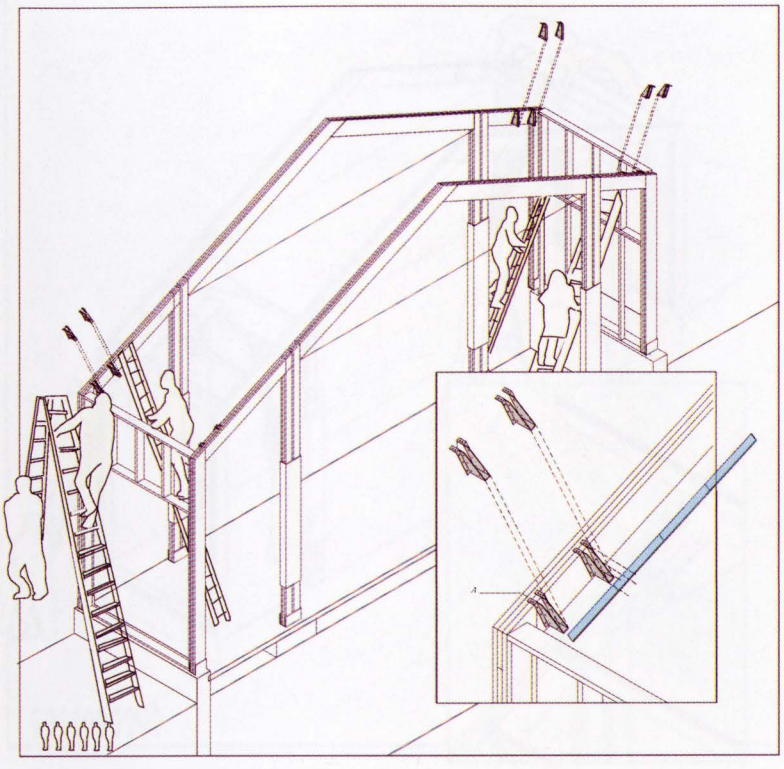
I made D.I.Y. illustrations of building a structural bay.



Step 1
Community members raise the structural frame into the already located metal shoes.



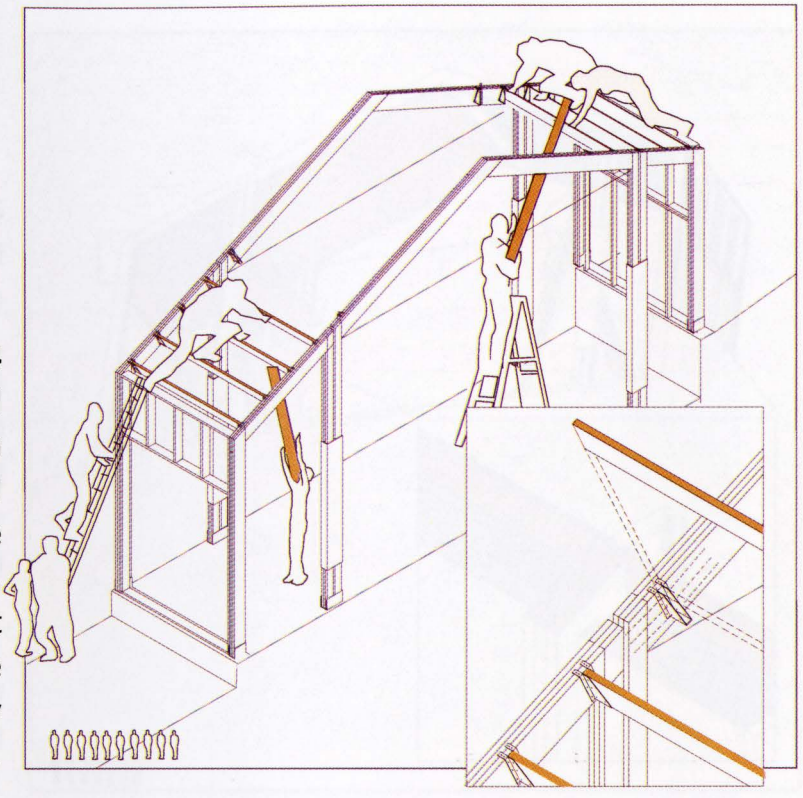
Step 2
Community members put the allocated wall type (listed in the specification drawing) inside the structural frame.



Step 3
Community members locate metal saddle, 2'-0" apart and nail into place.

Step 4

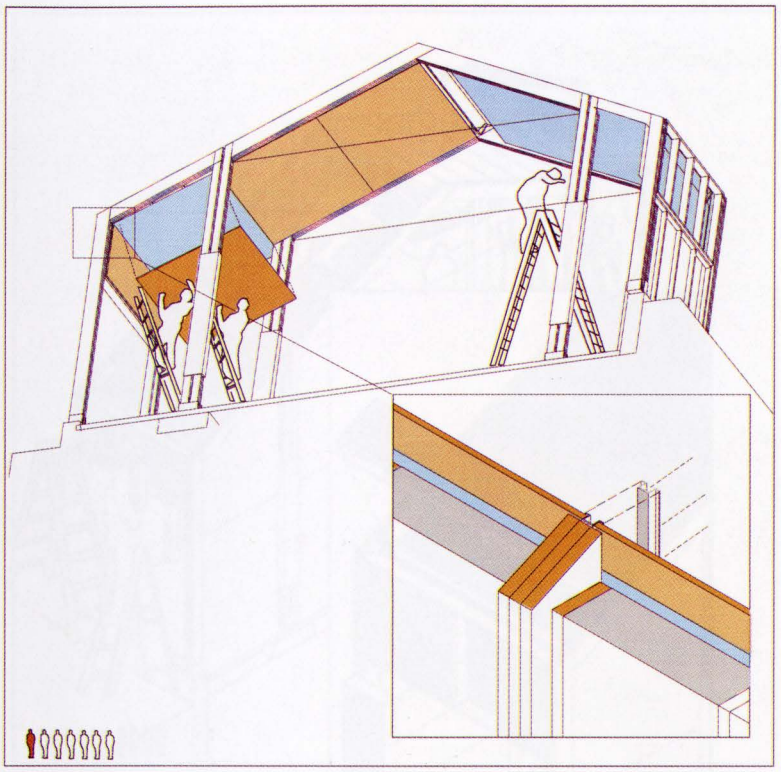
Community members will nail joists into place. Each joist that's put in place will become the ladder to locate the next joist above. The joists are precision cut 2x10's, that will not require any manicuring before they are nailed down.



Step 5

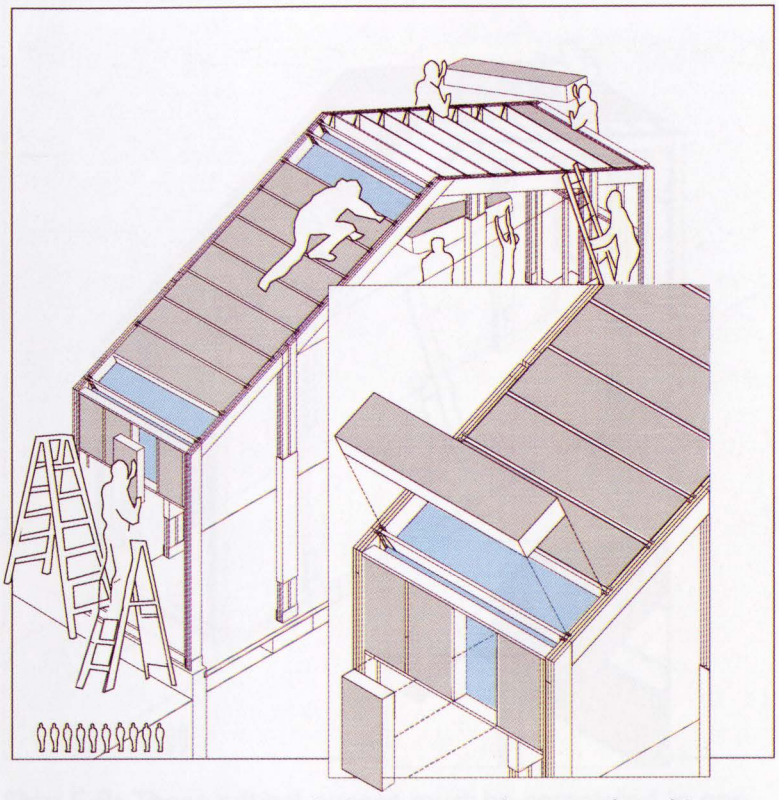
Both trained and untrained labour forces will begin to seal roof. Community members will put up vapour barrier, and trained and untrained labour will size (4' x 4' x 1/2") plywood and lift into place.

Image on far right: Metal cap over exposed plywood edge and vapour barrier.

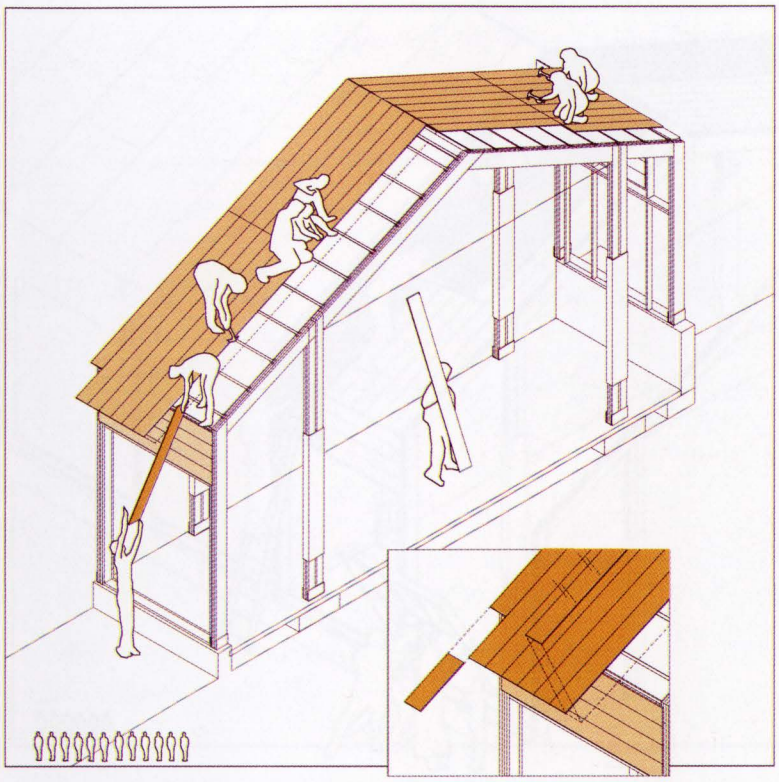


Step 5-8: These critical phases must be completed in one day.

Step 6
Community members place batt insulation between joists.



Step 5-8: These critical phases must be completed in one day.



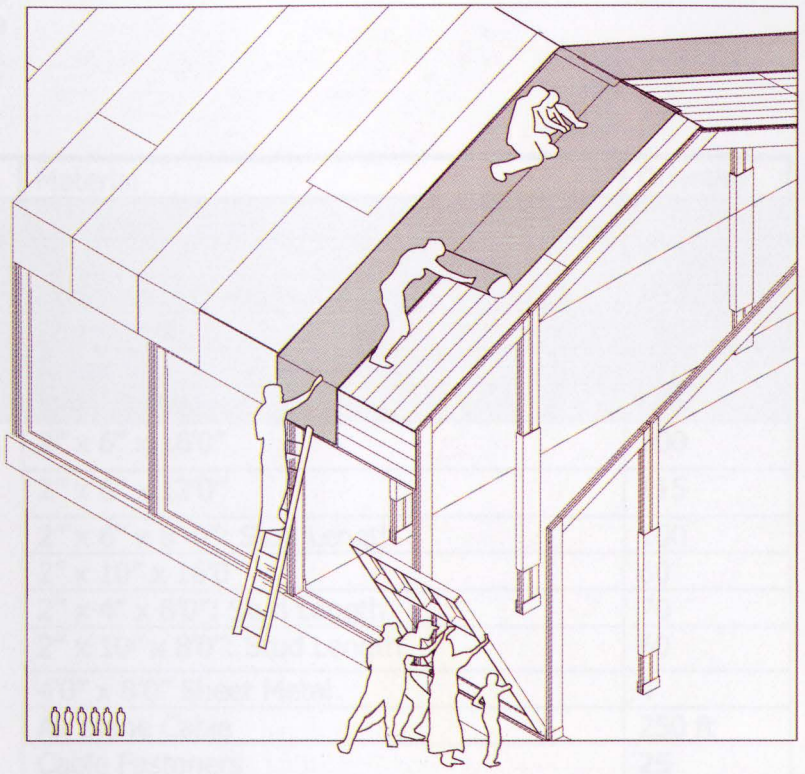
Step 7
Community members nail down 1″x8″ decking. Cut planks that extend beyond wall.

Step 5-8: These critical phases must be completed in one day.

Step 8

Community members roll down waterproof membrane. Ensure overlap of all seams.

Assembly of the facility happens in a linear fashion. While one bay has the interior plywood applied, the adjacent bays can remain unfinished.



Step 5-8: These critical phases must be completed in one day.

BUILDING SPECIFICATIONS

I made a list of materials required. The dark areas note the materials assembled by a trained labour group.

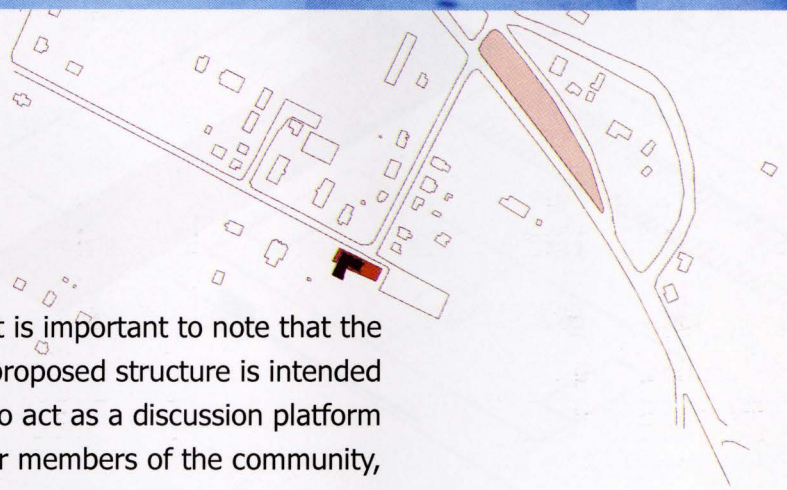
Construction Phase	Material	Quantity
PHASE1		
EXCAVATION		1 Backhoe
FOUNDATION	Concrete and aggregate	1732 ft^2
WALLS	Form work	
	Rebar	
	Metal Saddles	64
PHASE 2	2" x 6" x 16'0"	200
BUILD PRIMARY	2" x 6" x 12'0"	115
STRUCTURE	2" x 6" x 8'-0": Stud Length	100
	2" x 10" x 16'0"	60
	2" x 4" x 8'0": Stud Length	70
	2" x 10" x 8'0": Stud Length	60
	4'0" x 8'0" Sheet Metal	4
	Air plane Cable	250 ft
	Cable Fasteners	25
	Metal Joist Shoes	174
	10" Batt Insulation @ 16" wide	424 ft
	6" Batt Insulation @ 2' wide	1230 ft
	2mm Polyethylene Vapour Barrier	4745 ft^2
	4'0" x 8'0" x 1/2" Interior Birch Veneer Core Plywood	150
	Extruded Metal Channel	600 ft
	1" x 8" x 16'0": T&G Spruce Decking	474
	Exterior Membrane: Blue Skin or Equiv.	4745 ft^2
	Nails 2"	?lbs
	Nails 6" Galvanized	?lbs
	Nails 3 1/2" Galvanized	?lbs
	Deck Screws 3 1/2"	
TOOLS	Handsaws	
	Claw Hammers	
UNTRAINED LABOUR	Build 1 Wall Type	3 people
(WITH 1 TRAINED	Build 1 Structural Bay	10 people
PERSON)	Build 1 Structural Frame	13 people

Construction Phase	Material	Quantity
PHASE 3 DOORS AND WINDOWS	Factory Defect Casement Windows	415 ft^2
	7'0" x 8" Frame with Light and 7'0" x 4'0" Sliding Door	2
	7'0" x 8" Frame with Light and 7'0" x 4'0" Pivot Door	1
	8'0" x 10'0" Frame, with light and 4'0" Sliding Glass Door	7
	4'0" x 7'0" Exterior, Solid Core Wood Door	1
	Fixed Skylights	250 ft^2
	Metal Flashing	
PHASE 4 EXTERIOR CLADDING ON EAST AND WEST WALLS	1" x 3" x 16'-0": Strapping	40
	5/8" x 8" x 12'0": Cedar Cladding	80
	1" x 8" x 16'0": T&G Spruce Decking	80
	Nails 2" Galvanized	
	Linseed Oil	600 ft^2
	Paint Brushes	
	Rags	
UNTRAINED LABOUR (WITH 1 TRAINED PERSON)	Apply Decking	15 people
	Apply Strapping	15 people
	Apply Cladding	5 people
PHASE 5 METAL ROOF	1" x 3" x 16'-0": Strapping	300
	Steel Roof	4745 ft^2
	1 1/2" Nails	
OPERABLE SCREENS	3" x 3" x 1/4": Extruded Aluminium Angle	394 ft^2
	1" x 1" x 8"0": Stud Length Cedar Strapping	540
	2" x 2": Hinge	36
	Linseed Oil	17280 ft^2
	1 1/2" Deck Screws	
UNTRAINED LABOUR	Install Screens	3 people
	Apply Linseed Oil	6 people

Construction Phase	Material	Quantity
PHASE 6 RENOVATION TO EXTERIOR EXISTING WALL	Tar Coating	774 ft^2
	2" x 4" x 12'0": Stud Length	80
	4" x 2'0": Rigid Insulation	480 ft
	1" x 8" x 16'0": T&G Spruce Decking	180
	Building Paper: Tyvec or Equiv.	774 ft^2
	1" x 3" x 10'0": Strapping	17
	5/8" x 8" x 12'0": Cedar Cladding	100
	Flashing	100 ft
	Make Opening in Concrete Wall	
	Metal Beam / Columns	
RENOVATION INTERIOR CLADDING	2" x 6" x 16'-0": Stud Length	72
	4'0" x 8'0": Sheet Metal	2
	1" x 3" x 16'0": cedar Strapping	950
	Nails 6"	
	Nails 2"	
INTERIOR WALLS AND FLOOR	2" x 4" x 12'0": Stud Length	15
	2" x 10" x 8'0": Stud Length	4
	4'0" x 12'0" x 1/2": Interior Birch Veneer Core Plywood	12
UNTRAINED LABOUR (WITH 1 TRAINED PERSON)	Build Stud Walls	14 people
	Apply Insulation, Cladding, Flashing	7 people
	Apply Flashing	2 people
	Apply Cedar Cladding	5 people
	Build Columns	6 people
	Build Interior Walls	4 people
	Build Floor Above Daycare	5 people
PHASE 7 RENOVATION INTERIOR STAIR AND RAMP	Expanded Sheet Metal	574 ft^2
	10" C-Channel	400 ft
	1"x1" Metal Angle	500 ft
	1"dia Metal Pipe x 28" Long, Painted Black	400 ft
	Black Paint	250 ft^2
TABLES	4' x 8' x 1": Birch Veneer Core Plywood	22
	1" dia. Pipe, Painted Black	88
	2" x 4" x 8': Spruce Lumber, Stud Length	66
UNTRAINED LABOUR	Assemble 1 Table	2 people
COMPUTER CABINETS	4' x 12' x 1" Birch Veneer Core Plywood	8
	Folding Metal Legs	16
KITCHEN CABINETS	4' x 12' x 3/4": Birch Veneer Core Plywood	19
	4' x 12' x 1": Birch Veneer Core Plywood	4
	Hardware	
PHASE 8 MISC.	Forced Air Unit	2
	Hot Water Heated	1
	Toilet	6
	Sinks	6
	Urinal	2
	Mirror 4' x 4'	3

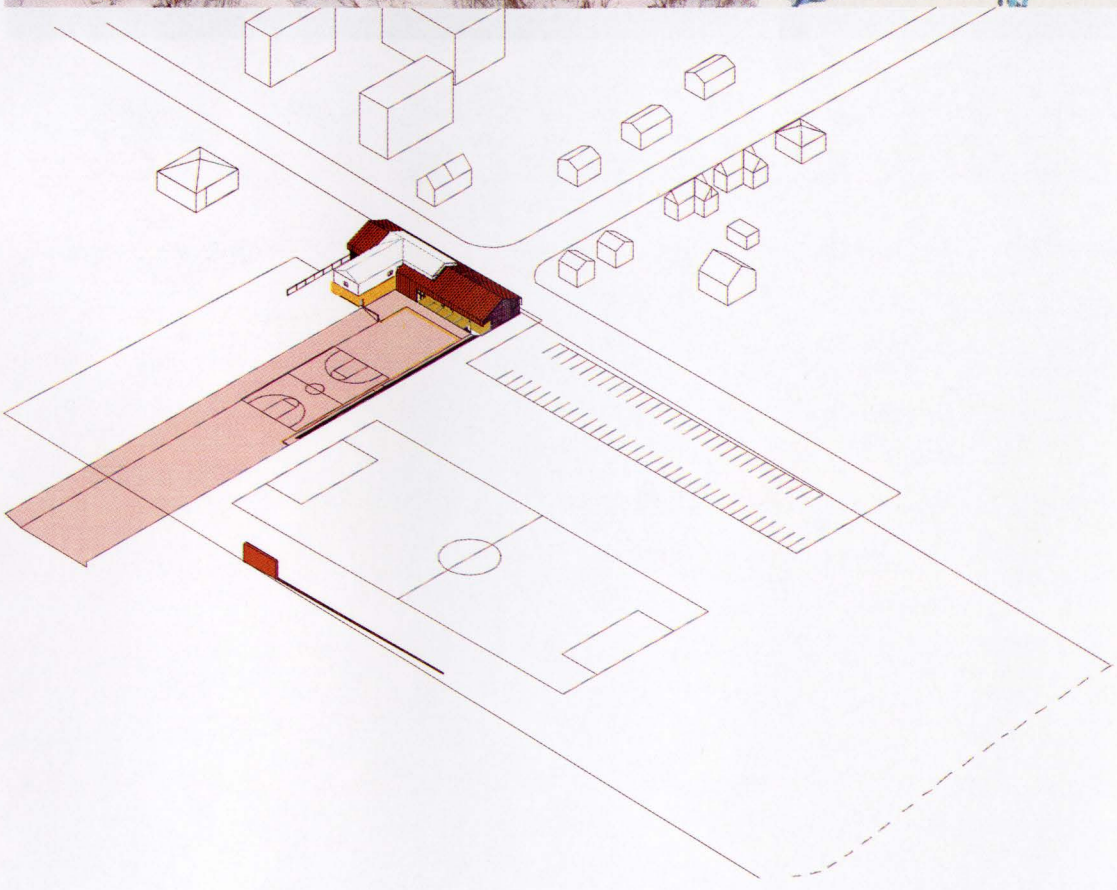
PRESENTATION IMAGES

I made images of the proposed structure to present to members of the community center.



It is important to note that the proposed structure is intended to act as a discussion platform for members of the community, as more people will now start to offer suggestions to changes in the spaces and program.

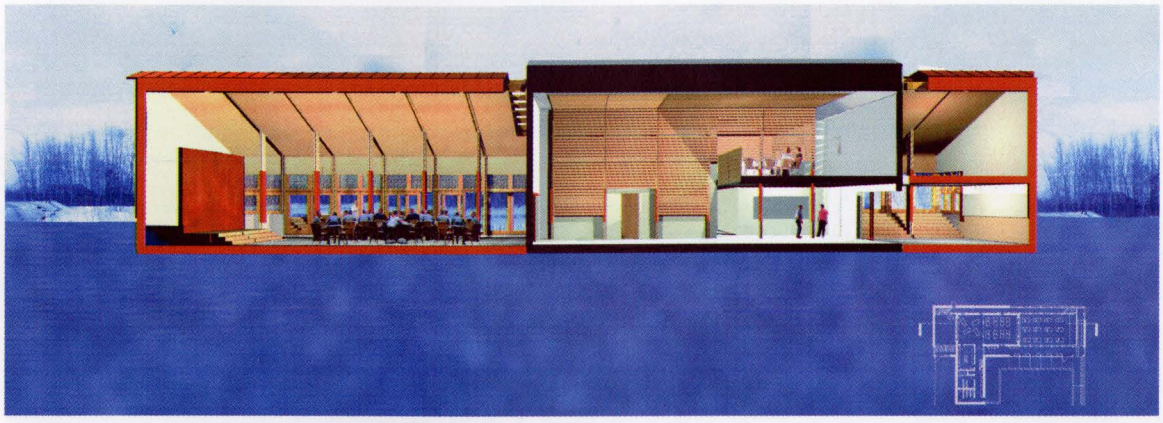
The image above illustrates how the multi-purpose hall will create an active human scale off the street, when the space is being used. The interior activity becomes public.



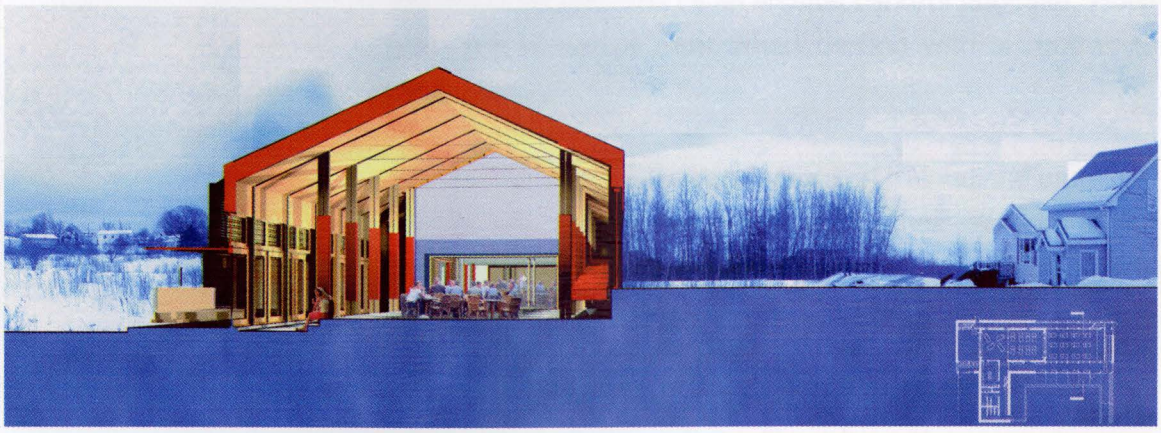
South side of proposal,
looking onto courtyard.

North elevation

View into grand hall from courtyard



North / south section through grand hall



East / west section through grand hall

LIABILITY ISSUES

Traditionally, a general contractor / project manager would supervise the construction of a building. They coordinate the schedules of different trades people to ensure that the quality of construction meets the requirements specified in the drawings provided by an architect and/or engineer. However, this is not as clear when dealing with an untrained labour force.

Iit is my assumption that each group of trained and untrained people will assume responsibility for their own work. For example, the trained group installing the windows/skylights will ensure that the glazing is installed correctly, and any malfunction will be fixed and/or replaced by the trained group that installed it. The community members involved in the construction of the project will not have the same responsibilities.

During the community construction event, a trained supervisor representing the community will be present. This person will oversee details and ensure that construction assemblies are built correctly.

The architect is then responsible for the scheduling / organizing of trades people. The architect becomes the project manager.

SUMMARY

It is often the case in professional practice that architects must use local resources and skill sets to construct a building. This thesis, in comparison to traditional practice, embraces a whole community as a labour force, not only hired individuals. As a result, members of a community are brought together in the construction event, "A Modern Barn Raising."

So, in answer to the question, "how can trained and untrained labour forces work together on the construction of a building?", it is simply -- be a responsible architect.

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